รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
1	3D Human Motion Generation	This project aims to develop algorithms that generate realistic, human-like motion sequences in 3D, allowing characters and avatars to move naturally and adaptively in virtual spaces. The objective is to create a model that can produce diverse motions (walking, running, dancing, etc.) with high realism and flexibility, enabling its use in industries like gaming, film, VR/AR, and robotics.	1. Develop Expertise in 3D Motion Generation: Gain hands-on experience with techniques for synthesizing realistic human motions in 3D, including walking, running, and dancing. 2. Build Skills in Machine Learning and Generative Modeling: Learn to design and train models for creating adaptive and lifelike character animations. 3. Prepare for Careers in High-Demand Fields: Acquire skills relevant to industries like gaming, film, VR/AR, and robotics, positioning themselves well for future roles in these sectors. This project will provide students with a comprehensive skill set in 3D animation, machine learning, and adaptive motion, making them highly attractive candidates for roles in tech and entertainment.	1. Data Preparation: Collect and preprocess 3D motion capture data for model training. 2. Algorithm Development: Design and implement models for generating adaptive, human-like motions in 3D. 3. Model Training and Evaluation: Train models on motion data and evaluate realism and adaptability of generated sequences. 4. Optimization: Fine-tune models for improved motion quality and responsiveness to virtual environments.	1. Programming Skills: Proficiency in Python; familiarity with libraries such as PyTorch or TensorFlow for deep learning. 2. Foundational Knowledge: Understanding of machine learning concepts, especially in computer vision and generative model. 3. Experience with 3D Data (Preferred): Familiarity with 3D motion data formats (e.g., meshes). 4. Problem-Solving Skills: Ability to work through complex problems systematically.	Unspecified	IHPC	Li Chen	1 Fusionopolis Way, #16-67 Connexis, Singapore 138632	Computing and Information Sciences,Computer Science	1
2	3D Physical Realistic Adversarial Attack and Early Prevention for Visual Surveillance Tasks	Adversarial attacks pose significant threats to the reliability of machine learning models in visual surveillance systems. While digital adversarial attacks have been widely studied, physically realistic adversarial attacks—those that manipulate real-world objects to deceive machine learning models—are particularly dangerous as they can be easily integrated in the real-world. In visual surveillance systems, such attacks can lead to severe consequences, such as misidentification in face recognition, object misclassification in detection, or failure in multi-camera tracking. These vulnerabilities underscore the need for robust models that can withstand physical adversarial manipulations, ensuring the reliability of systems used for public safety, autonomous vehicles, and security infrastructure. In this project, we aim to address adversarial risks from two complementary perspectives. Horizontally, we investigate the nature of adversarial attacks and propose early prevention methods, focusing on physically realistic adversarial attacks, detection techniques, and explainable risk analysis. Vertically, we examine adversarial risks specific to visual surveillance tasks, particularly in visual tracking, face recognition, and object detection. By addressing the intersection of adversarial attack design and its impact on surveillance tasks, our study aims to enhance the robustness and security of modern visual	Acuiqre experience in physical realistic adversarial attacks and defense methods. Publish at top-tier AI conferences.	Develop algorithm and deep learning code to evaluate on public dataset. Benchmark against state-of-the-art methods. Write up an academic paper for submission to top AI conferences. Strong self-motivation in AI research and strong desire to publish at top-tier AI conferences are necessary.	Familiar with Python and PyTorch. Knowledge in machine learning and deep learning	2	I2R	Xu Xun	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science	1
3	3D Printing Materials and Structurals for Future Energy applications	Materials development using 3D Printing for Future Energy	3D Printing technologies, future energy materials	Literature Survey, Experiemnt, Report Writing	Material Science and Chemical Engineering Background	Unspecified	IMRE	Wang Pei	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Materials Engineering	1
4	3D Printing of Ceramic Composite Materials for Extreme Environment Applications	The project aims to revolutionize the manufacturing of ceramic composites for use in extreme conditions, such as high-temperature environments, corrosive atmospheres, aerospace, and radiation-related applications. This project combines cutting-edge 3D printing technology with advanced ceramic composite materials to fabricate highly customized functional components, including durability, heat-resistant, and radiation-shielding components for industries where traditional manufacturing methods have proven inadequate.	(1) Understand 3D Printing Process (2) Understand Post-Processing Heat Treatment Processes (3) Understand Microstructural and Elemental Analysis of Ceramic Materials (4) Experimental Planning and Design Skills (5) Hands-On Experience with Additive Manufacturing Technologies (6) Hands-On Experience with Research & Development Work Environment	Project (1) Assist and Involved in 3D Printing Process and Post-Processing (2) Carry Out Experimental Validation (3) Carry Out Feedstock & Sample Preparation (4) Carry Out Material Characterization and Analysis Personal (1) Display Good Team Work (2) Critical Thinking for Problem Solving (3) Willingness to Learn	Basic Engineering and Material Science Knowledge	2	SIMTech	Liew Yan Han	Singapore Institute of Manufacturing Technology (SIMTech) @ CT2B 5 Cleantech Loop #01-01 CleanTech Two Block B Singapore 636732	Engineering and Technology,Materials Engineering	2
5	3D printing of wide FOV, high gain optical system	The ability to collect light from all any directions with high gain is important for many applications including optical wireless communications and solar energy harvesting. This project involves fabrication of lenses using our developed 3D printing. This technology allows fast rapid prototyping of optical elements. The aim is to optimize the surface smoothness and achieve high quality prints	- Gain knowledge in 3D printing, optics and optical wireless communications -Hands-on experience in 3D printing, ion beam deposition and optical characterization techniques -Work closely with a team of researchers who will provide guidance to student	The student will help to fabricate the samples using 3D printing and ion beam deposition method The student will also help in simulation of Bragg films.	- Experience in Python - Interest in lab work, 3D printing	Unspecified	IMRE	Teo Ee Jin	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Materials Engineering,Physics	1
6	4D Printing of Smart Materials and Structures	Materials development for 4D Printing	4D Printing technologies, material information	Literature Survey, Experiemnt, Report Writing	Mechanical and Materials Science Background	Unspecified	IMRE	Wang Pei	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Materials Engineering	1
7	A Generative AI-Based Framework for Interpreting Deep Learning Predictions in Histological Image Analysis.	The project aims to enhance the interpretability of deep learning models used in histological image analysis. Despite the impressive performance of these models in medical imaging, their "black-box" nature poses significant challenges, particularly in ensuring reliability and gaining trust from medical professionals. This research seeks to demystify these complex models using Generative AI techniques, offering a transparent window into their decision-making processes. The project will focus on developing a novel framework that integrates Generative AI with deep learning models, specifically tailored for histological images. This framework will be designed to generate intuitive, visual explanations for the predictions made by deep learning models. These visual explanations are expected to correlate strongly with the factors that human experts consider during diagnosis, thereby bridging the gap between AI-driven and traditional histopathological analysis. A significant portion of the research will involve validating the effectiveness of this approach. This will be achieved through collaborative efforts with pathologists, where the interpretability of AI predictions will be assessed in terms of and practical utility in clinical settings. The goal is to foster a deeper understanding and trust in AI-assisted medical diagnostics or drug screening, paving the way for more widespread adoption in	•□Knowledge of cancer immunology •□Knowledge of biomedical image processing •□Knowledge of advanced spatial omics technology •□Hands-on experience with real-world biomedical (image) data •□Deep learning modelling skill •□Interdisciplinary research experience	•□Organizing their time well •□Updating work progress on weekly basis •□Reading papers to learn about DL optimization strategies •□Resourcing for software packages when necessary •□Maintaining a positive learning attitude	•□Programming skill, deep learning/ image processing skill will be a plus •□Problem solving skill •□Fundamental knowledge of biology/ immunology	Unspecified	BII	Mai Chan LAU	8A Biomedical Grove, Immunos, Level 4, Singapore 138665	Computing and Information Sciences,Biomedical Sciences,Computer Science,Biomedical Engineering,Mathematics	3
8	A Resource-Efficient Multimodal Deep Learning Approach on Medical Images Diagnostics	Automation of accurate disease classification/detection for clinical imaging saves immense time and manpower resources and to that end, deep learning approaches have achieved state-of-the-art performance on various MRI and CT scans. However, these approaches still require large image datasets that must be accurately and laboriously labelled. Inspired by recent advances in resource-efficient multimodal approaches, the goal of this project is to develop a novel and data-efficient deep learning method for disease classification/detection on clinical imaging with reduced annotation burden. Such capability could be further applied for	The internship will help the student to learn image pre-processing and gain hands-on experience in the implementation and improvement of the algorithms. The student will get familiar with deep learning applications on the medical images with potential Conference or Journal paper publication.	This project involves developing and implementing a deep learning-based diagnosis system on the medical images and the intern's position is to: Task 1 -- Perform a literature review on the relevant studies. Task 2 -- Extend previous methods to further improve and develop a novel deep learning-based approach. Regular meetings will be arranged. The student will deliver the documentation and source code on the method investigated at the end of the attachment. The presentation will be arranged to	1. Prior knowledge in Machine Learning, Deep Learning, Computer Vision, etc. 2. Sufficient experience in programming in python 3. Familiarity with PyTorch libraries 4. Good verbal and written communication and troubleshooting skills	2	I2R	Yu Yang	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science	1
9	A trimodal AI framework for target discovery	Spatial omic technologies enable high-throughput spatially-resolved measurements of gene and/or protein expression in complex tissues. However, analytical pipelines remain underdeveloped, impeding biological insight and clinical translation. In this project, we will develop methods and algorithms for integration of whole-slide imaging and clinical data with spatial omics data for biomarker discovery.	Student will develop proficiency in AI models for clinical imaging analysis, such as vision transformers and graph neural networks. Student will also develop proficiency in processing and analyzing spatial omics data, including quality control, data preprocessing and visualization.	Student will collaborate with senior scientists to design, develop and train models for integration of spatial omics data with imaging and clinical data. Student will also assist in data preparation and preprocessing. Student will document experiments and findings, and prepare reports and presentations. Student will actively participate in team discussions and attend lab meeting	Strong programming skills in Python and/or R. Familiarity with machine learning libraries (eg. scikit-learn, PyTorch, DGL) and/or scRNA-seq/spatial omic analysis pipelines, is a plus.	Unspecified	GIS	Grace Yeo	Genome Institute of Singapore, 60 Biopolis Street, Singapore 138672	Computing and Information Sciences,Biomedical Sciences,Computer Science	2
10	A two-dimensional world with liquid metals and van der Waals materials: towards new applications in sustainable electronics and sensing	Semiconducting materials such as silicon form the bedrock of modern electronics that enabled the Information Age today. The discovery of 2D semiconductors in the last decade, sparked by the Nobel prize winning 'Scotch Tape Exfoliation' of graphene in 2004, presents an alluring prospect for next-generation devices. Such atomically thin materials with extreme size to thickness aspect ratios up to 1,000,000 have attracted intense research efforts, with wide ranging applications in AI, quantum and biosensing. Recently, liquid metals present an intriguing approach to synthesize 2D oxides, a useful addition to the diverse 2D material family. We will synthesize 2D materials and create functional devices for use-inspired fundamental studies.	Students will have experience working in cleanrooms. They will be exposed to fabrication techniques and tools such as nanolithography lithography, thermal deposition systems, and 2D material stacking. They will learn and work with measurement tools like electrical probe stations and dilution refrigerators, which can cool samples to extreme temperatures colder than older space (-273 degrees celsius). Students will learn to process and analyze experimental data, and should be able to apply their class room learning on material and solid-state physics to real world experiments	Students will be responsible for synthesizing and basic characterization of material properties, and assist staff in device fabrication. Students will be responsible for their sample and data.	Curious with a drive to learn more about science. Physics, material science, electrical engineering backgrounds. Python programming knowledge is useful.	Unspecified	Q.InC	Chit Siong Aaron Lau	2 Fusionopolis Way, Innovis, #08-03	Physical Sciences,Materials Engineering,Physics	2

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11	Accelerate circular plastics development by integrating database, molecular simulation and machine learning	Plastic waste has caused severe environmental pollution. Developing circular plastics is one may to mitigate the problem. Incorporation of dynamic covalent bonds into thermoset network produce vitrimers which can be reprocessed and recycled. It is because the dynamic bonds can undergo bond breaking and forming at certain temperature which impart thermoset polymers reprocessability and recyclability. However, development is still by trial and error. This project aims to develop a toolbox by integrating databases, molecular simulation and machine learning to accelerate the development	skills of searching and summarize scientific literature basics of molecular simulations (DFT, MD or MC) and ML potential joint publication	students can learn the skills of searching and read scientific literatures, and participate in the development using molecular simulation such as DFT, molecular dynamics (MD), Monte Carlo (MC) and machine learning (ML)	knowledge of Chemistry. Interests in research.	Unspecified	IHPC	Zheng Jianwei	1 Fusionopolis Way, #16-16 Connexis North Tower, S138632	Physical Sciences,Chemistry	2
12	Acoustic beam-forming and focusing	We will design an acoustic lens set. The aim is to enable potential applications in acoustic beam 3D mapping/imaging for robotic vision. Acoustic simulations and lens design using finite element modelling software (COMSOL, MATLAB, and/or python	fresnel diffraction simulations. Finite element modelling lens design	fresnel diffraction simulations. Finite element modelling lens design		Unspecified	IHPC	Marvin Tan	1 Fusionopolis Wy, L15, South Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical and Electronic Engineering ,Physics	3
13	Adaptable membranes for expansive organic solvent separations	Conventional thin-film composite (TFC) membranes are limited by fixed combination and pore size for targeted solvent separations. Aiming to break through this status quo, adaptable membranes with flexible building blocks and stimuli-responsive selectivity that can adapt to wide-ranging organic solvent separations are proposed.	Student will be able to carry out membrane fabrication and perform characterization of compounds using various instruments such as SEM, NMR, UV-Vis spectrometer and membrane testing techniques.	Perform literature review, synthesize composite materials, perform characterization, data collection, data analysis and data reporting	The student should have chemical engineering or material science background with basic laboratory skills. Candidate with passion for science and eager to learn are preferred	Unspecified	ISCE2	Li Bofan	1 Pesek Road, Jurong Island. S(627833); Fusionopolis II, 2 Fusionopolis Way, S(138634)	Engineering and Technology,Chemical and Molecular Engineering	1
14	Adaptive rooftop solar photovoltaic charging of electric vehicles: A deep learning-facilitated multi-objective spatiotemporal optimization	In recent years, rooftop solar photovoltaic (PV) charging of electric vehicles (EVs) has been acknowledged as a promising approach to effectively facilitate the transition to renewable energy. However, both solar PV potential and EV charging demand have spatiotemporally heterogeneous distributions at an urban scale, making it difficult to maximize charging capacity and achieve dynamic load balancing over time and space. To tackle this challenge, it is imperative to (i) accurately estimate both long-term (for planning the installed capacity) and short-term (for near real-time operation) solar PV electricity generation comprehensively affected by atmospheric conditions and urban morphology, (ii) precisely predict daily (for load balancing operation) and hourly (for near real-time operation) EV charging demand at each station, and (iii) flexibly plan adaptive charging schedules to maximize the utilization of generated electricity. To achieve this, our project will (i) develop deep learning networks (federated meta-learning and reinforcement learning) and integrate them into remote sensing and GIS models for accurate estimations, and (ii) propose multi-objective spatiotemporal optimization to dynamically dispatch EV charging to various charging stations. Based on these approaches, we will investigate the flexibility and effectiveness of the proposed method. We will explore global optimization when a utility-grid connects all PV modules or local optimization when smart-grids operate independently. Additionally, we will analyze the future charging capacity by comprehensively examining the interplay between growing demands in EV charging, changes in rooftop PV potential accompanying the urbanization process, and increases in PV conversion efficiency due to advancements in science and technology.	1. gain professional experinece in processing GIS and remote sensing data; 2. obtain practial knowledge in cutting-edge Geospatial Artificial Intelligence; 3. build confidence and new visions on R&D technologies; 4. Strength effective commuications and team work with colleagues at A*STAR	process data, development methods conduct experiments, and analysis results - under my dedicate supervision	Basic knowledge in computer programming (e.g., Python, Java, SQL), and Urban Informatics/ Geographical Information Science / Remote Sensing / Surveying / Urban Planning	Unspecified	IHPC	Rui Zhu	1 Fusionopolis Way, #15 Connexis, Singapore 138632.	Information Technology,Computer Science	2
15	Advanced 4D Printing of Shape Memory Alloy for Aerospace Application	We are seeking passionate and creative students to spearhead an exciting research project on developing Ni-based shape memory alloys through additive manufacturing (AM). This groundbreaking work focuses on designing advanced smart materials that combine exceptional shape memory effects with intricate geometries, driving innovation in aerospace applications.	Understanding of metal additive manufacturing (AM) technologies for shape memory alloys. Deep expertise in materials science, particularly in Ni-based shape memory alloys. Proven experience in designing, conducting, and analyzing experiments for AM of smart materials. Proficiency in data collection, statistical analysis, and the interpretation of complex datasets. Skilled in microstructure characterization techniques and the evaluation of material properties. Effective communicator and team player with a track record of successful collaboration in research settings. Strong presentation skills to effectively share research findings with technical and non-technical audiences.	Literature Review: Analyse advancements in 4D printing of Ni-based shape memory alloys to build a strong knowledge foundation. Experimental Setup: Prepare and execute laser powder bed fusion processes. Process Optimization: Refine printing techniques to achieve high-density parts. Characterization: Assess defects, microstructures, mechanical properties, and shape memory effects of printed components. Data Analysis: Interpret experimental results to uncover trends and guide further improvements. Reporting: Document findings, create presentations, and share insights with the research team and stakeholders.	Grade Point Average above 4.0 Mechanical / Materials Engineering knowledge Currently pursuing or recently completed a degree in materials science, mechanical engineering, or a related field. Strong problem-solving skills and attention to detail. A keen interest in advanced manufacturing, alloy development, and structure design. Effective teamwork and communication skills. Knowledge of additive manufacturing processes is advantageous.	2	SIMTech	Hu Zhiheng	5 Cleantech Loop, #01-01, S636732	Engineering and Technology,Aerospace Engineering	1
16	Advanced General Membrane-Level Cell Segmentation for Enhanced Immunofluorescence Analysis of Complex Cell Types	Current cell segmentation algorithms in multiplexed immunofluorescence imaging fall into two main cate-gories: generalized nuclear segmentation methods, which detect cell nuclei and segment cells without con-sidering precise cell shapes, and tissue-specific trained models, which can detect cell shapes and bounda-ries but require new models for each specific tissue type. The lack of algorithms capable of performing membrane-level cell segmentation in a generalized and reli-able manner makes it challenging to study cell types with significant concavity or flexibility in their struc-ture, such as amoeboid immune cells, neurons, and migrating cells. By developing a generalized cell segmentation algorithm that accurately segments cells based on their membrane-bound marker fluorescence, we aim to enhance the performance of immunofluorescence anal-ysis and gain a better understanding of these specific cell types.	1. Understanding of Cell Segmentation Techniques: Students will gain a comprehensive understanding of current cell segmentation algorithms used in multiplexed immunofluorescence imaging, including their strengths and limitations. 2. Algorithm Development and Implementation: Students will develop skills in designing and implementing advanced algorithms for membrane-level cell segmentation. 3. Data Analysis and Interpretation: Students will learn to analyze and interpret complex imaging data, enhancing their ability to study cell types with intricate structures. 4. Machine Learning and AI Model Training: Students will acquire knowledge in training and validating machine learning models for tissue-specific and generalized applications. 5. Research and Problem-Solving Skills: Students will enhance their research capabilities and problem-solving skills through hands-on experience with cutting-edge technology and methodologies.	1. Literature Review - Conduct a thorough review of existing cell segmentation methods in multiplexed immunofluorescence imaging. Identify the limitations and gaps in current algorithms, particularly in membrane-level segmentation. 2. Algorithm Design and Development - Collaborate in designing a generalized cell segmentation algorithm capable of accurately segmenting cells based on membrane-bound marker fluorescence. Implement the designed algorithm using appropriate programming lan-guages and tools. 3. Data Collection and Preprocessing - Collect multiplexed immunofluorescence imaging data from various sources. Preprocess the data to ensure it is suitable for algorithm training and testing. 4. Model Training and Validation - Train the developed algorithm on diverse datasets to ensure its generalizability across different tissue types. Validate the algorithm's performance using expert-annotated data, comparing its accuracy with existing segmentation methods.5. Performance Evaluation - Evaluate the algorithm's performance in segmenting complex cell types, such as amoe-boid immune cells, neurons, and migrating cells. Analyze the results to determine the algorithm's strengths and areas for improvement. 6. Documentation and Reporting - Document all stages of the project, including methodology, implementation, and results. Prepare detailed reports and presenta-tions to communicate findings to the research team and broader scientific		Unspecified	BII	YU Weimiao	Bioinformatics Institute 30 Biopolis Street #07-01 Matrix Singapore 138671	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Natural Sciences	2
17	Advanced metallic materials for mitigating hydrogen embrittlement	Low-carbon hydrogen has the potential to be a major decarbonisation pathway to support the transition towards Net Zero. In this conjunction, the hydrogen distribution and transportation infrastructure are of paramount importance for an operational hydrogen economy. Although pipeline steels are the most cost-effective and safest way for hydrogen distribution in long distance, the presence of hydrogen can degrade its mechanical properties, posing safety concerns for the extensive pipeline network. This research project aims to establish reliable experimental protocol for assessing hydrogen permeability and embrittlement in advanced structural metals and alloys (for instance additively manufactured advanced steels and high-entropy alloys), and to develop novel alloys and/or methodologies to mitigate the materials' susceptibility to hydrogen-induced damage. Especially, in-situ electrochemical mechanical testing methodology will be utilized for understanding the mechanical responses of the materials in hydrogen-rich environment close to real application environment. Based on the deformation mechanisms understood, possible mitigating strategies will be explored and applied to the advanced alloys, and their effects on the hydrogen embrittlement will be investigated.	Deep understanding on the mechanical properties of advanced structural alloys and the hydrogen effects on them, demonstrable with scientific publications and other research outcomes.	Conducte experiments, data analysis, paper preparation, etc.	Major in Materials Science or Mechanical Engineering, Fluent in English.	Unspecified	IMRE	Zhao Yakai	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Materials Engineering	2

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18	Advanced Techniques for Image Appearance Migration (IAM) for AI Digital Pathology Diagnostic Model Generalization	Develop deep learning models specifically designed for high-quality image appearance migration to enhance AI Digital Pathology Diagnostic Model Generalization. The focus will be on achieving realistic and consistent appearance and style transfer while preserving the morphological and pathological content of the original image. Focus on optimizing neural network architectures to enable real-time image appearance migration. This involves balancing model complexity and computational efficiency to achieve high performance on resource-constrained devices. Develop a comprehensive evaluation framework to assess the quality of image appearance migration. This includes creating both objective and subjective metrics that capture different aspects of image quality.	i). Novel deep learning models for IAM. Efficient neural network models capable of real-time IAM. ii). Enhanced visual quality and style consistency in migrated images. iii). A robust evaluation framework for IAM quality and standardized metrics for benchmarking IAM algorithms.	A). Literature Review: Review current deep learning approaches for style transfer and image-to-image translation. B). Model Development: Design and implement new deep learning models, possibly leveraging GANs or VAEs. Implement techniques such as model pruning, quantization, and knowledge distillation. Propose new metrics for evaluating style consistency, content preservation, and overall visual appeal. C). Performance Evaluation: Train models on diverse datasets and evaluate their performance using both qualitative and quantitative metrics. Validate the metrics through user studies and correlation with human judgments. Use the framework to benchmark existing and new IAM models.	Nil	Unspecified	BII	YU Weimiao	Bioinformatics Institute 30 Biopolis Street #07-01 Matrix Singapore 138671	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Natural Sciences	1
19	Advancing CFRP Composite Characterization: Integration of Inductive Thermography and Machine Learning for Non-Destructive Quality Assurance	This project aims to develop an innovative non-destructive testing (NDT) method using Inductive Thermography for characterizing Carbon Fiber Reinforced Polymers (CFRP). CFRPs, widely used for their excellent mechanical properties, require enhanced quality control across production and lifecycle stages. By examining induction heating patterns, which vary with interlaminar distances affected by factors like fabric type and process methods, this research seeks to replace conventional destructive testing with a non-invasive approach to assess component strength. Additionally, the project includes the development of a multi-physics electromagnetic-thermal model tailored to CFRP's anisotropic, low-conductivity properties, enabling accurate simulations under high-frequency excitation. Experimentally-derived heating patterns will train machine learning models for an automated quality assurance system, using synthetic data to supplement training and ensure model reliability. This combined approach will enhance the quality assurance and lifecycle management of CFRP components across industries.	Mastery of Inductive Thermography and Non-Destructive Testing (NDT) : Students will gain in-depth knowledge and practical skills in applying Inductive Thermography for material characterization, focusing on advanced composites like CFRP. - Proficiency in Multi-Physics Modeling and Simulation: Students will learn to develop and use electromagnetic-thermal models tailored to simulate complex materials, addressing challenges specific to anisotropic and low-conductivity properties. - Application of Machine Learning for Quality Assurance: Students will understand how to integrate Machine Learning techniques with experimental and synthetic data to create automated, reliable Quality Assurance tools for [illegible]	Students in this project will have the following roles and responsibilities: - Experimental Design and Testing: Conduct hands-on experiments with inductive thermography on CFRP samples, analyzing induction heating patterns and their relation to material integrity and quality. - Model Development and Simulation: Develop and validate multi-physics electromagnetic-thermal models for simulating CFRP behavior under induction, focusing on capturing anisotropic properties and optimizing simulation accuracy. - Data Analysis and Machine Learning Integration: Process experimental data to train machine learning models, using synthetic data generated through simulations. Develop and test automated algorithms for quality assurance, ensuring reliable performance [illegible]	1)Background in Materials Science or Mechanical Engineering: Familiarity with composite materials, particularly carbon fiber-reinforced polymers, and a fundamental understanding of material properties and behaviors. 2) Knowledge of Electromagnetic Theory and Thermal Physics: Understanding of electromagnetic induction and heat transfer principles, essential for modeling and simulating multi-physics systems in CFRP. 3) Proficiency in MATLAB, Python, or similar tools for data processing, model development, and implementing machine learning techniques for quality assurance applications	Unspecified	IMRE	Andrew Ngo	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Mechanical Engineering	1
20	Advancing optical wireless technologies for offshore applications	The team's objective is to pioneer optical wireless technologies to enable underwater communication. IHPC team is leading the design and analysis of the optical systems and measurement data, leveraging computational algorithms and AI/ML techniques. We are collaborating with industry partners, including multinational corporations and government agencies, to ensure seamless technology deployment for rapid and robust underwater optical data transmission, needed for real time monitoring and remote maintenance of offshore infrastructures, e.g. subsea cables.	• Gain experience with computational algorithms to solve design challenges in research • Gain understanding of state-of-the-art optics and material, relevant to applications in sensors, displays, ICs, space • Work in a collaborative environment with cross-domain experts, exposed to other domains' knowledge: e.g., precision manufacturing, robotics • Opportunity to publish and produce intellectual property	• Play a part as an active research team member • Develop computational algorithms to solve design challenges • Proactively engage supervisor & colleagues to explore new ideas/solutions • Actively learn new knowledge through literature reviews	> Proficiency in a programming language (e.g. Python) > Prior Experience with AI/ML is a plus	Unspecified	IHPC	Jonathan Trisno	1 Fusionopolis Way, #16-16 Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical and Electronic Engineering ,Physics	2
21	Advancing Polyelectrolyte Injectable Hydrogels for Sustained and Modulated Drug-Release	Thermogels are amphiphilic polymers with the ability to form temperature-dependent supramolecular interactions that could lead to gelation. The advantage of a system whereby gelation happens with increasing temperature includes injectability and the potential to encapsulate heat-sensitive drugs and cells. We have designed a versatile synthetic platform that allows the attachment of various chemical groups that would impart a mixture of mechanical and functional properties. By introducing cationic and anionic moieties, we seek to enhance the interactions between gels and drugs, expanding the range of possibilities for sustained and modulated release of drugs (e.g. amphoiytic biologics). Students will be involved in materials synthesis, characterization, and in vitro drug release.	Students will learn polymer synthesis and functionalization, spectroscopic characterization (e.g. NMR, FTIR), rheology, polymer self-assembly, and drug release mechanisms.	Synthesize and characterize chemical and mechanical properties of injectable hydrogels. Assist with in vitro drug release experiments. To develop the students' knowlegde, he/she student is expected to read widely, comprehend, and summarize the relevant literature.	B.Sc in Chemistry, B.Sc in Biology, B.Eng in Materials Engineering, or B.Eng in Chemical Engineering	Unspecified	IMRE	Rubayn Goh	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Chemical & Molecular Engineering,Chemistry	1
22	Advancing Robotics via Next-Gen Semantic Perception	In this exciting internship project, interns will delve into the realm of point cloud data and its significance in the context of mobile robots. Interns will explore the concept of a point cloud map, which serves as a crucial foundation for mobile robots to navigate and understand their surroundings. However, current approaches in map generation face limitations, including the possibility of incorrect loop closure and difficulties in extending the map into new areas without compromising the integrity of older sections. By leveraging the cutting-edge methodologies, interns will propose innovative solutions to enhance map generation, ensuring clean maps and seamless extension of the map into new areas.	You will learn about the latest state-of-the-art techniques used in robot localization and gain a deep understanding of their limitations when deployed in real-world scenarios.	In this role, you will explore the limitations of existing point cloud maps when deployed in real-world scenarios. You will actively engage with experts in the field, proactively seeking their insights to expand your knowledge and refine your understanding of the challenges faced in point cloud mapping. Drawing on your learnings and discussions, you will propose innovative solutions to overcome these challenges and enhance the capabilities of point cloud maps for mobile robot navigation. You will collaborate with our experienced team to design and conduct real-world tests, collecting and analyzing data to validate the effectiveness of your proposed	Our internship program is designed for students with a strong passion for computer programming and a solid understanding of mobile robot sensors. While prior knowledge of ROS (preferably ROS 2) and C++ would be very advantageous, it is not a mandatory requirement. If you already possess a foundational understanding of robotic navigation and localization, that's fantastic! Your prior knowledge will enrich your internship experience.	2	I2R	Saurab Verma	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical and Electronic Engineering	2
23	Agentic Retrieval-Augmented Generation: Developing Autonomous AI Agents with Enhanced Knowledge Retrieval	The advent of large language models has revolutionized the field of artificial intelligence, enabling machines to generate human-like text and understand complex language patterns. However, these models often operate within the confines of their training data, lacking the ability to access and utilize external, up-to-date information. Retrieval-Augmented Generation (RAG) addresses this limitation by integrating retrieval mechanisms with generation capabilities, allowing models to fetch relevant information from external sources dynamically. This project aims to explore the integration of agentic behavior in AI systems with RAG techniques. The goal is to develop autonomous AI agents that can not only generate contextually relevant responses but also proactively retrieve and incorporate external knowledge to enhance their performance. The project involves designing, implementing, and evaluating agent architectures that effectively retrieve information from knowledge bases or the internet and generate appropriate responses or actions based on that information. Potential applications include conversational AI, automated assistants,	Gain hands-on experience with cutting-edge AI methodologies, including LLMs and RAG. Develop a deep understanding of Retrieval-Augmented Generation principles and their applications in autonomous agents. Acquire skills in conducting research, analyzing experimental results, and effectively presenting findings. Work closely with a supportive team of experts who are passionate about AI and its applications in healthcare or Finance.	Conduct comprehensive reviews of existing research on agentic AI and RAG to inform project development. Assist in designing the architecture of AI agents integrating RAG techniques and implement prototypes. Conduct experiments to test different approaches, analyze performance metrics, and optimize agent capabilities. Document progress, prepare reports, and contribute to research papers or publications resulting from the project.	Python programming and fundamental knowledge of Machine Learning (ML), Natural Language Processing (NLP), LLM, and Prompt Engineering; Ability to work effectively both independently and as part of a team.	Unspecified	IHPC	Gao Fei	1 Fusionopolis Wy, #16-16 Connexis, North Tower, Singapore 138632	Computing and Information Sciences,Computer Science	2
24	AI assisted enzyme engineering	Enzymes play a critical role in bioeconomy. However, most enzymes are inefficient to support the high-flux required for industrial applications. In this project, we aim to develop AI assisted functional guidance to improve design of diverse and more-efficient enzymes.	Master current cutting-edge AI models (e.g., RFDiffusion) on protein design; a report/paper to summarize the work on enzyme engineering	Review cutting-edge AI models on protein design; finetune/adapt a suitable AI models (e.g., RFDiffusion) on in-house enzyme data	Experiences on deep learning, background on deep generative models (e.g., diffusion models) or bioscience.	Unspecified	IHPC	Yao Yinghua	1 Fusionopolis Way, #16-16, Connexis North Tower, Singapore 138632	Computing and Information Sciences,Biomedical Sciences,Computer Science,Bioengineering ,Natural Sciences	1
25	AI for Optimization: Developing end-to-end learning frameworks for martime and trasport operational planning.	This project aims to develop "end-to-end" (E2E) learning frameworks for solving operational planning problems, where operators manage resources to meet customer needs efficiently. The problmes have a large number of real-world applications. For instance, in facility management, operators control a range of infrastructures (roads or tolls) and must determine optimal service plans, including resource allocation and pricing. For managing maritime harbor crafts, operators coordinate a fleet of boats to cater to diverse maritime demands. In practice, customer demand exhibits spatial-temporal variations, and the external environment is varying. Therefore, the service plans often need re-optimization to adapt to changing demand levels. Since the problem is NP-hard, this poses substantial computational challenges. To tackle this, we're developing E2E learning frameworks that combine offline optimization, AI, and novel data-generation methods. Our goal is for these models to directly produce near-optimal service plans based on demand data, bypassing traditional optimization solvers. Our previous work showed that E2E frameworks can achieve solutions within 0.1% of optimality in minimal time for facility management. We're now customizing these frameworks for other applications, like urban traffic operations, mobility electrification, and maritime operations, aiming to create generalized approaches	Understand E2E Learning Frameworks: Students will gain a deep understanding of end-to-end (E2E) learning frameworks and how they can be applied to operational planning challenges in various industries, such as facility management and maritime operations. Analyze Operational Planning Problems: Students will learn to identify and analyze complex operational planning problems, particularly those involving resource management, spatial-temporal demand variations, and environmental changes. Apply AI and Optimization Techniques: Students will develop skills in applying artificial intelligence, offline optimization, and data generation methods to create efficient solutions for NP-hard operational problems. Evaluate Solution Quality and Efficiency: Students will learn to assess the effectiveness and computational efficiency of E2E frameworks, with a focus on achieving high-quality solutions within stringent time constraints.	Review and Analysis: Conduct literature reviews and analyze existing methods in operational planning, optimization, and machine learning. Assist in identifying gaps or areas for improvement in current E2E learning frameworks. Model Development: Participate in designing and implementing E2E learning models using machine learning, optimization techniques, and data generation methods. Contribute to coding, testing, and validating models to ensure they produce accurate, efficient solutions. Experimentation and Evaluation: Conduct experiments to assess model performance, including accuracy, optimality, and computational efficiency. Reporting and Documentation: Write research papers and reports, detailing the developed framework, methodologies, and findings.	Degree in Computer Science, Operations Research, Mathematics, Engineering, or a related field Good understanding of operations research and AI models Proficiency in Python programming	Unspecified	IHPC	LIN Yunhui	1 Fusionopolis Way, #16-16 Connexis, Singapore 138632	Computing and Information Sciences,Applied Mathematics	2

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
26	AI guided mosquito genomic data analyis for Dengue	Singapore has to deal with dengue fever outbreak regularly. This project focuses on using AI tools to understand mosquito population evolution w.r.t treatments, physical barriers, migration, etc. Our team is analysing the mosquito populations' SNP data. The AI tools will provide a different perpective on the genomic data for potential biological discoveries.	To learn the domain knowledge of the project and to learn how to use AI methods to solve the population stratification	Develop AI code, prepare and clean data, perform experiments, report results	Able to code in python. Basic applied mathematics skills	Unspecified	BII	Malay Singh	30 Biopolis Street, #07-01 Matrix, Singapore 138671	Computing and Information Sciences,Biomedical Sciences,Computer and Software Engineering,Biomedical Engineering,Computer and Software Engineering	2
27	AI in Genomics	We are a dedicated team of computer scientists focusing on innovative projects that intersect AI and genomics with an emphasis on cancer. Our ambition is to pave the way for groundbreaking AI solutions inspired by genomic research. Students who join our team will have the opportunity to delve into areas such as RNA/DNA language modeling, genome assembly using graph neural networks, microbial classification in samples, detection of epigenomic alterations in DNA, and RNA structure prediction (akin to Alphafold's approach to proteins).	Students will gain hands-on experience in: - Conducting data cleaning, wrangling, and exploratory analysis - Designing and implementing machine learning models using PyTorch - Training and optimizing AI models - Visualizing data and creating comprehensive reports	Students are expected to: - Engage in data preparation tasks - Contribute to the development and training of machine learning models - Attend regular lab meetings - Deliver presentations to the lab team - Actively participate in the lab's AI journal club discussions	Interns will actively participate in one of the highlighted AI-genomics projects, based on their personal interests. Throughout the internship, they will receive mentorship from both a Ph.D. student/postdoc and the principal investigator. Interns are expected to compile weekly one-page reports detailing their progress. Additionally, they will showcase their findings to a lab subgroup in mid-term and final presentations.	Unspecified	GIS	Mile Šikić	60 Biopolois Street	Computing and Information Sciences,Life Sciences,Computer Science,Mathematics	10
28	AI in RNA 3D structure evaluation	Lots of RNA sequences (1B+) but very few with structure annotations (1.7K RNA and 4K RNA-pro structures with redundancy reported in the literature); the lack of structures is due to inherent instability and dynamicity of RNA making them challenging to crystalise. Existing ARES published in Science learns a regression model that predicts the deviation of an RNA structure from its true one using its 3D coordinates and atom type. Our team is plan to learns a ranking model that ranks the (near) native RNA structure above those poor structures	Cooperation with domain experts in AI, RNA structural biology. First/main-author papers published in Nature Communications, Natural Machine Intelligence, ICML, ICLR, NeurIPS, etc	Model design, code implementation and regular meeting with RNA structural biology experts	Pytorch, Graph transformer, GCN, Preference learning, Ribonucleic acid	Unspecified	IHPC	Pan Yuangang	C16-60, Level 16, 1 Fusionopolis Way, Connexis Sourth Tower Singapore 138632	Biomedical Sciences,Bioscience and Biotechnology,Computer Science	1
29	AI model for tissue-based gene/protein expression prediction	Objective: to develop a hepatocellular carcinoma (HCC)-specific deep learning (DL) model which can predict gene expression in the tissue space from routine H&E images, enabling spatial gene analysis to be performed using low-cost and widely available H&E images Approach: re-implement, re-train, and optimize the performance of existing DL models, particularly ST-net and HisToGene, using the (10x Genomics) Visium data generated from HCC patient tissues. Visium data provides the ground-truth (data labels) of spatially resolved gene expression along with the H&E image	•Knowledge of cancer immunology •Knowledge of biomedical image processing •Knowledge of advanced spatial omics technology •Hands-on experience with real-world biomedical (image) data •Deep learning modelling skill •Interdisciplinary research experience	•Organizing their time well •Updating work progress on weekly basis •Reading papers to learn about DL optimization strategies •Resourcing for software packages when necessary •Maintaining a positive learning attitude	•Programming skill, deep learning/ image processing skill will be a plus •Problem solving skill •Fundamental knowledge of biology/ immunology	Unspecified	BII	Mai Chan LAU	8A Biomedical Grove, Immunos, Level 4, Singapore 138665	Computing and Information Sciences,Biomedical Sciences,Computer Science,Biomedical Engineering,Mathematics	3
30	AI-assisted Tunable Nanophotonics	This project focuses on integrating artificial intelligence (AI) techniques into nanophotonics research to address challenges in developing compact, efficient, and high-speed optical devices. The project goals include enhancing efficiency by developing AI-driven methodologies for rapid design and optimization of nanophotonic devices, optimizing simulation tools through AI algorithms to streamline the prototyping process, expediting material exploration by integrating novel materials like two-dimensional (2D) materials, and ensuring physical validity using physics-informed neural networks. Prospective candidates with backgrounds in electrical engineering, applied physics, or related fields, along with proficiency in simulation techniques and AI, are encouraged to apply, aimed at advancing the forefront of nanophotonics research.	1 - Learn how to develop AI-driven methodologies for rapid design and optimization of nanophotonic devices, 2 - Study and optimize simulation tools through AI algorithms to streamline the prototyping process, 3 - expediting material exploration by integrating novel materials like two-dimensional (2D) materials	1 - Develop AI models for forward and inverse design of Nanophotonics devices 2 - Integrate nanooptics physics and AI to accelerate design speed and accuracy	backgrounds in AI, electrical engineering, applied physics	Unspecified	IMRE	Omar Abdelrahman Mohamed Abdelraouf	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Materials Engineering	2
31	AI-driven Development of Sustainability Solution Knowledge Base	The lack of knowledge and expertise is a significant barrier to the effective implementation of sustainability strategies. To address this, a comprehensive knowledge base is needed to help industries adopt best practices and support research into the real-world impacts of these measures. Given the rapid expansion of sustainability information, automating knowledge mining and its representation is essential. This project will explore the use of large language models and knowledge graphs to establish a continuous knowledge extraction and codification pipeline. The pipeline will extract sustainability measures from reports, articles, and other sources, aligning them with international sustainability standards using natural language processing. These measures will then be represented as a knowledge graph, with the standards serving as the foundational ontology.	Students will be exposed to the applications of Artificial Intelligence (AI) in sustainability, focusing on cutting-edge AI technologies such as natural language processing, large language models, knowledge representation, and Retrieval-Augmented Generation (RAG). They will develop a working knowledge of applying these tools in real-world operational environments.	The intern will test various pipelines for extracting sustainability measures and to validate the results. They will refine large language model outputs through prompt engineering and parameter tuning. Additionally, the intern will represent the extracted measures in a knowledge graph framework, aligning with international sustainability standards.	Proficiency in Python programming. Experience with natural language processing projects. Interest in sustainability and familiarity with sustainability disclosure standards are ideal. A willingness to learn new concepts and work independently to solve problems.	2	SIMTech	Chuan Fu Tan	Singapore Institute of Manufacturing Technology (SIMTech) @ Fusionopolis 2 2 Fusionopolis Way #08-04, Innovis Singapore 138634	Computing and Information Sciences,Computer and Software Engineering	1
32	AI-driven innovation: Advancing semiconductor manufacturing	The team is developing ways to solve bottlenecks in next-generation semiconductor lithography (e.g. Optical Proximity Correction). Specifically, we are building numerical simulations and AI/ML methods to control the process parameters in optical lithography. The team will work with industry partners (MNC and government agency) for technology deployment in Singapore's advanced manufacturing ecosystem.	• Gain experience with computational modelling or AI to solve design challenges in research. • Gain understanding of state-of-the-art optics, relevant to applications in sensors, displays, ICs, space. • Work in a collaborative environment with cross-domain experts, exposed to other domains' knowledge: e.g., lithography, additive manufacturing, nanotechnology. • Opportunity to publish and produce intellectual property	• Play a part as an active research team member • Develop computational modelling or AI tool to solve design challenges • Pro-actively engage supervisor & colleagues to explore new ideas/solutions • Actively learn new knowledge through literature reviews	> Proficiency in a programming language (e.g. Python) > Prior Experience with AI/ML is preferred.	Unspecified	IHPC	Jonathan Trisno	1 Fusionopolis Way, #16-16 Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical and Electronic Engineering ,Physics	2
33	AI-Driven Medical Image Synthesis for Enhanced Parkinson's Diagnostics	This project aims to address the challenge of missing DATScan data, which is critical in Parkinson's disease (PD) diagnostics but often unavailable due to cost and accessibility issues. Students will develop AI techniques to synthesize DATScan images from MRI and fMRI data, drawing from established models like U-Net and CycleGAN, and exploring advanced methods such as diffusion models and Vision Transformers. This synthesis approach aims to improve diagnostic accuracy in multi-modal systems where DATScan data is limited or absent.	Students will gain hands-on experience in advanced image synthesis models and cross-modality learning, developing skills in generating DATScan data from MRI and fMRI inputs. This project provides foundational expertise in healthcare AI applications, emphasizing real-world data handling and model optimization for medical diagnostics. They will also develop skills in scientific writing.	Literature review, propose methodologies, implementation, report writing	Coding, machine learning concepts, deep learning	Unspecified	IHPC	Tanvi Verma	1 Fusionopolis Way, #16-16, Connexis North Tower, Singapore 138632	Computing and Information Sciences,Computer Science	1
34	AI-driven Multi-Omics Data Integration to Overcome Challenges in Cancer Drug Response Prediction	Recent advancements in single-cell atlases, along with AI methods, now enable for the simultaneous profiling of multiple molecular layers from the same cells or tissues under diverse disease conditions. A major challenge in current cancer drug response prediction methods, particularly with AI models like MOMLIN, requires high computational demands, extensive memory usage, and the black-box nature of these models. To address the challenges, we propose SMAP (Scalable Mapping of Single-cell Multimodal datasets using Approximate Pseudobulk estimation). SMAP provides a scalable solution for single-cell RNA-seq analysis and is designed to offer improved accuracy over existing methods. It is expected to effectively address cancer heterogeneity across both cellular distributions and cross-tissue/disease conditions. SMAP is broadly applicable for atlas-scale data analysis, integrating single-cell and bulk data seamlessly. We plan to apply SMAP to a range of paired single-cell multi-omics datasets, including 10X Multiome, CITE-seq, and single-cell transcriptomics. To evaluate its performance, the candidate will benchmark SMAP against state-of-the-art methods in cell clustering and the inference of phenotype-associated multicellular interactions. By the end of this project, SMAP is expected to perform comparably while also enhancing biological interpretability.	Learn skills in data analytics and machine learning techniques.	Literature survey, prototype model development, simulations and report writing	R/python/Linux, Machine learning and basic data QC, biology/statistics,	Unspecified	BII	Kumar Selvarajoo	30 Biopolis Street, #07-01 Matrix, Singapore 138671	Computing and Information Sciences,Biomedical Sciences,Computer and Software Engineering,Biomedical Engineering,Computer and Software Engineering	2
35	AI-Driven Operation in Maritime: RL-driven Digital Testing for Maritime Autonomous Surface Ships (MASS) and Vessel Location Prediction using Foundation Models	The development of Maritime Autonomous Surface Ships (MASS) represents a significant advancement in the maritime industry, focusing on enhancing safety and operational efficiency in complex marine environments. This project aims to create an end-to-end digital testing framework for MASS using reinforcement learning to generate safety-critical scenarios, including those involving complex maneuvers of both own and attacking vessels. Additionally, the project integrates a vessel next location prediction model using foundation models with pre-training on large-scale AIS data. By leveraging spatio-temporal knowledge and Transformer-based architectures, this approach aims to forecast vessel locations, considering environmental factors and vessel activity patterns. Together, these initiatives create a comprehensive testing and predictive system that contributes to safer and more reliable maritime operations.	Students participating in this project will gain experience in (1) developing digital testing frameworks for autonomous maritime systems, (2) implementing reinforcement learning models for safety-critical scenario generation, (3) applying foundation models pre-trained on diverse AIS data for vessel location prediction, (4) utilizing Transformer-based encoder-decoder architectures to model spatio-temporal dependencies in complex maritime environments, (5) analyzing real-world geographic and trajectory data from the Singapore Strait, and (6) building advanced skills in data analysis, problem-solving, and machine learning techniques in a maritime context.	The student will be actively involved in both the digital testing and prediction components of this project, with specific responsibilities including (1) developing machine learning models for autonomous ship digital testing to generate safety-critical scenarios, focusing on both own and attacking ship perspectives, (2) implementing foundation models for vessel next location prediction using AIS and environmental data, (3) collaborating with the project team to enhance model performance and scenario adaptability within the digital twin environment, (4) applying reinforcement learning and foundation model techniques to construct and test scenarios, and (5) analyzing model outputs to assess scenario fidelity, predictive accuracy, and operational	Ideal candidates should have a strong foundation in computing, mathematics, engineering, or a related field, with relevant skills and experience in (1) Python programming and machine learning frameworks like PyTorch, (2) reinforcement learning techniques, (3) working with large-scale spatio-temporal datasets, and (4) knowledge of generative models, particularly within transportation or maritime applications. Experience with Transformer-based architectures and familiarity with maritime AIS data is a plus.	Unspecified	IHPC	Wang Hongwei	1 Fusionopolis Way, #16-16, Connexis North Tower, Singapore 138632	Engineering and Technology,Electrical and Electronic Engineering	1

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Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
36	Algorithm development Develop algorithm to calibrate gas sensors for low carbon fuels.	Low-carbon fuels are being explored as energy sources for a sustainability-focused future. However, these fuels pose their own challenges for deployment and have different safety criteria. In this project, the student will work with the team at the National Metrology Centre (NMC) to accurately measure the dispersion of vaporized low-carbon fuels using a network of gas sensors. Specifically, the student will assist in developing an algorithm to calibrate gas sensors connected in a network	1) Understand calibration of gas sensors 2) Understand sensor networks 3) Understand dispersion of gases and mitigation measures	To develop an algorithm to check and calibrate gas sensors	Knowledge of coding in python/matlab	Unspecified	NMC	Ng Wee Hoe	8 Cleantech Loop, #01-20 B, Singapore 637145	Engineering and Technology,Computer and Software Engineering,Electrical engineering,Mathematics	1
37	All-optical synapses for photonic neuromorphic computing	Synapse is one of key components for any neural network hardware for AI or deep learning. Phase change materials have emerged as the potential solutions for non-volatile synapse weighted memories. In this project, we will study the fundamental properties of materials and achieve multiple logic states. The results will build a foundation of develop all-optical neuromorphic neural computing chips with low power consumable and high speed	Experienced in nanophotonics simulation modeling, with knowledge of nanofabrication processes and characterization techniques.	Conduct nanostructure modeling and perform data analysis	Attended couse in applied physics	Unspecified	IMRE	Wang Qian	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Physics	1
38	Alloy Design through Microstructural Engineering using ICME approach	Integrated Computational Materials Engineering (ICME) is increasingly gaining attention from industries, as a transformative approach for designing new alloys with tailored properties, through modelling guided experimental assessment. This process relies on the correlation between processing conditions, microstructural evolution, and resulting properties. Computational modeling of microstructure evolution is a vital asset in ICME, providing insights that support process optimization and material performance predictions. However, conventional microstructure simulation tools are often computationally demanding. In this project, we propose to evaluate alternate/accelerated modeling techniques aiming to achieve rapid assessments of microstructure evolution and targeted properties	The student would gain insight into ICME approach as a research tool and its application to manufacturing process, insight on phase transformation, microstructural evolution. Based on the student's motivation and the specific problem of interest during the attachment, they will have the opportunity to work with various modeling-related toolkits, such as programming languages, numerical techniques, visualization tools, parallel computing, and ML/AI .	As part of the project attachment, the student would be involved in some of the following tasks such as developing new subroutines, modify existing code, running simulations, collect and analyze results, evaluate and curate literature data. Towards the above tasks, the student is expected to maintain logs and periodically prepare report/updates on their project.	Self-Motivated, Enthusiastic attitude towards research, Eager to learn new skills and Team player; Exposure to Numerical analysis, Basic programming skills, Data analysis would be desirable	Unspecified	IHPC	Ramanarayan Hariharaputran	1 Fusionopolis Way, #16-16, Connexis North Tower, Singapore 138632	Engineering and Technology,Materials Engineering,Physics	1
39	Alternative Protein Development Platform (APDP): From lab to pilot scale	The project aim to develop capabilities of protein isolation, processed for plant and microbial protein, and protoype protein ingredients and food prototype. Analytics platform serves as colaborator which responsible to perform analytical testing for every prototype ingredients and food developed during the project. Some of the key parameters are amino acid content, fat content, and aroma components.	1) understanding the principle of lipid extraction in various matrices 2) hands on experience of operational Gas Chromatograpgy (GC) instrument and data analysis 3) hands on experience on standardized AOAC fatty acids analytical method 4) understanding the nature of lipids/fatty acids in different food ingredients	Within the project, student will assist in analysis of fat/lipid content in sample. She/He will perform sample preparation, instrument run and data analysis in quantitative manner. Interprete results and communicate it with others.	Background in analytical chemistry and basic lab skill such as weighing, pipetting, centrigue, solvent and standard solution preparation. Currently studying to complete a diploma/degree related to chemistry, biochemistry or food science.	Unspecified	SIFBI	Nur Eka Fitriani	31 Biopolis Way, Nanos Level 1, Singapore 138669	Biomedical Sciences,Biochemistry,Chemistry	1
40	Artificial Intelligence Powered Synthetic Biology	Synthetic biology exhibits significant potential in addressing important societal problems including food, chemicals, pharmaceuticals, agriculture, energy, healthcare, and climate change. However, our ability to predict biological systems is still very limited as compared to physical or chemical ones. This is due to the lack of mechanistic understanding of biological systems and its components (e.g., genes, enzymes, pathways, cells). Here, we aim to apply AI tools (PRNSS) to guide the engineering and optimization of microbial cells for food and chemical production. In particular, we aim to redesign novel artificial pathways and enzymes (like AI guided structures) for the production of specialty chemicals using next-generation feedstocks (waste, CO2 derived)	1. Acquire basic molecular biology skills such as media preparation, yeast culture, growth curve, PCR, Restriction Enzyme digestion reaction, gel electrophoresis, bacteria transformation, plasmid extraction etc. 2. Learn analytical chemical technique, like HPLC and LCMS, and use them to qualify and quantify the synthetized products. 3. Yeast transformation, mutant screening and identification. 4. Gene expression and quantitative expression analysis. 5. Functional analysis of mutants.	Training the student on basic molecular biology and microbiology skills	1. Have learned molecular biology and/or microbiology; 2. Proactive learning attitude; 3. Postgraduate or higher degree	Unspecified	SIFBI	Zhang Congqiang	31 Biopolis way, Nanos #06-01	Biomedical Sciences,Bioscience and Biotechnology,Bioinformatics,Bioengineering	1
41	Artificial Nural Network (ANN)-based Non-linear modeling of GaN High Electron Mobility Transistors (HEMTs) for RF and millimeter wave circuit design.	Device characterization and modeling are usually considered as a pivotal step in the design of next generation electronics circuits like, power amplifiers (PAs), Low Noise amplifiers, RF switch etc. Presently, several new semiconductor device and material technologies are being developed at a faster rate than ever before; Conventional compact models based on device physics need a larger number of measurements and longer developing time. Deep Learning tools like ANNs have been gaining a lot of attention because of their remarkable data processing capabilities to develop fast and efficient device models.	By the end of the training, the student will have good understanding of semiconductor device characterization techniques, strong skills in data analysis and Machine Learning Regression techniques applied in the fields of RF and microwave engineering. Student will be equipped with microelectronics knowledge and software skills which will be helpful for him to build career in industry or academia.	In this project, the student will be working with semiconductor device electrical characterization team for developing nonlinear model of GaN HEMTs for RF applications. The device DC, Pulse and RF measured data will be used for ANN based approach to model and estimate the behavioral of GaN HEMTs. The developed model of HEMTs will estimate the device parameters in various bias conditions.	(1) Strong interest in mathematics and computation tecqnue (2) interest in device characterization, simulation, modeling, experiment (3) Experince in MATLAB, Coding	3	IME	Kumud Ranjan	Kinesis Building, Fusionopolis 2	Engineering and Technology,Electrical and Electronic Engineering	2
42	Asian Reference Genome (ARG)	This project aims to pioneer advanced methodologies in de novo assembly to establish high-quality reference genomes for Asian population. Our approach involves meticulous optimization of assembly techniques to achieve a comprehensive representation of the reference genome for asian population, ensuring accuracy and completeness. Our methodology will integrate multiple sequencing platforms and assembly strategies to capture a broad spectrum of genetic variations, including structural variants and genomic rearrangements.	Hands-on experience with 1) Computational Assembly Techniques 2) Genomic Variation Analysis 3) Assembly and variant calling Quality Control Measures	1) Understanding the problems related to genome assembly 2) Reading research articles to stay updated on advancements in de novo assembly methodologies 3) Exploring and testing the different assembly and downstream analysis related tools 4) Documentation and reporting the findings 5) Adherence to guideline	1) Willingness to learn new things 2) Basic understanding of genomics and biology 3) Basics of genomic sequencing technology and bioinformatics 4) Knowledge of command line tools and any of the programming languages (e.g., Python, R, or PERL) 5) Attention to Detail and Patience 6) Critical Thinking, Problem-Solving Skills and Collaborative Mindset	Unspecified	GIS	Liu Jianjun	60 Biopolis Street, Genome, #04-01, Singapore 138672	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Mathematics	2
43	Atomic precision doping of silicon using solid state dopants	Electron and nculear spin coupled to single atomic dopants in silicon have recently been shown to function as high fidelity qubits and have potential for scaling up. However, the standard fabrication process for realizing these qubits require toxic and pyrophoric gases such as phosphine. While semiconductor foudnaries use these gases routinely in their fabs, the infrastructure required to safely handle these gases can be out of reach for many research labs. The student will explore the use of safe solid dopant sources for depositing single dopants by molecular beam exitaxy. The student will be involved in device fabrication using advanced lithography techniques and measurements using scanning tunelling microscopy	The student will be trained in ultra-high-vacuum (UHV) instrumentation, electrical measurement techniques and 2D semiconductor fabrication. These skillsets and techniques will be directly relevant to the research and semiconductor manufacturing industries	Students will be responsible for fabricating their devices, collecting measurements and analysis of their data.	Physics and Electrical engineering	Unspecified	IMRE	Calvin Wong	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Electrical Engineering,Physics	2
44	Audio LLM for Southeast Asian music generation and classification	In this project, we develop an audio LLMs for SEA music generation and classifications	Data processing for large scale AI model training/Advanced large scale deep learning model training/Large Language Models/SEA music	Take part in one or few tasks listed in J)	PyTorch/Deep Learning/Audio & speech processing	2	I2R	Teh Kah Kuan	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering ,Mathematics	1
45	Audio RAG-LLM developments	In this project we develop an end-to-end framework to connect audio and speech recognition and understanding engines to interfacing through LLM via RAG with knowledge graphs and vectorized datasets	Data processing for large scale AI model training/Advanced large scale deep learning model training/Large Language Models/RAGs	Take part in one or few tasks listed in J)	PyTorch/Deep Learning/Audio & speech processing	2	I2R	Jayakrishnan Melur Madhathil	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering ,Mathematics	1
46	Automatic Speech Recognition and Understanding for Radio Voice Procedures	In this project we develop end-to-end solutions for radio voice procedure understanding and automations with several applications in aviations, maritime and transportations	Data processing for large scale AI model training/Advanced large scale deep learning model training/Voice procedure data generation/Model optimisation	Take part in one or few tasks listed in J)	PyTorch/Deep Learning/Audio & speech processing	2	I2R	Luong Trung Tuan	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering ,Mathematics	1
47	Automation of AC/DC transfer using python	This project aims to automate the process of the AC/DC transfer measurement using Python. Python is a versatile and widely-used programming language and offers an open and extensible platform for instrument control. VISA provides a standard API for communication with instruments, while SCPI defines a set of standardized commands, facilitating interoperability between instruments from different manufacturers.	1) Understanding the process behind AC/DC voltage and current transfer. 2) Understanding circuit setup 3) Utilizing python to implement a program for instrument control and measurements 4) Improve the process using automation	Design a python software to automate the AC/DC transfer process	Knowledge of programming concepts and programming languages (Python preferred) Basic electrical circuit concepts	Unspecified	NMC	Connor Peh	8 Cleantech Loop, #01-20 B, Singapore 637145	Engineering and Technology,Electrical engineering	1
48	AutoML	At I2R, we have deep experience in developing predictive maintenance solutions. This project is aimed at leveraging our expertise and experience in developing these solutions towards building an autoML tool based on our planned framework for predictive analytics. Such a tool will accelerate the process of solution development and will enable pervasiveness of predictive analytics, including predictive maintenance, for several applications.	1. Feature Engineering 2. Predictive analytics 3. Time-series data analysis	1. Develop an autoML tool for predictive analytics 2. Integrating various modules towards AutoML	1. Coding in python and pytorch 2. Good understanding of deep learning and transformers	2	I2R	Savitha Ramasamy	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science,Mathematics	1
49	Autonomous Network Vulnerability Auditor (ANVA)	Exploratory project involving research and development of a PoC system. Build semi-autonomous robot for specific use case that can perform penetration testing in an environment and find cybersecurity vulnerabilities.	Learn to build robots using simple kits. Learn about cybersecurity attacks, VAPT, wireless security, cyber-physical security, ethical hacking and defense.	Student will be responsible for the system development with guidance from supervisor. Should demonstrate independence in exploration and self motivation to learn fast and acquire skills in the relevant area. Responsible for building, configuring the basic robot using a simple kit, with guidance. Setup a controlled network environment and configure software tools needed. Simulate certain attack scenarios, collect data, monitor and analyze. Demo and final report at completion	Basic programming skills with Python(eg. sckit-learn). Basic networking concept. Basic cybersecurity knowledge. Basic Linux. Robotics background is not necessary but a plus. Familiarity with cybersecurity tools such as wireshark, kali linux is a plus. Self motivated, teamplayer, interested in research. (Project requires minimum 4 months of attachment duration)	2	I2R	Anku Adhikari	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering	2

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	Project Title	Project Description	Learning Outcomes for Students	Roles and Responsibilies of Student	Students' pre-requisites	Minimum Duration (Months)	Research Institute of Internship Supervisor	Name of Internship Supervisor	Workplace Address	What is the project's research category?	No. of Students Required
50	Ballistic spin injection in transition metal dichalcogenides	Transition metal dichalcogenides are interesting new materials for Valleytronics due to the presence of spin-valley coupling in the band structure, allowing us to address the valley states using the carrier spin states. However, spin injection is a challenging problem as there is a fundamental impedance mismatch between the ferromagnet and the semiconductor. In this project, the student will explore spin injection using ballistic spins, where the spin polarized current is driven by kinetic energy and is not limited by the impedance mismatch. The student will be involved in device fabrication using advanced lithography techniques and measurements using cryogenic tunnelling microscopy.	The student will be trained in ultra-high-vacuum (UHV) instrumentation, electrical measurement techniques and 2D semiconductor fabrication. These skillsets and techniques will be directly relevant to the research and semiconductor manufacturing industries in Singapore.	Students will be responsible for fabricating their devices, collecting measurements and analysis of their data.	Physics and Electrical engineering	Unspecified	IMRE	Calvin Wong	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Electrical Engineering,Physics	1
51	Biobased chromophores for catalyst-free photo-crosslinkable polymers	Photo-crosslinkable polymer systems have become indispensable in many applications including coating adhesives, and hydrogels. However, current applications of photochemical reactions in polymer crosslinking are restricted by harmful UV light activation or expensive catalysts. This research aims to develop visible light responsive chromophores derived from renewable resources such as vanillin and hippuric acid for catalyst-free photocrosslinking of polymers at red-shifted wavelengths. The outcome will be a light responsive materials platform that can be readily synthesized and scaled up for industry adoption. The developed photochemical technology will further advance the field of photochemistry in soft matter materials, promoting sustainable practices in advanced manufacturing.	Student will be able to carry out synthesis experiment and perform characterization of compounds using various instruments such as NMR, UV-Vis spectrometer, fluorescence spectrometer, FTIR etc.	Perform literature review, synthesize materials, perform characterization, data collection, data analysis and data reporting	The student should have chemistry background with basic laboratory skills. Candidate with passion for science and eager to learn are preferred	Unspecified	ISCE2	Janice Koay Wai Lean	1 Pesek Road, Jurong Island. S(627833).	Physical Sciences,Chemistry	1
52	Bio-inspired robot navigation	Cognitive scientists have discovered various types of neural cells to help the rats to do navigation thruought decades research. In this project, we will investigate how to simulate the different functioning neutal cells to form a new framework for better the robot navigation.	Deep understanding of the current deep learning framework; A framework on the bio-inspired robot navigation system	Be a part of the project team to provide benchmark on a few foundation models; finetune or re-train deep learning model based on the foundation model	Programming language: Python Basic knowledge of the deep learning / AI; team work; Problem solving willingness to learn	2	I2R	LI Jun	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical Engineering	2
53	Bonding Before Birth - a mHealth app intervention study on first time expectant couples	Bonding Before Birth is an intervention study targeting the emotion regulation of expectant parents during pregnancy. Candidates will learn how to administer research tasks, such as lab-based cognitive tasks with the parents and children, getting participants' informed consent and administrative work pre- and post-research visit.	Student will learn how to administer research tasks, such as lab-based cognitive tasks with the parents and children, as well as other research work related to parental mental health and child outcomes. Students may also be tasked to do some literature reviews and data analyses.	Student will be administering research tasks, such as lab-based cognitive tasks with the parents and children, getting participants' informed consent and administrative work pre- and post-research visit. Student will also be ask to code for parent-child interaction tasks, do literature reviews and data analyses.	Ability to interact with parents and babies, able to multi-task, able to commit at least 3 weekdays and 1 weekend, 21 years-old and above (to perform informed consent). Student can be from Psychology, Social Work, Biological Science or other relevant courses/background.	Unspecified	IHDP	Michelle Kee	30 Medical Drive. Brenner Centre for Molecular Medicine. Singapore 117609	Biomedical Sciences,Psychology and Neuroscience	2
54	Broadening the Functional Capabilities of Hydrogels	Temperature-responsive supramolecular hydrogels, which undergo sol-gel transitions near body temperature, hold significant potential as biomedical materials. Their injectability and thermal responsiveness enable effective drug encapsulation and controlled delivery. While this project primarily focuses on thermogels, it may include other hydrogel systems. Building on our previously established, straightforward synthetic platform for producing gelling polymers tailored for sustained drug release, this project will investigate the physicochemical properties of these gelling polymers and develop compositions optimized for specific applications.	The student will gain hands-on experience in fabricating hydrogels and investigating their physicochemical properties. Throughout this process, the student will be introduced to chemical synthesis techniques and acquire a foundational understanding of polymer design and its physicochemical characteristics. Additionally, the student is expected to develop their scientific communication skills.	Students will be responsible for preparing and characterizing hydrogels, engaging in both their synthesis and analysis. They are expected to be motivated, independent learners with a strong interest in mastering the fundamentals of each technique. Monthly reports or presentations will be required throughout the internship.	We strongly encourage students with backgrounds in Materials Science and Engineering, Chemical Engineering, or Chemistry to join us. Preference will be given to students who have completed coursework in polymer synthesis.	Unspecified	IMRE	Chan Siew Yin	2 Fusionopolis Way, Innovis, Singapore 138634	Biomedical Sciences,Biomedical Sciences,Biomedical Engineering,Chemistry	2
55	Building an integrated atlas from single-cell epigenomics datasets	Single-cell epigenomic profiling is essential for understanding the role of epigenetic modificiation in diseases and biological processes. There is an increasing number of publications based on single-cell ChIP-seq and single-cell ATAC-seq. In this project, we will collaborate with Dr. Tim Stuart's lab to collect publicly available datasets and processing them uniformly to create an integrated single-cell epigenomics dataset. Such a dataset will be a valuable resource for knowledge discovery, validation of findings and benchmarking exercises.	Students will learn 1) how to handle and process big data efficiently. 2) how to collaborate with experimental scientists and other bioinformaticians. 3) how to manage their time, deadlines and presentation skills. 4) single-cell epigenomic field and its importance. 5) deepen their coding skills. Additional training in Unix, R and Python will be provided as needed.	Student will be responsible to 1) identify relevant datasets in collaboration with the supervisor and collaborators 2) download the relevant datasets along with the corresponding meta data 3) preprocess all dataset uniformly 4) assess quality of samples and annotate the cell types using a variety of computational tools. 5) document the process and decisions made We can explore additional tasks for well motivated candidates	Some experience with any coding software, willingness to learn new softwares and interest to collaborate.	Unspecified	GIS	Adaikalavan Ramasamy	60 Biopolis St, Genome Building, 3rd Floor, Singapore, 138672	Biomedical Sciences,Biomedical Sciences,Bioinformatics	1
56	Catalyst Development using 3D Printing	Materials and Catalyst Structural development using 3D Printing	3D Printing technologies, catalyst information	Literature Survey, Experiemnt, Report Writing	Material Science and Chemical Engineering Background	Unspecified	IMRE	Wang Pei	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Chemical & Molecular Engineering	1
57	Causal analysis to identify beneficial gut microbes for atopic dermatitis in European and Asian populations	Atopic dermatitis (AD) is a global concern, affecting up to 20% of children and 2-5% of adults. Over the past three decades, its prevalence has steadily increased, underscoring the need for more effective interventions. Emerging research has highlighted the gut-skin axis, linking the gut microbiome to various skin conditions such as acne, psoriasis, and AD. Notably, Fecal Microbial Transplantation from healthy donors to moderate-to-severe AD patients has shown promise in improving symptoms. However, the specific gut microbes that may causally improve AD conditions remain unknown. This project aims to investigate the causal relations between gut microbes and AD by performing Mendelian randomization analyses. The identified beneficial gut microbes may serve as a foundation for future probiotic development.	1. Principles of genetic and molecular epidemiology; 2. Practical skills in performing Mendelian randomisation analysis; 3. Data visualisation; 4. Report drafting	The student will be responsible for 1) data cleaning and aggregation; 2) developing analysis code for Mendelian randomisation; 3) reporting analysis result in the research group; 4) drafting analysis summary.	1. Basic understanding of epidemiology and statistical analysis; 2. Interest in applying Mendelian randomisation in cross-population analysis. Previous experience in Mendelian randomisation is not necessary, but the student is expected to learn and perform the analysis during the internship; 3. Experience in coding in R language; 4. Good communication skills	Unspecified	IHDP	HUANG JIAN	30 Medical Drive, Brenner Centre for Molecular Medicine, Singapore 117609	Biomedical Sciences,Biomedical Sciences,Statistics	1
58	Cell-cell communication in spatial transcriptomics data	Cell communication is essential for human physiology, enabling the coordination of cellular activities throughout the body. Through various signaling pathways, cells exchange information to facilitate processes like cell growth, differentiation, programmed cell death and migration. Disruptions in cell communication can contribute to disease progression. For instance, in male pattern baldness, dihydrotestosterone (metabolite of testosterone) alters signaling between hair follicle cells and their surrounding environment. This leads to the miniaturization of hair follicles and subsequent hair loss. Spatial transcriptomics technology such as Stereo-seq and Visium provide us an opportunity to study cell-cell communication in an unbiased manner. This technology preserves the spatial oganization of tissues which allows us to quantify the gene expression of cells within the tissue architecture. We can model the cell-cell communication between two cell using their spatial distance and correlation between expression profiles. Several methods have been published (DeepLinc, spaCI, COMMOT, BATCOM, SpaTalk, Giotto, COMMOT, NCEM, SpaOTsc, CellChat)	Student will learn 1) about spatial transcriptomics data and how to handle it 2) how to implement published cell-cell communication methods in python and R 3) how to compare the results from different methods 4) how to collaborate with experimental scientists and other bioinformaticians	Student will be responsible to 1) implement published cell-cell communication methods 2) document the steps and parameters in the implementation 3) develop metrics to compare the results from different methods	Some experience with any coding software, willingness to learn new softwares, interest in spatial biology and interest to collaborate.	Unspecified	GIS	Gokce Oguz	60 Biopolis St, Genome Building, 3rd Floor, Singapore, 138672	Biomedical Sciences,Biomedical Sciences,Bioinformatics	1
59	Characterising tryptophan metabolism in the placenta	The placenta serves as the functional interface between mother and child. Tryptophan is an essential nutrient found in the diet and is necessary for healthy growth and development in the womb. Our lab is interested in investigating the factors that alters tryptophan processing in the placenta and whether these changes relate to differences in maternal and child outcomes using the local GUSTO mother-child cohort.	The selected student(s) will gain an appreciation for the study of human potential in the areas of developmental/reproductive biology and intrauterine programming of long-term health, while learning practical laboratory skills in cell/tissue culture, molecular biology (eg. extraction of RNA and protein, qPCR, immunoblotting, ELISAs), safe handling of human tissue samples as well as analytical skills in statistics.	'- Follow all lab safety rules - Perform experiments and data processing/analysis as guided by mentor - Regularly read the scientific literature and assist with literature reviews of scientific papers - Attend and participate in lab meetings - Have proof of Hepatitis B antibody titres to work with human tissue samples in the lab	- Undertaking biology subjects at the undergraduate level - Experience with using a micropipette	Unspecified	IHDP	Hannah Yong	Dry lab at Institute of Human Development and Potential, Brenner Centre for Molecular Medicine, 30 Medical Drive, Level 4, Singapore 117609 Wet lab at MD11, Level 4 (Prof Chan's lab)	Biomedical Sciences,Life Sciences,Natural Sciences	1
60	Characterization of Chip-Based Photonic Devices	The internship project is about the characterization of chip-based photonic devices, working closely with the research and development team. Key responsibilities include setting up and maintaining optical and electronic measurement systems, conducting performance tests on photonic components, analyzing experimental data, documenting results, and troubleshooting technical issues. This role provides hands-on experience in photonics, ideal for students or recent graduates in physics, electrical engineering, or related fields. Familiarity with optical instrumentation and data analysis is preferred.	Through this internship, the intern will gain hands-on experience with optical and electronic measurement systems, developing skills in experimental design and data analysis for photonic components. They will enhance their understanding of photonic devices, learn to troubleshoot and resolve technical issues in a lab environment, and build a strong foundation in photonics and its practical applications.	The intern will be responsible for assisting in the characterization of chip-based photonic devices. This includes setting up and maintaining optical and electronic measurement systems, conducting performance tests on photonic components, and analyzing experimental data. Additional responsibilities involve documenting results, troubleshooting technical issues, fabricating and packaging photonic devices, and aiding in the development of new measurement techniques. The intern will work closely with the research and development team to ensure accurate and reliable results.	A background in physics, electrical engineering, or a related field, along with familiarity with optical instrumentation and data analysis, is preferred.	Unspecified	IMRE	Victor Leong / Adrian Utama	Kinesis	Physical Sciences,Physics	1

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
61	Characterizing Nash Equilibria in the Quantum Volunteer's Dilemma	The Volunteer's Dilemma is a well-known game that models decision-making in collaborative situations involving multiple participants. In the classical version, the Nash equilibria often yield suboptimal outcomes, motivating a generalization to a quantum computing framework. This project aims to explore the Nash equilibria in the quantum version of the Volunteer's Dilemma, providing new insights into strategic interactions and potential improvements in collective decision-making.	Students will explore fundamental principles of quantum computing, including quantum states, superposition, and entanglement, and apply these concepts to model and analyze complex interactions in quantum game theory. They will also develop a solid foundation in classical game theory and its quantum extensions, learning key concepts such as Nash equilibria and the strategic considerations unique to quantum games.	Students are expected to review relevant research papers and textbooks on quantum computing and game theory, developing a strong theoretical foundation to support their project work. Students will work on translating classical game theory concepts to a quantum framework, focusing on modeling the Volunteer's Dilemma as a quantum game and analyzing its Nash equilibria. Students will implement algorithms on quantum simulators or real quantum hardware where feasible, gaining hands-on experience in coding, simulating, and debugging quantum circuits related to game theory. Students will collaborate with peers and mentors, discuss findings, and contribute to regular project meetings. They will also document their work, present results, and participate in discussions on how	Students should ideally have a foundational knowledge of quantum computing concepts such as qubits, superposition, and entanglement. However, those without prior experience are welcome, provided they are eager to learn and engage with quantum computing principles throughout the project. Familiarity with fundamental game theory concepts, including Nash equilibria and strategic decision-making, is beneficial. Students without a game theory background should be prepared to study these concepts, as they are essential for understanding and analyzing quantum games.	Unspecified	IHPC	Goh Siong Thye Dax Enshan Koh	1 Fusionopolis Wy, #16-16 Connexis, North Tower, Singapore 138632	Computing and Information Sciences,Applied Mathematics	1
62	Chemical Free and Energy Efficient Wastewater Treatment with Hydrogen Production	Wastewaters need be properly treated to mitigate pollution to environment and reclaim water sources for reuse. The contaminants in wastewaters may present in various types (soluble, non-soluble, inorganic, organic, microbial, etc.) and with different concentrations (from < 1 mg/L to > 100 g/L). Therefore, a comprehensive process including different technologies (biological, chemical, physical) would be a practical solution to remove these contanninants in the wastewaters. However, there are several limitations in current wastewater treatment technologies such as sludge generation by coagulation and biological treatment, chemical input for pretreatment and conditioning of wastewater, and high energy consumption by electrochemical treatment and advanced oxidation processes (AOPs). In this project, we will leverage on the synergistic effect of hybrid wastewater treatment technologies to provide minimal chemical addition, sludge generation and secondary pollution in wastewater treatment. In addition, the potential energy recovery such as hydrogen	The student will learn analytical tools for water and wastewater characterization, electrochemical advanced oxidation process for organic wastewater treatment, filtration process, as well as other research skills including literature review and data analysis.	The attached student should go through HSE induction and briefing and ensure safety compliance at all time during duration of attachment. Student will start the project work, starting with literature review, followed by experimental plan, experiments, data gathering, documentation and final report covering introduction, experimental procedure, results/discussion and conclusion.	N.A.	2	SIMTech	Weiyi Wu	Singapore Institute of Manufacturing Technology (SIMTech) @ Fusionopolis 2 2 Fusionopolis Way #08-04, Innovis Singapore 138634	Engineering and Technology,Chemical and Molecular Engineering	1
63	Cilia and Ciliopathies	Cilia and microtubule-based filamentous organelles that function in signal transduction as well as driving fluid flow and cell motility. Defective cilia cause a wide spectrum of human diseases collectively called ciliopathies. This includes retinal degeneration, polycystic kidney disease, respiratory dysfunction and infertility. The student will use genetics and cell biology in zebrafish, mice and human embryonic stem cell-derived ciliated epithelia to investigate cilia formation and function and how abnormalities in	Genetics, light and confocal microscopy, animal models, molecular biology (PCR, cloning, sequencing etc), protein biochemistry, cell culture, human embronic stem cell culture and differentiation.	Team up with post-doc and graduate student to learn experimental techniques and then develop independence to execute them independently.	Pursuing bachelors or masters in life sciences	Unspecified	IMCB	Sudipto Roy	08-12B, Proteos, 61 Biopolis Drive, Singapore 138673	Biomedical sciences,Bioscience and Biotechnology	2
64	City-scale roadside electric vehicle parking and charging capacity: A deep learning augmented street-view-image data mining and analytic framework	In response to the escalating sales of electric vehicles (EVs), roadside parking and charging have been developed to facilitate EV penetration in many cities. However, its city-scale capacity is usually unknown, hindering effective planning of parking and charging infrastructures. To tackle this problem, this project aims to develop a deep learning (DL) augmented street-view-image (SVI) data mining and analytic framework, consisting of four hierarchical modules. The first module will retrieve geo-locations along roads in the government authorized parking zones (APZs) and obtains SVIs that present both sides of roads centralized at these geo-locations, used to identify suitable roadside parking locations. The second module will conduct transfer learning to determine a suitable SVI dataset with well-defined classes of interested street-view geo-objects and to develop an advanced DL model capable of refined segmentation of various types of roads. The third module will identify different urban functional zones to suggest locations suitable for roadside parking, develops a 3D space geometric projection method to estimate parking areas in each location. The fourth module will predict EV charging hotspots and plan roadside charging locations through geospatial statistics of historical EV charging records in Singapore. This project will greatly facilitate vehicle electrification and promote flexiable and convienicent EV parking and charging, bringing significant impacts	1. gain professional experinece in processing GIS and remote sensing data; 2. obtain practial knowledge in cutting-edge Geospatial Artificial Intelligence; 3. build confidence and new visions on R&D technologies; 4. Strength effective commuications and team work with colleagues at A*STAR	process data, development methods conduct experiments, and analysis results - under my dedicate supervision	Basic knowledge in computer programming (e.g., Python, Java, SQL), and Urban Informatics/ Geographical Information Science / Remote Sensing / Surveying / Urban Planning	Unspecified	IHPC	Rui Zhu	1 Fusionopolis Way, #15 Connexis, Singapore 138632.	Information Technology,Computer Science	2
65	Color metrology for colorimetric sensors and demonstration of application with miniaturized holographic sensor	This project aims to enhance our recently developed miniature holographic pH sensor with smartphone integration capabilities. Building upon our successful implementation of color metrology methods that produce visual colorimetric responses to pH conditions, we propose to develop a smartphone application that will enable precise color recognition and correction. This advancement will transform our sensor into a portable, user-friendly diagnostic tool that can accurately monitor pH levels in bioprocessing applications. The integrated system has potential applications beyond pH measurement, including lactate and glucose monitoring, making it valuable for both industrial	(1) Master holographic sensor development and mobile app programming (2) Apply experimental research methods and data analysis (3) Gain hands-on industry experience in laboratory settings	(1) Conduct pH sensor experiments and calibrations (2) Develop and test smartphone app features (3) Collect and analyze experimental data	Knowledge and experience of programming with Python are preferred.	Unspecified	NMC	Zhang Jing	8 Cleantech Loop, #01-20 B, Singapore 637145	Engineering and Technology,Biochemistry,Computer Science,Electrical engineering,Physics	1
66	Colorimetric wearable sensor for analyte detection	Printed wearables are gaining traction due to its potential as tools for personalized healthcare assistants. The advent of wearables such as Fitbit and Samsung Gear Fit are synonymous with fitness enthusiasts. However such devices monitor physical vital signs such as heart rate and blood pressure. Information at the physiological level is undoubtedly more practical as it provides pertinent feedback of a user's health. As such, sweat sensors can fulfil this gap. As a non-invasive approach, sweat is attractive as it is easily accessible. With a trove of biomarkers in this hypotonic fluid, useful onsite diagnostic information can be gleaned. Usually, a wireless communication component has to be integrated, allowing a user to synchronise with an interface for data interpretation. For ease of operation, this is typically accomplished by a smartphone. However, this can be distractingly cumbersome for a fitness enthusiast. In this project, we aim to eliminate the use of wireless communication by offering a solution in the form of a direct readout. Data is directly displayed on the printed wearable and this allows a user to have immediate access to his physiological status. By using a colorimetric approach, photoconductors will complement with a chemical-responsive active layer. Careful calibration of the electrical readout allows a user to directly ascertain data interpretation, without the need for	1) Spectroscopic characterisations for various types of polymers, small molecules, etc. 2) Various printing techniques for sensor design 3) Calibrating analyte concentration (glucose, uric acid, creatinine, lactate, etc) against different transmittance profile 4) Simple electrical layout design for analyte detection	1) Colorimetric sensor fabrication 2) Sensor characterisation	Basic engineering, simple chemistry	Unspecified	IMRE	Goh Wei Peng	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Biomedical Engineering	1
67	Commanding Mobile Robot AI agent actions using natural language	In this project, the student will explore methods for enabling robots to interpret and execute commands given in natural language, a key step toward user-friendly AI systems. The student will work closely with a team of scientists and engineers, utilizing both simulated environments and physical robots. Cutting-edge large language models (LLMs) will be employed to help bridge the gap between human language and robot actions. This project offers hands-on experience with AI, machine learning, and robotics, advancing autonomous systems' understanding of human commands for dynamic real-world applications.	Understand principles of robotics and AI, and how to bridge between human language and machine language in planning robot actions. Apply advanced AI models to mobile robots with hands-on experience in Nvidia Isaac/robotcasa simulation tools. Develop critical problem-solving skills, focusing on real-world implementation.	Implementation of AI and robotics in simulation and/or real environments	Passion in robotics. Experience in using ROS, proficiency in C++, and simulations will be useful	2	I2R	Albertus Hendrawan Adiwahono	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical and Electronic Engineering	2
68	Computational analysis of spatial multi-omics data	Spatial transcriptomics is a cutting-edge technology that allows researchers to study the gene expression patterns within tissues in their native spatial context. Many diseases, including cancer, are characterized by significant heterogeneity within tissues. The intern will participate in the development of machine learning algorithms and software tools for quantifying the immune cell phenotypes from tumor tissue images.	The intern will have the opportunity to learn bioinformatics software development process, and prepare for a possible career in this exciting field. He/she will have the opportunity to work in a highly interdisciplinary and stimulating environment, and learn how computational biology can help clinicians to fight cancers.	The candidate will design, program, and test software tools for storing and analyzing molecular profiles and tissue images collected from cancer patients. He/she will also have to perform research on current clustering algorithms, and benchmark the performance of these methods.	The intern must have taken undergraduate-level courses in computational biology/bioinformatics, genomics, and machine learning. He/she must be proficient in R, Bioconductor, Python, and comfortable to work under the Linux environment. Prior knowledge/training in cell biology, image processing, or web programming (HTML and Javascript) are preferred but not required.	Unspecified	BII	Loo Lit Hsin	30 Biopolis Street, #07-01 Matrix, Singapore 138671	Computing and Information Sciences,Bioinformatics	1

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(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
69	Computational analysis of spatial omics data	New technologies in spatial transcriptomics now enable us to collect spatially-resolved measurements of gene expression within a tissue. We are looking for students interested in working with spatial omics data generated using cutting-edge technologies.	Students will learn to work with spatial data generated from the latest spatial omics technologies (such as Xenium, CosMx, Vizgen). They will gain experitse in bioinformatics analysis methods and workflows.	Students will work on improving algorithms used in analysing spatial omics data. They will work closely with senior members in the lab who will guide them. Students will be encouraged read, learn, pose questions, and actively pursue their assigned tasks.	Familiarity with Python, deep learning libraries (Pytorch, Tensorflow), along with some existing knowledge of machine learning, deep learning and computer vision.	Unspecified	GIS	Shyam Prabhakar	60 Biopolis Street, Genome L3, Singapore 138672	Computing and Information Sciences,Biomedical Sciences,Bioinformatics	2
70	Computational design of high entropy perovskite for optoelectronics	Lead halide perovskites nanocrystals have been widely studied and applied to optoelectronic devices such as solar cells, lasers, photodetectors, and light-emitting diodes (LED). Doping perovskite in the metal site enhances its radiative rate and allows possible applications in quantum technologies. However, only <10% of the total Pb content can be substituted before structural instability occurs, with the high Pb toxicity limiting potential commercialization of perovskite devices. High entropy alloys (HEA), first proposed in 2004 as an innovative way to maximize configurational entropy to stabilize multicomponent systems, have demonstrated improved structural stability and functional performances. The ideas have been extended to ceramics, oxides and chalcogenide materials used in structural, catalysis and thermoelectric applications. More recently, multi-component substitution in perovskite and double perovskite have been achieved using a mix of isovalent metals, resulting in higher photoluminescence yield and reduced Pb content. The proposed project aims to accelerate the prediction of stable high-entropy phases of perovskite with the vast compositional space using a combination of first-principles density functional theory (DFT)	The student will learn about the cutting edge research in computational material design, and the utilization of emerging materials as a platform for optoelectronics, quantum and sustainability applications. The student will learn about the tools to carry out these research such as density functional theory, cluster expansion and machine learning techniques.	The student will perform first-principles density functional theory calculations on many perovskite alloy structures. The student is expected to write/modify scripts to automate the workflow for a large number of calculations. The student is expected to extract and interpret the output of these calculations such as total energies, band structures, density of states and wavefunctions. Depending on the project progress, the student can participate in structure design of the high entropy perovskite or double perovskite, using surrogate models such as cluster expansion.	Condensed Matter Physics or related knowledge, basic programming skill on using bash or python are desirable.	Unspecified	IHPC	Liu Yun	1 Fusionopolis Way, #16-16 Connexis, Singapore 138632	Physical Sciences,Materials Engineering,Chemistry	1
71	Computational development of antimicrobial therapeutics	We are in the midst of a crisis of antimicrobial resistance, with fewer and fewer antibiotics effective against bacterial pathogens, whilst viral pathogens can mutate rapidly to evade vaccines. This project aims to characterize the mechanisms of action of antimicrobial molecules and therapeutics targeting bacterial membranes and viral envelopes. This will be achieved using computational approaches based on molecular modelling and simulations, and will help to guide collaborative wet lab experiments, towards novel therapeutic approaches.	The student will learn how to use multiple cutting-edge programs and tools in structural biology and bioinformatics. They will gain knowledge in basic principles of structural biology and the biophysics of biomolecular systems. This will enable them to elucidate the structure-function relationships of antimicrobials interacting with membranes, as well as the roles of their dynamics and influence of mutations upon antimicrobial activity.	The student will perform the study as described with supervision from members of the research team. The student will be responsible for doing literature research, searches on bioinformatics servers, setting up simulation systems, and performing subsequent data analysis. Other duties include attending and/or presenting at group meetings, learning how to generate graphs and figures to present data, and writing project reports.	The student should have basic knowledge in biological chemistry, especially structural biology and intermolecular interactions. Experience using Linux command line environments is an advantage. Other desirable skills include experience using bioinformatics servers such as the Protein DataBank (PDB), performing literature searches, and working with biomolecular visualization programs such as PyMOL or VMD. The student must be willing and enthusiastic to learn the basics of computational structural biology, including molecular modelling, molecular dynamics simulations, and simple scripting with Python.	Unspecified	BII	Peter Bond & Jan Marzinek	Bioinformatics Institute, 30 Biopolis Street, #07-01 Matrix,Singapore 138671	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Chemistry	2
72	Computational development of therapeutics against coronaviruses	The COVID-19 pandemic took the world by storm. The ongoing threat of pandemics causes by novel SARS-CoV-2 variants and by other coronaviruses necessitates the development of new therapeutics to prevent future outbreaks. The spike protein is the main structural protein on the surface of coronaviruses and is a critical target for vaccine and drug development. Using molecular modeling and simulations, we aim to understand the interaction of the spike protein with small molecule drugs, lipids, and antibodies. The outcome of this project will contribute to the design of novel therapeutics against coronaviruses to ensure preparedness for future outbreaks.	The students will learn how to use cutting-edge programs and tools in the areas of computational biology, bioinformatics, and structure-based drug design. They will gain knowledge in principles of structural biology and the chemistry and biophysics of biomolecular systems. This will enable them to elucidate the structure-function relationships of proteins, such as the roles of mutations in protein dynamics and protein-protein binding, enabling the prediction of antibody interactions with therapeutic targets such as the spike protein.	The student will perform the study as described with supervision from members of the research team. The student will be responsible for doing literature research, searches on bioinformatics servers, setting up simulation systems, and performing subsequent data analysis. Other duties include attending and/or presenting at group meetings, learning how to generate graphs and figures to present data, and writing project reports.	The student should have basic knowledge in biological chemistry, especially structural biology and intermolecular interactions. Experience using Linux command line environments is an advantage. Other desirable skills include experience using bioinformatics servers such as the Protein DataBank (PDB), performing literature searches, and working with biomolecular visualization programs such as PyMOL or VMD. The student must be willing and enthusiastic to learn the basics of computational structural biology, including molecular modelling, molecular dynamics simulations, and simple scripting with Python.	Unspecified	BII	Peter Bond & Firdaus Samsudin	Bioinformatics Institute, 30 Biopolis Street, #07-01 Matrix,Singapore 138671	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Chemistry	2
73	Computational sequence and structure analysis to combat viral infectious diseases.	Our FluSurver (https://flusurver.bii.a-star.edu.sg/) is the most complete one-stop influenza mutation analysis tool being used by researchers and surveillance experts globally relating to influenza drug resistance, viral fitness, host specificity and antigenic changes. The FluSurver is also a primary analysis tool for the global data science initiative GISAID used by WHO flu surveillance networks. BII/A*STAR has been a technical and scientific partner to GISAID for several years providing analysis tools. When the new coronavirus was discovered by Chinese colleagues, the sequences were shared using GISAID's platform on January 10th 2020 (https://gisaid.org). In addition to the expert advice contributing to build the new system and annotation tools like the CoVsurver (https://gisaid.org/covsurver), the Singapore team has been critical in enabling global genome sharing from the first day to over 16 million genomes from 215 countries and territories by 2023, earning the WHO Chief Scientist's commendation of GISAID as a "game changer". (Swaminathan, Nature 2020). This had significant impact for Singapore and the world. Diagnostics, drugs, and vaccine development were started based on sequences in GISAID and are constantly checked with new incoming data if they are still working well and help to identify new variants. In Singapore, BII has become a hub for multiple institutions and agencies to access and benefit from the GISAID work, from other A*STAR colleagues to NPHL/NCID, MOH, Duke-NUS, hospitals and DSO. Because we can quickly go from genomes to protein structures through modelling in our computers often only requiring the new	study virus evolution and interpret effects of mutations, contribute tools for better surveillance	learn to analyze biomedical data and interpret patterns and biological mechanisms	basic knowledge in scripting languages like python (or willing to learn) and interest to read and understand about the underlying biology of the project	Unspecified	BII	Sebastian Maurer-Stroh	30 Biopolis Street, #07-01 Matrix, Singapore 138671	Computing and Information Sciences,Microbiology,Computer and Software Engineering,AI/ML,Natural Sciences	1
74	Computational sequence and structure analysis to study protein allergenicity in novel food	We have developed our AllerCatPro 2.0 web server for comprehensive analysis and prediction of allergenicity potential from the protein/nucleotide sequence, and visualization of 3D models for the input protein based on the similarity of 3D surface epitopes. AllerCatPro 2.0 provides a user-friendly interface to identify protein allergenicity potential with detailed results for cross-reactivity, protein information (UniProt/NCBI), functionality (Pfam, InterPro, SUPFAM), as well as clinical relevance of IgE prevalence (Allergome) and allergen information of the most similar allergen. We are now studying individual allergen families to improve predictions in real worlkd case studies such as on alternative proteins from insect, fish, plant as well as industrial proteins.	use and develop tools to predict protein allergenicity in novel food from the sequence and structure	learn to analyze biomedical data and interpret patterns and biological mechanisms	basic knowledge in scripting languages like python (or willing to learn) and interest to read and understand about the underlying biology of the project	Unspecified	BII	Sebastian Maurer-Stroh	30 Biopolis Street, #07-01 Matrix, Singapore 138671	Biomedical Sciences,Biomedical Sciences,Bioinformatics,AI/ML,Natural Sciences	1
75	Computational sequence and structure analysis using AI for evaluating genetic variants in human diseases	We aim at bridging the gap from nucleotide variation to protein structures to interpret effects of human mutations. For example, we have helped clinical collaborators to analyze variants found in patients and tried to mechanistically explain their possible role in a range of diseases like cancer, myopia, leprosy or atopic dermatitis. We are participating in the National Precision Medicine Programme to help mapping mutations into 3D protein structures relative to drug binding sites supporting our colleagues at GIS, LKC and PRECISE	Apply and develop workflows of computational methods inlcuding AI to predict effects of mutations on protein structure and function relevant for human diseases	learn to analyze biomedical data and interpret patterns and biological mechanisms	basic knowledge in scripting languages like python (or willing to learn) and interest to read and understand about the underlying biology of the project	Unspecified	BII	Sebastian Maurer-Stroh	30 Biopolis Street, #07-01 Matrix, Singapore 138671	Biomedical Sciences,Life Sciences,Bioinformatics,AI/ML,Natural Sciences	1
76	Conductive meshes and stretchable transparent electrodes	Stretchable and transparent conductive films (STCs) are urgently demonded in wearable devices such as electronic skins, on skin sensors, wearable displays, heat sheets and energy harvesting devices. However, poor stretchability and environmental instability of current STCs limit its application. In this project, metal mesh based STCs will be fabricated with low cost process (e.g. inkjet and self-cracking coating). The strechability and stability of the STC films will be achieved through a novel core-shell structure of the mesh wires. The optical, electrical and mechanical properties of the films will be characterized, and optimization on the STC electrode will be conducted based on the performance data. The STCs will be used for fabrication of self powered on-skin sweat sensors which are currently in development in the lab.	The student will be trained on the solution methods for micro-patterning and electroplating processes as well as the mechanisms, and use them for fabrication of metal-mesh STC films. He will also learn the integration of the STC electrodes into our in-developing wearable optoelectronic devices.	1) Fabrication of self-cracking films on ITO glass using doctor-blade coating 2) Fabrication of metal mesh TCF film by electroplating processes. 3) Measurement for the transmittance, conductivity and bending/stretching cycles, and analyze/optimize the TCF film. 4) Device fabrication of stretchable transparent electrochemical electrodes, and integration into wearable devices.	NA	Unspecified	IMRE	Jiang Changyun	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Materials Engineering	1

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Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
77	Continual Self-Evolving Imitation Learning through Black-Box Optimization with Human/AI Feedback	Imitation learning has achived great success in practical application such as robotics locomotion. Traditional imitation learning are keen on mimicing the expert behaviors from the given demonstrations. However, it may be expensive to obtain large amount of high-quality expert demonstrations in practice, which limits the performance of traditional imitation learning methods. This project aims to develop a novel self-evolving imitation learning method that is able to continually improve itself. To achive this goal, we propose to periodically check the quality of the policy behaviors through human or AI feedback. Then, we leverage the human/AI feedback data to improve the current policy through black-box optimization.	1. Publish papers in top AI conference/journals. 2. Obtain experience in cutting-edge AI research. 3. Improve team working ability. 4. Improve scientific skills: scientific paper writing, presentation, coding, etc.	1. Conduct literature reviews . 2. Develop and implement self-evolving imitation learning models. 3. Collaborate with team members and mentors to troubleshoot and refine models. 4. Present findings and progress in reports and presentations.	1. Pro-active. 2. Self-motivated. 3. Team working. 4. Research experiences in one or more of the following topics: machine learning, reinforcement learning, imitation learning, LLM, RLHF, black-box optimization. Previous paper submision or publication is a plus.	Unspecified	IHPC	Yu Xingrui	1 Fusionopolis Way, #16-16, Connexis North Tower, Singapore 138632	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering ,Natural Sciences	2
78	Continuous manufacturing of carotenoids from recombinant E. coli	The project aims to establish continuous processes for carotenoids production using E. coli strains, in which we will optimize different continuous models. In addition, metabolic engineering will be applied to enhance both the stability and yield of the strains in continuous mode.	1. Hands-on Experience with Microbial Culturing Techniques: aseptic techniques, media preparation, and microbial culture maintenance. 2. Molecular Biology Skills: PCR, DNA/RNA extraction, cloning, and genetic manipulation of microorganisms. 3. Bioinformatics: Acquire skills in analyzing genomic data, understanding gene function, and utilizing bioinformatics tools (Benchling) 4. Experimental Design: Develop the ability to design experiments in microbial engineering projects. 5. Bioprocess Engineering: Learn fermentation processes. 6. Communication Skills: Practice effectively communicating scientific findings through presentations, reports, and discussions within the team. 7. Critical Thinking and Problem-Solving: Enhance problem-solving skills by tackling challenges encountered during experimental work and proposing solutions. 8. Teamwork and Collaboration: Collaborate with other lab members on projects, fostering teamwork and learning to contribute effectively within a research environment. 9. Ethical Considerations in Research: Understand the ethical implications of microbial	1.Conduct research using techniques learned (microbial culturing techniques, molecular biology techniques, fermentation techniques); comply lab safety guidelines. 2.Analyse results and report. 3.Help with common lab duties.		Unspecified	SIFBI	Ngoc-Phuong-Thao NGUYEN	31 Biopolis Street, Nanos Level 6, Singapore 138669	Biomedical Sciences,Bioscience and Biotechnology,Bioengineering	1
79	CRISPR Protein Purification for Cell-Based Screening to Optimize RNA Therapeutic Delivery Systems	With the rapid rise of RNA-based therapies, one major challenge remains: efficiently and precisely delivering these therapeutics to the right cells to activate their therapeutic potential. CRISPR proteins have emerged as powerful tools in enabling this targeted delivery, but effective purification of these proteins remains a critical hurdle in ensuring their functionality for RNA activation. In this project, the student will contribute directly to solving this challenge by helping to establish and optimize a protocol for purifying CRISPR proteins. This work will enable the development of cell-based screening assays for evaluating RNA therapeutic delivery systems. The student will gain hands-on experience in protein expression, purification techniques, and troubleshooting, all while working on a project that is at the forefront of RNA therapeutics and gene-editing innovation.	•Understanding Challenges in RNA Biotechnology Development: Through hands-on work, you'll gain insights into the cutting-edge obstacles that researchers encounter in developing RNA-based therapeutics and the strategies being employed to overcome them. •Hands-on Experience in Experimental Techniques: Gain practical experience in key biotechnology techniques, including RNA handling, DNA cloning, and cell culture. •Experimental Planning and Troubleshooting: Learn how to design and plan experiments from start to finish, considering variables, controls, and potential challenges, troubleshoot experimental issues, refining your problem-solving skills and ability to adapt to unexpected results. •Literature Review and Research: Enhance your ability to conduct thorough literature reviews, critically analyzing scientific papers to inform your own research. •Data Documentation, Analysis, and Presentation: Develop strong skills in documenting experimental procedures and results in a clear, organized manner. You will also gain experience in analyzing data, using software tools to interpret results, and present your findings, honing your ability to	•Ownership of Experimental Execution: Collaborate with the team to plan experiments and take full responsibility for executing them, ensuring that all steps are carried out with precision and scientific rigor. You will manage your own experiments from start to finish, ensuring consistent progress and high-quality results. •Optimization of Protocols: Work closely with mentors to identify areas for improving experimental procedures, developing more efficient, cost-effective, or accurate methodologies. Your contributions will help streamline research processes and increase the reliability of experimental outcomes. •Accurate Record-Keeping: Maintain meticulous and detailed lab notebooks, documenting every aspect of your experimental work. Ensure that all records are accurate, organized, and comply with regulatory and scientific standards, allowing for clear reproducibility and traceability. •Data Presentation and Communication: Regularly present your experimental progress and findings at data update meetings and journal clubs, honing your ability to clearly communicate scientific concepts and results. •Collaborative Problem Solving: Actively engage in brainstorming sessions, contributing innovative ideas and solutions to overcome challenges that arise in the course of research. Your creativity and critical	Biochemistry and molecular biology are preferred	Unspecified	IMCB	Chermaine Tan	61 Biopolis Drive, Proteos, #08-06, S(138673)	Biomedical Sciences,Biochemistry	2
80	Data-driven destination choice modelling for Singapore	Travel demand modelling is a crucial aspect of effective transportation planning. Destination choice modelling is an important step in travel demand modelling, where the focus is on examining the factors influencing the choice of destinations for various trip purposes such as work, education, shopping and leisure. An individual's' decisions regarding their trip destinations are often influenced by the attributes of these destinations like the accessibility and opportunities at these destinations along with the individual specific characteristics of the decision maker. In this project, we aim to develop data-driven destination choice models primarily relying on secondary data sources	1. Experience on data curation and visualization of large-scale geospatial datasets. 2. Understanding of methods used in destination choice modelling. 3. Gaining hands-on experience on data-driven modelling techniques.	1. Literature review on destination choice modelling 2. Data curation and visualization of large-scale mobility datasets 3. Development of destination choice models 4. Documentation of the work in the form of meeting slides, report/manuscript	1. Experience in python programming 2. Experience in handling geospatial datasets 3. Basic understanding of travel demand modelling 4. Experience in statistical modelling or machine learning/deep leaning methods	Unspecified	IHPC	Rakhi Manohar Mepparambath	1 Fusionopolis Way, #16-16 Connexis, Fusionopolis, Singapore 138632	Computing and Information Sciences,Statistics	2
81	Data-Driven Modeling for Material Removal Rate Prediction in Pad Conditioning of Chemical Mechanical Polishing (CMP)	This research project focuses on developing a generalized, data-driven mathematical model to predict the material removal rate (MRR) across conditioning pad surfaces during the chemical mechanical polishing (CMP) process, a critical step in semiconductor manufacturing. By utilizing globally varying parameters to refine the localized Princeton equation, this model aims to enhance accuracy in MRR predictions across the conditioning pad, ultimately improving uniformity and yield in semiconductor production. This approach leverages statistic data to capture complex, non-linear relationships, providing promising solutions for advanced wafer-scale modeling. We are looking for students with a background in mathematics, aerospace, engineering mechanics, or computer science to	1. Mathematical model to serve as a localized Princeton equation for a controllable MRR prediction. 2. A report/paper on the method with a virtual validation. 3. Scientific paper writing skills.	coding, partially algorithm development, and writing	1. Basic Matlab coding skills and 2. a passion to learn.	Unspecified	IHPC	Wang Zhenpei	1 Fusionopolis Wy, #16-16 Connexis, North Tower, Singapore 138632	Engineering and Technology,Manufacturing Engineering	1
82	Data-driven modelling for weather forecasting	Predicting wind variations in the next few days is crucial to effective operations in the aviation and maritime industries. Machine learning tools, such as neural networks, can be utilised to accelerate understanding of convective weather phenomena. We will apply these tools to forecast data combined with sensor information and assess their effectiveness in generating fine-resolution localised forecasts.	Learn about numerical simulation and modelling Learn about weather forecasting and machine learning	Conduct numerical simulation and modelling	Computational/programming skills	Unspecified	IHPC	Ronald Chan	1 Fusionopolis Way, #16-16 Connexis	Engineering and Technology,Computer and Software Engineering,Mechanical Engineering,Physics	1
83	Data-driven modelling for weather nowcasting	Predicting precipitation in the next hour or two, or weather nowcasting, is crucial to effective operations in the aviation and maritime industries. Machine learning tools, such as neural networks, can be utilised to accelerate understanding of convective weather phenomena. We will apply these tools to satellite and radar images, as well as lightning data, and assess their effectiveness in modelling the genesis and transport of weather systems.	Learn about numerical simulation and modelling Learn about weather forecasting and machine learning	Conduct numerical simulation and modelling	Computational/programming skills	Unspecified	IHPC	Ronald Chan	1 Fusionopolis Way, #16-16 Connexis	Computing and Information Sciences,Computer and Software Engineering,Environmental Engineering,Physics	1
84	Deciphering the role of novel targets for skin fibrosis using in vitro 2D/3D human skin models	We aim to develop in vitro 2D and 3D human skin models that mimic skin fibrosis, to better understand the mechanisms driving fibrosis. We also aim to develop cell-based assay to screen library compounds and identify new potential therapeutics for skin fibrosis.	The student will learn how to design experiments, including proper controls. The student will acquire practical skills in mammalian primary cell cultures as well as reconstruction of 3D skin models. The student will also learn various molecular biology and analytical methods, and immunohistochemistry techniques. Through this internship, we intend to cultivate the intern's interests in research as a career	The student is expected to assist research officers and scientists in the development of skin models and assays using different methodologies.	skin biology, cell culture, genetics, molecular biology, immunostaining	2	A*SRL	Carine BONNARD	11 Mandalay Road, #17-01 Clinical Sciences Building, Singapore 308232	Biomedical Engineering	1

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Project No.	Project Title	Project Description	Learning Outcomes for Students	Roles and Responsibilies of Student	Students' pre-requisites	Minimum Duration (Months)	Research Institute of Internship Supervisor	Name of Internship Supervisor	Workplace Address	What is the project's research category?	No. of Students Required
85	Decoding Cellular Motion: Integrating Live Tissue Dynamics with Immunofluorescence Imaging for Enhanced Pathological Insights	Fixed tissue samples have long been the cornerstone of modern pathology and medicine. However, a notable limitation of these samples is the loss of information regarding cell migration and motility vectors, resulting from the single-time sectioning inherent in fixed tissue preparation. Recent advancements in cancer immunology have underscored the pivotal role that the movement of immune and cancer cells plays in disease progression. While live tissue imaging presents a promising avenue for studying cell motility, current methodologies fall short in providing the necessary volume and scale required for comprehensive, direct studies. To address this gap, we propose integrating motility patterns observed from live tissue imaging experiments with existing large-scale immunofluorescence imaging datasets. By doing so, we aim to accurately infer cell motility vectors within fixed tissue samples. This innovative approach will equip doctors and researchers with a more nuanced understanding of how cell motility interacts with and influences disease progression, thereby enhancing the potential for breakthroughs in diagnostic and therapeutic strategies.	1. Understanding of Cell Motility and Disease Progression: Students will gain an in-depth understanding of how cell motility vectors influence disease progression, particularly in the context of cancer immunology. 2. Mastery of Imaging Techniques: Students will become proficient in both live tissue imaging techniques and immunofluorescence imaging, understanding their applications, limitations, and how to integrate data from these sources.3. Data Integration and Analysis: Students will develop skills in integrating and analyzing complex datasets, learning to combine live tissue motility patterns with large-scale immunofluorescence imaging data. 4. Research Methodologies: Students will learn to design and execute experiments, analyze results, and draw meaningful conclusions that contribute to the field of pathology. 5. Critical Thinking and Problem-Solving: Students will enhance their critical thinking and problem-solving abilities by addressing the challenges of studying cell motility in fixed tissue samples.	1. Literature Review and Theoretical Understanding: Conduct a comprehensive review of existing literature on cell motility, fixed tissue samples, and imaging techniques. Understand the current challenges and limitations in studying cell motility within fixed tissue samples.2. Imaging and Data Collection: Participate in live tissue imaging experiments to observe and record cell motility patterns. Collect and curate large-scale immunofluorescence imaging datasets from existing sources. 3.Data Integration: Develop methods to integrate live tissue motility data with immunofluorescence imaging datasets. Use software tools and statistical methods to align and correlate data from different imaging techniques. 4. Model Development: Assist in the creation of computational models to predict cell motility vectors within fixed tissue samples based on integrated datasets. Validate models using both existing and newly acquired data. 5. Analysis and Interpretation: Analyze integrated data to identify patterns and insights related to cell motility and disease progression. Interpret findings in the context of cancer immunology and pathology. 6. Documentation and Presentation: Document all research activities, methodologies, and findings in a clear and concise manner. Prepare and deliver presentations to communicate research progress and outcomes to the project team and broader scientific community. 7. Collaboration and Communication: Work closely with other team members, including		Unspecified	BII	YU Weimiao	Bioinformatics Institute 30 Biopolis Street #07-01 Matrix Singapore 138671	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Natural Sciences	2
86	Deep Learning for Cancer genomics	The advent of precise and affordable high-throughput DNA sequencing technologies has recently led to a breakthrough in data generation for cancer research. The research field is generating massive datasets comprising genetic and molecular profiles of tumors in combination with detailed medical histories of the patients. Our lab (www.skandilab.org) is working on data mining of such datasets with the aim of improving cancer diagnosis and treatment. In this project, the student will assist to co-develop machine learning and deep learning approaches to identify cancer causing mutations from tumor and liquid biopsy (blood samples) DNA sequence data. These datasets comprises thousands of candidate features and billions of training instances (mutations).	The student will be exposed to new areas cancer research, genetics, bioinformatics, data science, and machine / deep-learning.	Literature studies, data analysis, software development.	Special knowledge/Skills Required: * Strong quantitative background (such as statistics, bioinformatics, computer science, physics, engineering) * Strong programming skills, preferably in Python * Knowledge of linear algebra * Knowledge and experience with machine learning and deep learning is a plus, but not a requirement	Unspecified	GIS	Anders Skanderup	60 Biopolis Street	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Mathematics	2
87	Deep ultra-violet Nanophotonics Light Source	We invite prospective researchers to engage in advanced investigations at the convergence of nanophotonics, nanotechnology, and materials science. Deep Ultra-Violet (DUV) light, with wavelengths shorter than 300 nm, pivotal for applications in biological sensing, DNA analysis, nano-photolithography, and water purification, confronts challenges stemming from the scarcity of suitable materials within this spectral range. Our project aims to pioneer advancements in DUV coherent light sources and resonant nanophotonic devices. We seek to develop coherent and high-fluence DUV light sources to enable compact nano-photolithography process using novel DUV nanophotonic devices and designs, employing nonlinear optics to improve the up-conversion efficiency through integrating novel nonlinear two-dimensional materials to enhance the nonlinear conversion efficiency, exploring gain materials for light's coherence and chirality control. Prospective candidates possessing degrees in electrical engineering, applied physics, physics, or related disciplines, along with expertise in simulation techniques (FDTD/FEM) and nanofabrication, are invited to contribute to the advancement of DUV nanophotonics.	1 - Learn how to develop coherent and high-fluence DUV light sources to enable compact nano-photolithography process using novel DUV nanophotonic devices and designs, 2 - study and employ nonlinear optics to improve the up-conversion efficiency through integrating novel nonlinear two-dimensional materials to enhance the nonlinear conversion efficiency, and 3 - survey and exploring gain materials for light's coherence and chirality control.	1 - Develop coherent and high-fluence DUV light sources to enable compact nano-photolithography process using novel DUV nanophotonic devices and designs, 2 - employing nonlinear optics to improve the up-conversion efficiency through integrating novel nonlinear two-dimensional materials to enhance the nonlinear conversion efficiency, and 3 - exploring gain materials for light's coherence and chirality control.	Prospective candidates possessing degrees in electrical engineering, applied physics, physics, or related disciplines, along with expertise in simulation techniques (FDTD/FEM) and nanofabrication	Unspecified	IMRE	Omar Abdelrahman Mohamed Abdelraouf	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Physics	2
88	Delivery of biologics into cells using coacervating peptide technology.	Express and purify various therapeutic cargos developed in the lab. Then test these in tissue culture to score for functional delivery using co-acervating peptides as delivery vehicles.	Student will learn general molecular biology skills including protein expression and purification along with tissue culture.	Help with construction of expression plasmids. Carry out protien expression and purification. Test for delivery of proteins in tissue culture model.	Keen to learn and implement new methodologies in field of therapeutics delivery.	Unspecified	IMCB	Farid Ghadessy	61 Biopolis Drive		1
89	Design Interaction Sensor for Improved Pose Estimation During Physical Aerial Interaction	This project aims to design an interaction sensor to enhance pose estimation accuracy for aerial robots during physical interactions with their environment. By providing real-time tactile feedback, the sensor allows aerial robots, such as drones, to maintain stable and accurate positioning while in contact with various surfaces. Traditional pose estimation methods rely primarily on visual or inertial data, which can be unreliable in challenging environments. This tactile-based approach improves pose estimation by capturing detailed contact and force data, enabling aerial robots to perform complex tasks such as inspection, maintenance, and assembly with greater precision and adaptability. The project involves sensor design, data integration to ensure robust and responsive pose estimation, ultimately expanding the operational capabilities of aerial robotic systems in dynamic and constrained environments.	1. Understanding of Tactile Sensing and Odometry: Gain a solid foundation in tactile sensing principles, including the physics of force sensing, contact mechanics, and how tactile feedback contributes to odometry and pose estimation in robotics. 2. Sensor Design and Prototyping Skills: Develop hands-on skills in designing and prototyping sensors, electronic component integration, and building lightweight, responsive systems tailored for aerial applications. 3. Data Processing and Fusion: Learn how to process tactile sensor data and integrate it with other sensor data, such as IMU, using algorithms that improve pose estimation accuracy. This includes skills in filtering, data fusion, and handling noise in sensor data. 4. Getting exposure in a professional robotics	1. Design and Development 2. Data Collection and Processing 3. Testing and Evaluation 4. Documentation and Reporting	1. Computer-Aided Design (CAD) experience 2. Sensors integration and testing (good to have) 3. Basic coding experience, especially with embedded systems 4. Do-It-Yourself (DIY) experience 5. Excellent team player attitude	2	I2R	Nursultan Imanberdiyev	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical and Electronic Engineering	1
90	Design of a sub-micron pixel for color down-conversion in display technologies	Color down-conversion of light from blue to green or red is an optical process used to create red, green and blue (RGB) pixels that constitute the basic blocks in display technologies (like in LED screens for instance). However, the current pixels in the market are few microns in size, limiting the resolution of the devices. In this work, using plasmonic nanoantennas (that is, nanometric particles made of noble metals such as gold or silver and that can strongly interact with light because of their optical resonances), we aim at designing sub-micron pixels that efficiently convert an incident blue light into green or red colors. For that, the student would be provided commercial softwares to run electromagnetic simulations and to design a system with the desired optical specifications.	Experience to work in an international team, with potential applications into the field of display technologies. Learn state-of-the art softwares used for optical designs and more general muti-physics designs.	Learn about numerical software to conduct optical simulations. Understand the desired outcome of the project, and investigate a suitable design that meets the requirements.	Programming (Python, Matlab or other languages). Some knowledge in electromagnetism (wave optics or wave physics in general).	Unspecified	IMRE	Emmanuel Lassalle	2 Fusionopolis Way, Innovis, Singapore 138634	Physics,NA,Engineering and Technology	1
91	Designing Microbial Consortia to Enhance Fermented Food Flavors using AI-based genome-scale metabolic modeling	Flavor poses a challenge in many plant-based food but can be addressed by using fermentation to both enhance desirable flavors and reduce off-flavors. However, different microbes perform differently depending on their interactions and the substrates. To address this challenge, we are developing an approach leveraging on genome-scale AI-based metabolic modelling and metatranscriptomic data. This will help to elucidate the metabolic capacity of individual strains within the context of the community and their contributions to flavor productions. Such an understanding will enable us to design more effective microbial composition.	Appreciation & skills in data science, systems biology modelling, machine learning, & metatranscriptomics.	Conduct metatranscriptomics analysis. Apply AI-based metabolic modelling. Develop deployable, well-annotated, & neat codes based on interactive python notebook.	Experiences & skills in python coding. Willingness to explore, learn, and apply machine learning techniques. Take initiative & with 'can do' spirit!	Unspecified	BII	Yeo Hock Chuan	Bioinformatics Institute 30 Biopolis Street #07-01 Matrix Singapore 138671	Engineering and Technology,Bioscience and Biotechnology,Bioinformatics,Production and process Engineering,Natural Sciences	1
92	Developing a quantum computer with 2D materials	Quantum computers are transformative technologies with disruptive applications in many fields, including finance, logistics, aerospace, agriculture, medicines, communications, and simulations. To get to a universal, fault-tolerant quantum computer capable of such behemoth tasks, radical solutions are needed to address the challenges of quantum computers today, mainly in the area of quality and quantity. Current versions are mainly based on well-known material systems such as superconducting circuits and silicon, but emerging quantum materials with intrinsic quantum phenomena may present intriguing opportunities. Here we aim to utilise low-dimensional quantum materials to build the first spin-valley 2D qubit for quantum information processing applications.	Students will have experience working in cleanrooms. They will be exposed to fabrication techniques and tools such as nanolithography lithography, thermal deposition systems, and 2D material stacking. They will learn and work with measurement tools like electrical probe stations and dilution refrigerators, which can cool samples to extreme temperatures colder than outer space (-273 degrees celsius). Students will learn to process and analyze experimental data, and should be able to apply their class room learning on material and solid-state physics to real world experiments.	Students will be responsible for synthesizing and basic characterization of material properties, and assist staff in device fabrication. Students will be responsible for their sample and data.	Curious with a drive to learn more about science. Physics, material science, electrical engineering backgrounds. Python programming knowledge is useful.	Unspecified	Q.InC	Chit Siong Aaron Lau	2 Fusionopolis Way, Innovis, #08-03	Physical Sciences,Materials Engineering,Physics	2

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
93	Developing a virtual quantum network for space-based quantum technologies	The project aims to design and develop a global quantum network on a virtual platform that features known quantum physics and technologies. As a first step, the distribution of secret keys through continuous and discrete variable quantum key distribution protocols will be implemented and simulated. This includes the virtual design and modelling of stationary/dynamic nodes and links in the network as well as the incorporation of real-time weather data. The virtual network is to be extended to enable the simulation of quantum sensing between different links and nodes, the use of classical/quantum algorithms for path optimisation through the network, and design of virtual nodes to incorporate the characteristics of quantum technologies such as quantum memories.	(1) Develop an understanding and appreciation for quantum physics and technology through the three pillars of communication, computation, and metrology by studying and applying quantum key distribution, quantum algorithms/memories, and squeezed light. (2) Develop an understanding of how quantum networks are structured, operate, and advantageous for next generation communications and computation. (3) Develop collaboration and networking skills desirable in academia.	(1) Develop software for a virtual quantum network. (2) Collaborate with academics in the different facets of the project. (3) Take part in resulting publications.	(1) Strong background in programming: GUI development, API development, OOP. (2) Good verbal and written communication skills. (3) Motivated and willingness to learn. (4) Background in quantum physics is not required but is desirable.	Unspecified	Q.InC	Mikhael Sayat	2 Fusionopolis Way, Innovis, Level 9, Singapore 138634	Physical Sciences,Computer and Software Engineering,Physics	1
94	Developing AI-Driven Algorithms for Real-Time Task Management in Industrial Automation	The intern will focus on creating advanced algorithms to decompose complex industrial tasks into executable atomic units. This involves employing machine learning techniques to analyze structured high-level tasks and automatically break them down into sub-tasks based on predefined criteria such as technical feasibility and resource requirements. The project will require iterative testing and refinement of the algorithms through simulations and integration with real-time operational data.	Gain hands-on experience in applying machine learning algorithms in a real-world industrial context. Develop expertise in dynamic task decomposition strategies using AI. Enhance problem-solving skills by addressing real-time data integration challenges.	1) Develop test scenarios for data collection. 2) Perform data collection and preprocessing 3) Develop AI based task decomposition strategies. 4) Help team in coding and integration.	Proficiency in programming languages such as Python. Experience with machine learning libraries and frameworks (e.g., TensorFlow, PyTorch). Knowledge of algorithm design and system modeling.	Unspecified	ARTC	Pranjal Vyas	Advanced Remanufacturing and Technology Centre (ARTC) 3 CleanTech Loop, #01/01, CleanTech Two, Singapore 637143	Computing and Information Sciences,Computer and Software Engineering	1
95	Developing an automatic algorithm for estimating treatment effects from Big Data	The goal of this project is to develop an automated algorithm that appropriately identifies subsets of treated and untreated individuals from large clinical datasets, and draw conclusions about treatment effects (or lack thereof) using principled statistical approaches.	Student will gain a deep understanding of the use of propensity score methods in estimating treatment effects in real world clinical settings, and develop software to execute these methods	Conduct extensive simulation study, test hypotheses and draw conclusions from data	Basic programming (or willingness to learn), statistics, hypothesis testing, confidence intervals	2	I2R	Benedict Wong	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Statistics,Mathematics	1
96	Developing circular RNA strategies for RNA vaccines	The recent development of mRNA vaccines has revolutionized our ability to protect against SARS-CoV-2 virus and opened the possibility of vaccinating us broadly from diseases including viral, bacterial infections, and even cancer. The current mRNA vaccine utilizes a linear mRNA that is modified, capped and polyA tailed. This RNA is then packaged with lipid nanoparticles and delivered into human cells through intramuscular injection. While highly effective, current RNA vaccine designs suffer from several drawbacks, including the need for low temperatures for transport and storage, the need for high doses to be injected, development of allergic reactions due to formulation, a lack of target specificity and high cost. As such, much remains to be studied with regards to increasing the stability and translatability of the RNA, the formulation of the nanoparticle and alternative delivery methods. Here, we combine expertise in RNA biochemistry, structural biology, nanoparticle delivery and immunology to develop circular RNA strategies towards SARS-CoV-2. If successful, circular RNA vaccine strategies can also be applied to protection against other	The student will learn cell culture, molecular biology techniques including western blotting, dot blotting and cloning, as well as high throughput sequencing library preparations to study different aspects of RNA.			Unspecified	GIS	Wan Yue	60 Biopolis Street, Singapore 138672	Biomedical Sciences,Biomedical Sciences	2
97	Developing In-Cell Cleavage Assays for Optimizing RNA Therapeutics	RNA therapeutics hold great promise, but one of the biggest hurdles in their development is the discrepancy between cell-free assays and in-cell functionality. While RNA-based solutions often perform well in simplified cell-free systems, translating that efficiency to living cells presents a new set of challenges. In this project, you will work on developing an in-cell cleavage assay to evaluate the functionality of our RNA-based solution for cell-targeted activation of RNA therapeutics. This critical step will bridge the gap between in vitro testing and real-world application, helping to refine and optimize our approach for cellular efficiency. The intern will gain hands-on experience in cell culture techniques, using software tools to interpret results, as well as exposure to cutting-edge sequencing technologies, all while contributing to solving one of the key challenges in RNA therapeutic development.	•Understanding Challenges in RNA Biotechnology Development: Through hands-on work, you'll gain insights into the cutting-edge obstacles that researchers encounter in developing RNA-based therapeutics and the strategies being employed to overcome them. •Hands-on Experience in Experimental Techniques: Gain practical experience in key biotechnology techniques, including RNA handling, DNA cloning, and cell culture. •Experimental Planning and Troubleshooting: Learn how to design and plan experiments from start to finish, considering variables, controls, and potential challenges, troubleshoot experimental issues, refining your problem-solving skills and ability to adapt to unexpected results. •Literature Review and Research: Enhance your ability to conduct thorough literature reviews, critically analyzing scientific papers to inform your own research. •Data Documentation, Analysis, and Presentation: Develop strong skills in documenting experimental procedures and results in a clear, organized manner. You will also gain experience in analyzing data, using software tools to interpret results, and present your findings, honing your ability to communicate your science.	•Ownership of Experimental Execution: Collaborate with the team to plan experiments and take full responsibility for executing them, ensuring that all steps are carried out with precision and scientific rigor. You will manage your own experiments from start to finish, ensuring consistent progress and high-quality results. •Optimization of Protocols: Work closely with mentors to identify areas for improving experimental procedures, developing more efficient, cost-effective, or accurate methodologies. Your contributions will help streamline research processes and increase the reliability of experimental outcomes. •Accurate Record-Keeping: Maintain meticulous and detailed lab notebooks, documenting every aspect of your experimental work. Ensure that all records are accurate, organized, and comply with regulatory and scientific standards, allowing for clear reproducibility and traceability. •Data Presentation and Communication: Regularly present your experimental progress and findings at data update meetings and journal clubs, honing your ability to clearly communicate scientific concepts and results. •Collaborative Problem Solving: Actively engage in brainstorming sessions, contributing innovative ideas and solutions to overcome challenges that arise in the course of research. Your creativity and critical thinking will help drive the project forward, fostering		Unspecified	IMCB	Chermaine Tan	61 Biopolis Drive, Proteos, #08-06, S(138673)		2
98	Developing innovative data-driven approach for discover governing equations in systems biology	In 1601, after ~40 attempts to fit the world's best data on planetary orbits to various models, Johannes Kepler found that Mars' orbit was elliptical, resulting in a scientific revolution. This is a fundamental problem to scientists working in the basic sciences: given a set of data, what are the governing equations (and parameters) generating the data? As systems biologists, we are working on key pillars enabling a fully data-driven approach to uncover the underlying mechanistic equations driving the dynamics of metabolic & signaling networks. This will have potential applications in the biotechnological and biomedical domains, such as biomanufacturing, aging, and disease treatment. More fundamentally, the successful development of the approach will enable the discovery of useful and hitherto unknown laws of nature.	Appreciation & skills in data science, systems biology modelling, and machine learning techniques.	Innovatively apply techniques, ideas, and concepts. Develop deployable, well-annotated, & neat codes based on interactive python notebook.	Experiences & skills in python coding. Willingness to explore, learn, and apply machine learning techniques. Take initiative & with 'can do' spirit!	Unspecified	BII	Yeo Hock Chuan	Bioinformatics Institute 30 Biopolis Street #07-01 Matrix Singapore 138671	Physical Sciences,Biochemistry,Applied Mathematics,Chemical and Molecular Engineering,Chemistry	1
99	Developing scalable in-vitro models for inherited retinal diseases to evaluate RNA-based and cell replacement therapies	This project addresses the unmet need of developing a scalable, robust, in-vitro disease model tailored for IRDs like AMD (Age-Related Macular Degeneration) and Stargardt. The primary goal is to create a model that accurately mimics the physiological environment of the human retina, thereby enabling comprehensive preclinical assessments of emerging therapies. Additionally, this research will investigate the immune responses triggered by these therapies using in-vitro immunogenicity assays, providing crucial insights into the safety and compatibility of therapeutic interventions for retinal disorders.	The student will acquire expertise in the handling, maintenance, and optimization of cell culture systems. They will gain practical experience with a range of cell culture-based and molecular biology techniques. Some of them are quantitative PCR (qPCR), Western blotting, ELISA, standard PCR, as well as assays for assessing cytotoxicity and apoptosis, among others.	1. To do the experiments and keep records of the same. 2. To prepare chemicals	Basic wet lab and molecular biology techniques - pipette handling, aseptic techniques for cell culture, Immunochemistry, western blot .	Unspecified	IMCB	Animesh Banerjee	05#15, 61 Biopolis Drive, Proteos, Singapore - 138673	Biomedical Sciences,Life Sciences	1
100	Developing therapeutic approaches for tissue scarring and fibrosis based on mechanobiology	Skin scarring is an example of tissue fibrosis, or dysregulated wound healing. As many as 45% of deaths in the developed world may be related to fibrosis or scarring of various organs, including diseases such as metabolic dysfunction associated steatohepatitis (MASH, affecting liver) and idiopathic pulmonary fibrosis (IPF, affecting lung). Fibrosis-associated disease is expected to rise with the aging population. We will study protein-protein interaction networks relevant to mechanobiological regulation of tissue fibrosis and scarring. This may include genome engineering of stable cell lines for proximity labelling proteomics and biochemical or microscopy validation of protein interactions. We will also elucidate the role of specific proteins of interest using RNAi or CRISPR. Ultimately, we hope to identify novel therapeutic targets for the treatment of fibrosis that can be evaluated in mouse models of disease.	Achieve increasing independence in planning and performing rigorous, well-controlled laboratory experiments in the area of cell and molecular biology. Attain greater understanding of the field of research, and the underlying principles of research techniques. Gain appreciation for the spectrum of biomedical research activities, from basic discovery research to pre-clinical studies. Become comfortable working in a life science laboratory environment. Develop record-keeping and presentation skills relevant to biomedical laboratory research.	Work under supervision of the project supervisor and other lab members to perform cell and molecular biology experiments with increasing independence as the attachment progresses. Plan experiments and maintain detailed experimental records. Assist in laboratory maintenance and upkeep. Prepare and present presentations and reports to update supervisor and lab on progress.	Motivated to read relevant biomedical scientific literature, learn scientific thinking, and to work in a biomedical science laboratory. Hands-on laboratory experience in molecular and cell biology strongly preferred.	2	A*SRL	Yin Loon LEE	A*STAR Skin Research Labs, 8A Biomedical Grove, #06-06 Immunos, Singapore 138648	,Biomedical Sciences,Biomedical Sciences	1
101	Development of a Histology Image Visualization Tool with Integrated Molecular Prediction Capabilities	This project aims to develop a cloud-based histology image visualization tool with integrated molecular prediction capabilities. Leveraging the AWS platform, the tool will ensure seamless scalability, secure data handling, and high computational performance. The architecture will support easy deployment and accessibility, enabling clinical and non-computational collaborators to use the tool with minimal technical requirements, thus facilitating broader translational research and clinical adoption.	1, They can gain hands-on experience in handling real-world biological (imaging) data. 2. They can develop proficiency in analyzing large-scale biological datasets and interpret the results and draw meaningful conclusions from complex biological data 3. They can enhance their software development skill. 4. Interns have opportunities to present their research findings.	1.Organizing their time well 2.Updating work progress on weekly basis 3.Reading papers to learn about digital pathology and AI approaches for spatial immunology 4.Resourcing for software packages when necessary 5.Maintaining a positive learning attitude	1.Deep learning/ image processing skill, AWS experience will be a plus 2.Problem solving skill 3.Fundamental knowledge of biology/ immunology	Unspecified	BII	Mai Chan LAU	8A Biomedical Grove, Immunos, Level 4, Singapore 138665	Biomedical Sciences,Life Sciences,Bioinformatics,Chemical and Molecular Engineering,Mathematics	2

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(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	Project Title	Project Description	Learning Outcomes for Students	Roles and Responsibilies of Student	Students' pre-requisites	Minimum Duration (Months)	Research Institute of Internship Supervisor	Name of Internship Supervisor	Workplace Address	What is the project's research category?	No. of Students Required
102	Development of a Multi-Agent AI Disruption Monitoring System for Supply Chain Resilience	This project aims to enhance our Early Disruption Monitoring prototype, which currently scans global news for potential supply chain disruptions. The intern will expand this into a web/mobile application using a multi-agent AI system, where specialised AI agents work together to deliver early risk detection and actionable recommendations, supporting supply chain stability. Each AI agent will have a defined role: [News Monitoring Agent] Scans global news for potential disruptions. [Risk Assessment Agent] Analyses internal data to identify vulnerable supply chain areas. [Impact Analysis Agent] Evaluates the significance of events for specific supply chain components. [Recommendation Agent] Suggests adjustments for inventory and supply chain planning. [Boss Agent] Consolidates and delivers daily summary and	1. Develop expertise in Large Language Model (LLM)-driven, multi-agent systems. 2. Gain practical skills in applying LLM to solve complex supply chain challenges. 3. Strengthen technical proficiency in web and mobile application development. 4. Gain experience in analysing real-world data to make informed recommendations.	1. Work with the R&D team to understand and enhance the current disruption monitoring prototype. 2. Develop a functional web/mobile application with multi-agent capabilities. 3. Design, test, and optimize AI agents for tasks such as data retrieval, supply chain analysis, impact evaluation, and recommendation generation. 4. Integrate and refine agent interactions to ensure accuracy and responsiveness. 5. Document project progress and outcomes, and present a final report.	1. Experience in web/mobile app development. 2. Familiarity with AI development frameworks (e.g., LangChain, LangGraph, OpenAI, Microsoft AutoGen) is helpful but not mandatory. 3. Proactive and self-motivated, capable of taking ownership of project from concept to deployment.	2	SIMTech	Wei Yuen Teng	Advanced Remanufacturing and Technology Centre (ARTC) 3 CleanTech Loop, #01/01, CleanTech Two, Singapore 637143	Computing and Information Sciences,Computer and Software Engineering	2
103	Development of a new biodegradable thermogels.	This project aims to develop new biodegradable thermogels. Fundamentally, the spatial functionalization densities of polymers are hypothesized to alter their micellization self-assembly and impact their gelation behaviour. This project will investigate polymers with different levels of functionalization densities and study their resulting properties.	- Working independently in a research laboratory environment - Experimental design, planning and execution - Time management - Critical thinking	The student will be involved with polymer synthesis and characterization, as well as analysis of the resulting gel properties.	STEM background preferred, able to work in a wet-chemistry laboratory	Unspecified	IMRE	Chang Jun Jie	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Biomedical Engineering,Chemistry	1
104	Development of AI-enabled Electric vehicle (EV) power drivetrain technology	The drivetrain (motor and drive electronics) are core components of any EVs that deliver mechanical power from the prime mover to the driven components. The drivetrain plays a vital role for the overall performance of the electric vehicles that deliver power to the drive wheels. EV drivetrain technology is constantly evolving. This project is R&D of improving the drive cycle efficiency through a combination of AI-enabled algorithms with novel traction motor topology to achieve high power density through the optimization of non-conventional motor parameters. Students will have a chance to co-develop electromagnetic modelling of a high performance traction motor and generation of AI-enabled	Students are responsible to co-develop AI-enable algorithm and data analysis to improve drive cycle efficiency of future generations electric vehicles. Students have a chance to learn real world research and involved in the co-development of AI generated machine learning model to improve the drive cycle efficiency for next gen Electromobility applications.	•Involve as a team member in electromagnetic modelling EV drivetrain system •Assist in developing AI-enable algorithm and data analysis	This project is suitable for students studying in electrical, electronics, mechanical Engineering, computer science or a related fields. Basic knowledge in computational electromagnetic, engineering physis and AI model development & data analysis is preferred.	Unspecified	IHPC	Hla Nu Phyu	1 Fusionoplis way, #16-16, Connexis North, Singapore 138632	Engineering and Technology,Computer Science,Electrical and Electronic Engineering ,Physics	2
105	Development of Aqueous Plasma Electrolytic Polishing for Efficient Surface Finishing of Additively Manufactured Metal Parts	Plasma electrolytic polishing (PeP) is a post-processing technique that enhances the surface quality of additively manufactured (AM) parts by reducing roughness, improving wear behavior, biocompatibility, and fatigue strength, and creating glossy surfaces in a short time. This immersion-based process is ideal for complex geometries and uses environmentally friendly electrolytes, making it a promising option for AM parts. However, several considerations must be addressed, including developing suitable electrolytes for different AM material alloys, ensuring the part design compensates for surface properties that affect processing time and efficiency, and overcoming challenges with deep cavities, part size limitations due to power constraints, and the need for uniform polishing, particularly in intricate internal channels where the Faraday cage effect may occur. Additionally, polishing effectiveness depends on the initial surface quality, and deep	Upon completing this project, the student will conduct a comprehensive literature review, study the aqueous PeP process, and perform detailed surface characterization. They will design and build devices for a lab setup that facilitates continuous PeP polishing using an optimized aqueous electrolytic solution. The student will also have the opportunity to explore and contribute to other related research areas within the group.	Conduct experimental work, document results, observations, and findings, and report progress updates and final outcomes in accordance with scientific standards. Ensure strict adherence to safety protocols and organizational requirements throughout the process.	Basic engineering domain knowledge, majored in material science, mechanical engineering etc. GPA higher than 4.0 Intern duration at least 6 months	2	SIMTech	Neo Wee Keong Dennis	A*STAR Singapore Institute of Manufacturing Technology (SIMTech) @ CT2B, 5 Cleantech Loop #01-01, CleanTech Two Block B, Singapore 636732	Engineering and Technology,Manufacturing Engineering,Chemistry	1
106	Development of Dedicated Domain Features for AI Digital Pathology Diagnosis	Identifying Key Human-interpretable Image-Driven for Disease Grading, Diagnosis and Prognosis. Develop and validate a set of human-interpretable, hand-crafted morphological features that are crucial for recognizing different disease grades in pathology images. This involves close collaboration with pathologists to identify and define these features. Create and validate hand-crafted texture-based features, i,e, domain features, that help in differentiating disease grades in pathology images. These features can include metrics like texture homogeneity, contrast, and entropy. Investigate the role of color and intensity variations in pathology images for disease grade recognition. Develop hand-crafted features that capture these variations and correlate them with disease progression.	i). A validated set of hand-crafted domain features for AI models ii). Improved accuracy and interpretability in disease grade recognition and improve the model optimization. iii). Provide explainable AI for the field of AI Digital Pathology Diagnosis.	A). Literature Review: Study existing hand-crafted features in digital pathology, including morphological features, texture-based features, color and intensity-based features. B). Feature Identification: Collaborate with medical experts to identify key features such as cell shape, size, density, and arrangement relevant to different disease grades. Explore existing methods of texture analysis in medical imaging. Develop texture-based feature extraction techniques, including metrics such as texture homogeneity, contrast, and entropy. Study how color and intensity changes in pathology images correlate with different disease grades. Develop algorithms to extract color and intensity-based features, such as color histograms, intensity gradients, and color texture patterns. C). Integration and Testing: Integrate these features into a classification model and evaluate its performance on diverse multi-centre pathology image datasets.	Nil	Unspecified	BII	YU Weimiao	Bioinformatics Institute 30 Biopolis Street #07-01 Matrix Singapore 138671	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Natural Sciences	1
107	Development of high power and energy efficient electric drivetrain for electromobility applications	The aim of the research project is to investigate how the power density and efficiency of an high speed electric machine can be enhanced through improved heat dissipation. A computational model of the electric machine will be developed to demonstrate how heat dissipation can be maximized. Through this investigation the optimal cooling conditions that maximizes the power density and efficiency will be determined. The concept device will be evaluated on an experimental set-up simulating a typical drive cycle in an electromobility applications. The outcome of this research will lead to the significant improvement of the power density and efficiency of electric powertrain systems deployed in electric vehicles	1. Achieve competencies in the usage of computational software tools e.g. COMSOL Multiphysics and perform electromagnetic / thermal analysis of an electrical machines 2. Gain practical skills in the setting up of experiments, design of experimental procedures and usage of instruments to characterize non-isothermal flow 3. Gain understand of the following: a) Operating principles of electrical machines b) Electromagnetic enhancement in electric	1. Design analysis and optimization – electromagnetic and thermal analysis, trade-off analysis and application of optimization techniques 2. Prototyping and experimentation – design of experiments, cooling system implementation, instrumentation and experimental testing	1. Good understanding of electromagnetics, heat transfer and fluid dynamics principles 2. Understanding of FEA and CFD analysis methods 3. Competent with simulation software tools e.g. Ansys, COMSOL	2	SIMTech	Heng Kiat Jonathan Hey	Singapore Institute of Manufacturing Technology (SIMTech) @ Fusionopolis 2 2 Fusionopolis Way #08-04, Innovis Singapore 138634	Computing and Information Sciences,Computer and Software Engineering	2
108	Development of High Strength Aluminum Alloys for Aerospace Application	We are seeking passionate and innovative students to lead an exciting research project on developing high-strength aluminum alloys through additive manufacturing (AM). This cutting-edge work aims to design advanced materials with exceptional mechanical properties and complex geometries, driving innovation in aerospace and other high-performance applications.	Advanced knowledge of metal additive manufacturing (AM) processes, with a focus on aluminium alloys. Deep understanding of aluminium alloys in AM, including mechanism of the solidification cracking and the strength-ductility trade-off. Proven ability to design, conduct, and analyse experiments on advanced materials for AM applications. Strong aptitude for data acquisition, statistical evaluation, and translating complex datasets into actionable insights. Expertise in microstructure analysis and the evaluation of mechanical and physical properties of materials. Outstanding communication and interpersonal abilities, fostering effective teamwork in dynamic research environments. Skilled in delivering clear, impactful presentations to both technical experts and	Literature Review: Conduct a thorough review of research on additive manufacturing of high-strength aluminium alloys. Experimental Setup: Prepare and execute laser powder bed fusion processes. Process Optimization: Investigate and optimize the printing process to achieve crack-free parts. Material Characterization: Analyse defects, microstructures, and mechanical properties to evaluate the performance of printed high-strength aluminium alloys. Data Analysis: Interpret experimental data, identify trends, and provide actionable recommendations for process and material improvements. Reporting: Prepare comprehensive reports and presentations to effectively communicate research findings to the team and stakeholders.	Grade Point Average above 4.0 Mechanical / Materials Engineering knowledge Currently pursuing or recently completed a degree in materials science, mechanical engineering, or a related field. Strong problem-solving skills and attention to detail. A keen interest in advanced manufacturing and alloy development. Effective teamwork and communication skills. Knowledge of additive manufacturing processes is advantageous.	2	SIMTech	Hu Zhiheng	5 Cleantech Loop, #01-01, S636732	Engineering and Technology,Aerospace Engineering	1
109	Development of hybrid cultivated meat products	One of the bottlenecks in realizing the viability of the cultivated meat industry is its cost of production. Here, the use of edible biomaterial scaffolds that support the growth and proliferation of cultivated meat cells in culture, or which provide a product template for the cultivated meat ingredient, may help in lowering costs while affording a meat-like product texture. The offered project involves the synthesis and processing of these scaffolds, cell culture, and forming of the hybrid cultivated meat product	Synthesis and processing of edible biomaterials for cultivated meat	Experimentation, collection and analysis of data, discussion and planning of next steps	Knowledge of chemistry, materials science, bioengineering, or cell culture techniques	Unspecified	SIFBI	Andrew C. A. Wan	31 Biopolis Way, Nanos, S(138669)	Engineering and Technology,Bioengineering	2
110	Development of liquid cooling solution for cooling an advanced electronic package	There is increasing recognition that 3D IC promises tremendous performance advantage. However, thermal management technologies currently limit implementation. At IME, we develop an embedded backside 2-phase cooling solution that enables the dissipation of high power in two stacked chips, aimed at future HPC and AI applications.	1. The student will learn the fundamental concepts of advanced packaging and liquid cooling. 2. The student will gain hand-on experience in fabricating the test vehicles. 3. The student will gain hand-on experience in characterizing the thermal performance of two stacked chips	Experimental setup & testing. Student will support the development of liquid cooling solution for cooling two stacked high-power chips, from the fabrication of the test vehicles to characterizin of the test vehicles, with measurable involvement in them.	Major in mechanical engineering	3	IME	Zhang Xiaowu	2 Fusionopolis Way, #08-02 Innovis, Singapore 138634	Engineering and Technology,Mechanical Engineering,Physics	1

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	Project Title	Project Description	Learning Outcomes for Students	Roles and Responsibilies of Student	Students' pre-requisites	Minimum Duration (Months)	Research Institute of Internship Supervisor	Name of Internship Supervisor	Workplace Address	What is the project's research category?	No. of Students Required
111	Development of next-generation Terahertz detectors	Terahertz (THz) waves offer significant potential for optoelectronic applications, particularly in fields like security and wireless communications. However, achieving highly sensitive detection of THz radiation remains a major challenge. A promising solution lies in Dirac semimetals, such as graphene, which feature highly mobile charge carriers capable of being excited by low-energy THz photons. This project aims to harness these advanced materials to develop a high-performance THz photodetector, paving the way for enhanced sensitivity and efficiency in THz technologies.	In this project, the student will join a dedicated team at the forefront of terahertz technology, with a focus on Dirac semimetal material systems. The student will explore two key areas: (i) methods of terahertz detection and (ii) analysis and interpretation of terahertz signals. By the end of the project, the student will gain valuable hands-on experience in scientific research methods and develop skill sets directly applicable to the laser and optoelectronics industries.	•Terahertz characterization of novel devices. •Work on Optical setups. •Data analysis	Some experience working on scientific project. Pursuing degree in Physics/ Electrical/Electronics or related. Optional: Some prior knowledge of optics or optical characterization.	Unspecified	IMRE	James Lourembam	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Electrical and Electronic Engineering ,Physics	1
112	Development of non-invasive hemoglobin biosensor for chronic kidney disease application	Join us on an exciting journey where the worlds of biomedical science and microelectronics converge. This unique opportunity will immerse you in the development of cutting-edge biosensors for medical devices, from packaging to validation. Explore the fascinating properties of polymeric materials used in microelectronic packages as we chemically characterize them for precise target sensing. You'll also have the chance to design and model next-generation applications, pushing the boundaries of what's possible.	The student will learn the fundamentals concepts of non-invasive/ optical based sensor for hemoglobin monitoring. The student will learn the mechanical manufacturing design rule and design the 3D modeling for integrated device. Student will learn to use various testing equipments for different stage of development of the biosensor, which is essential in order for them to conduct testing on material sample. The student will learn to plan design of experiment for sensor characterisation using simulated blood sample, execution of the protocol and data analysis.	The student will be supporting in the 3D modeling design, design of experiment, conducting sensor characterisation and repeatibility studies. The student will be performing literature review on market landscaping and technology benchmarking for non-invasive hemoglobin devices.	Familiarity with Python for data analysis and automation tasks. Proficiency in MS Office Suite including Microsoft PowerPoint for creating engaging presentations and knowledge of Microsoft Excel, including functions, formulas, and data analysis tools. Biochemistry, optofluidic knowledge: Added advantage: Previous coursework or experience in biochemistry including laboratory techniques and methodologies. Strong verbal and written communication skills for presenting findings and collaborating with team members.	3	IME	Lim Ruiqi	2 Fusionopolis Way, #08-02 Innovis Tower, Singapore 138634	Engineering and Technology,Biomedical Sciences,Computer and Software Engineering,Electrical and Electronic Engineering ,Physics	1
113	Development of Novel Cell Wall- and Membrane-Active Antifungals for Therapeutic Applications	Overuse of existing antifungal drugs and climate change have led to the emergence of new life-threatening fungal pathogens. The development of novel antifungal agents is critical to address this healthcare challenge with significant social and economic impact. This project aims to develop a new class of antifungal supramolecules with cell wall- and membrane-activity, as well as to understand their action mechanism against prevalent fungal pathogens. Lead designs will be evaluated as topical or systemic antifungal therapeutics using animal models. A multidisciplinary approach will be taken in this project including chemical synthesis, biochemistry, molecular biology, and in vivo studies. Success of the project and subsequent development will lead to effective and useful antimicrobial agents for clinical use.	By the end of the project, students will have a clear understanding on the AMR crisis, promising research directions, experimental design principles, and key parameters for antimicrobial activity evaluation.	In this project, students will assist the PI and other group members to conduct wet lab experiments. They will be trained in basic chemical techniques, in vitro antifungal activity assessment, mechanism understanding, and some key concepts for in vivo studies. Students with excellent attitudes and abilities will be given additional opportunities to lead small side projects.	Responsible, pro-active, adaptive, detail-orentated. Basic wet lab skills will be bonus.	3	ID Labs	Li Ning	#05-13, 8A Biomedical Grove, Immunos, Singapore 138648	Biomedical Sciences,Microbiology	1
114	Development of novel fluorescent-based RNA and ribozyme biosensors	Development of fluorescent-aptamer-based biosensors and ribozymes	RNA handling, In vitro transcription, RNA cleavage assay, RNA detection, fluorescence-based assay, cell culture, molecular cloning, and flow cytometry.	Read up on background material, design and carry out experiments, analyse data, present and share data with the lab	Biochemistry and molecular biology are preferred	Unspecified	IMCB	Sherry Aw/Samuel Kevin Pasaribu	61 Biopolis Drive, Proteos, #08-06, S(138673)	Biomedical Sciences,Biochemistry	2
115	Development of photonic chip for AI acceleration	The computing power required by AI is doubling every 3.5 months. Current electronic chips cannot keep up with this pace. Photonic chip is a solution because light faster and more energy-efficient. At IME, we develop computing chips using light instead of electrons to accelerate computing.	1. The student will learn the fundamental concepts of photonic computing. 2. The student will design and simulate photonic chip using commercial software. 3. The student will gain hand-on experience in fabricating photonic chips and characterizing their performance for AI acceleration.	Student will support the development of photonic chips for AI acceleration, from the aspects of simulation and testing, with measurable involvement in fabrication.	The student should have relevant backgrounds in Physics, Mathematics, or Engineering. Knowledge and experience in optics and programming will be a plus.	3	IME	Dong Bowei	4 Fusionopolis Wy, Singapore 138635	Engineering and Technology,Electrical and Electronic Engineering	2
116	Development of process-driven synthetic data generator for omics application	Here, the student will study the statistical distribution of transcriptome-wide gene expressions of a given cell type (e.g. immune cell) and derive a AI or mechanistic model to learn and regenerate the gene expressions for (single gene) mutated condition. The results will be tested on actual mutated transcriptome dataset. Expected outcomes: A synthetic transcriptomic data generator with proper documentation. Exceptional results can be considered for scientific publication.	Learn skills in systems biology, dynamic modeling and machine learning techniques.	Literature survey, protoype model development, simulations and report writing	Requirement: R or python coding, deep knowledge of statistics or AI is an advantage	Unspecified	BII	Kumar Selvarajoo	30 Biopolis Street, #07-01 Matrix, Singapore 138671	Computing and Information Sciences,Biomedical Sciences,Computer and Software Engineering,Biomedical Engineering,Computer and Software Engineering	2
117	Development of Rapid detection of pathogens using isothermal amplification of nucleic acids		Molecular Diagnostics technologies, data analysis, working under ISO138485 compliance	Work in the Laboratory with PCR, dPCR and NGS platforms. To get familiar and follow Laboratory Quality Management System. Paperwork including experimental planning and outcome. Participate in ongoing collaboration projects.	Good communication skills, ability to work as a team player, to be familiar with basic molecular biology methods	Unspecified	GIS	Alexander Lezhava	60 Biopolis Street, Singapore 138672	Biomedical Sciences,Biomedical Sciences	2
118	Development of RNA ligation methods for optimised function of RNA therapeutics in cells	Design and adding on of stabilising RNA motifs to RNA therapeutic platforms using RNA ligation to improve their performance in cells .	RNA handling, In vitro transcription, RNA cleavage assay, RNA detection and Northern blotting, cell culture, molecular cloning, and flow cytometry.	Read up on background material, design and carry out experiments, analyse data, present and share data with the lab	Biochemistry and molecular biology are preferred	Unspecified	IMCB	Charannya Sozheesvari Subhramanyam	61 Biopolis Drive, Proteos, #08-06, S(138673)	Biomedical Sciences,Biochemistry	1
119	Diet-microbiome effects on brain and body function	Nutrients and the gut microbiome interact to influence both metabolic and brain function, and are a common currency for gut-brain signaling across species. By leveraging both the zebrafish model and human cohort studies, we will identify nutrients, microbes, and microbial metabolites that affect immune-metabolic function and behavior (appetite, sleep, mood, anxiety). Promising candidates will be followed-up mechanistically in other preclinical models. This study will help establish causal links between diet, microbiome, and brain-body function, and identify novel therapeutic interventions for metabolic or mental health disorders.	The trainee will become familiar with fundamental laboratory skills (including zebrafish behavior, imaging, and microbiome techniques), proper experimental design, data analysis, scientific reading and writing. They will also gain a broad understanding of appetite/nutritional biology, microbiome and neuroscience research.	1. Accurate monitoring and reporting of experimental results and research findings. 2. Zebrafish animal colony management including genotyping and husbandry. 3. Zebrafish brain and behavioural phenotyping experiments; immunostaining / in situ hybridisation; imaging; pharmacology; gnotobiotic techniques, multi-omics approaches; data analysis 4. Routine lab techniques: molecular biology (cloning, DNA, RNA extraction), making buffers and reagent preparation. 5. Evaluate and interpret data for oral or written presentations.	1) Basic lab skills (e.g. pipetting), molecular biology or any other biology lab techniques is a plus 2) Basic competence with computers (statistics / programming / bioinformatics is a plus) 3) Responsible, focused, and willing to learn	Unspecified	IMCB	Caroline Wee	61 Biopolis Drive #08-13B	Biomedical Sciences,Physiology,Bioinformatics,Bioengineering ,Natural Sciences	2
120	Digitalising a colorimetric biosensor	Current wearable sensors are mostly on biophysical markers with very few on biochemical markers. Biochemical markers provide important information on human body health conditions. All current biochemical sensors are invasive, painful and inconvenient to operate. IMRE has developed a proof-of-concept (POC) technology for detecting sweat-based biochemicals such as glucose, lactate, uric acid, and creatinine that is non-invasive, painless and convenient by using the colorimetric approach. Through photoconductivity, biomarker concentration can be quantified in the form of a direct readout. Data is directly displayed on the printed wearable without the need for interfacing with an external device or with a complex built-in spectrometer. This allows a user to have immediate access to his physiological status.	1) Spectroscopic characterisations for various types of polymers, small molecules, etc. 2) Various printing techniques for sensor design 3) Calibrating analyte concentration (glucose, uric acid, creatinine, lactate, etc) against different transmittance profile 4) Simple electrical layout design for analyte detection	1) Colorimetric sensor fabrication 2) Coding (such as Arduino, Python, etc) to interpret electrical readout with biomarker concentration	Basic engineering, coding background	Unspecified	IMRE	Yang Le / Goh Wei Peng	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Electrical & Electronic Engineering	1
121	Discovery and Development of NanoBodies for Cell Specific Targeting	Project will entail the use of inhouse Nanobody phage based libraries and differential selections against cell lines panels to identify new modalities that recognise specific target cell lines. These modalities will then be characterised for their rate of internilization and their suitability for targeting synthetic RNA molecules.	Student will learn how to perform phage based library selections and charaterise the resulting hits using cell based ELISA and FACs assays.	1) Student will perform Cell-based Nanobody selecions, 2) charaterise hits for binding using ELISA/FACs based assay	Background in Biochemistry	Unspecified	IMCB	Christopher J Brown	#06-12B, 61 Biopolis Drive, Proteos, Singapore - 138673	Biomedical Sciences,Biochemistry	1
122	DV-CV hybrid quantum information	Discrete-variable (DV) and continuous-variable (CV) quantum information are two distinct approaches to quantum communication and computation. DV quantum information ultilizes individual photons or qubits with binary states, while CV quantum information exploits continuous properties, for example as squeezed state in the quadratures of an electromagnetic field. This project aims to investigate interfaces that the bridge DV and CV quantum systems.	Through this internship, the student will learn the basic concept of photonic quantum information science and technology. In addition, the student will gain hands-on experience in a quantum optics lab.	(1) Taking responsibility and weekly report. (2) Understanding physics (3) Taking experimental data and participating analysis	(1) Pro-active team player, (2) Good verval and written communication skills, (3) Not mandatory but prefer one who has background in quantum physics and quantum information. (4) Students who have experience on optics experiment are higly encouraged to apply	Unspecified	Q.InC	Young-Wook Cho	2 Fusionopolis Way, Innovis, Level 9, Singapore 138634	Physical Sciences,Information Technology,Electrical and Electronic Engineering ,Physics	2
123	Dynamic Recyclable Thermosets for Sustainable Plastics	Thermosets are cross-linked polymers with superior strength and durability at the expense of recyclability. Vitrimers, a new class of polymers, possess dynamic covalent cross-links which can rearrange when activated. This stimuli-driven recyclability makes vitrimers highly attractive as sustainable plastics. This project aims to develop vitrimers with good strength and stability to drive the adoption of these circular plastics. The intern will actively participate and work with the team to synthesise vitrimers and optimise their mechanical properties and recyclability.	1. Gain in-depth knowledge of vitrimers, including synthesis and performance characterisation 2. Ability to perform a wide range of lab work and experiments independently, including synthesis and formulation. 3. Gain knowledge and ability to operate molecular and polymer testing equipment and other common characterization tools 4. Independent and critical thinking skills, problem-solving skills, and teamwork are among the many other transferrable skills to be gained.	1. Execute tasks assigned by the supervisor with due diligence. 2. Comply to laboratory safety rules set by the institute.	1. Pursuing undergraduate studies in Bachelor's Degree in Chemistry, Materials Science or any relevant degree. 2. Possess a proactive and positive learning attitude 3. Able to work both independently and in a team	Unspecified	IMRE	Shermin Goh	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Chemical & Molecular Engineering,Chemistry	2

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(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	Project Title	Project Description	Learning Outcomes for Students	Roles and Responsibilies of Student	Students' pre-requisites	Minimum Duration (Months)	Research Institute of Internship Supervisor	Name of Internship Supervisor	Workplace Address	What is the project's research category?	No. of Students Required
124	EBV-based methods for populaiton screening and early diagnosis of NPC	The project aims to discover NPC-associated EBV risk strains in Southeast Asian and further develop EBV risk strain(s)-based biomarker that can help to identify individuals with high risk for NPC developments. Identification of such high-risk individuals will help to advance the early diagonosis and thsu improve the overall treatment response and survival rate of NPC.	Hands-on experience with 1) Computational skills on sequencing data analysis 2) Genetica association analysis 3) molecular techniques for sequencing analysis	1) assist the wetlab operation on EBV sequencing analysis 2) assist with the primary data management and analysis of EBV sequencing data 3) assist with genetic association analysis of EBV genome variation	1) basic skills for molecular biology, such as DNA/RNA extraction, and PCR analysis 2) basic skills for computational anlaysis and programing 3) previous experience in NGS data analysis will be preferred	Unspecified	GIS	Liu Jianjun	60 Biopolis Street, Genome, #04-01, Singapore 138672	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Mathematics	2
125	Effect of different materials on measurement uncertainty for mass flow meter used in low carbon fuels	This project aims to investigate the impact of different materials on measurement errors in mass flow measurements for low-carbon fuel applications. Simulation tools will be used to develop 3D models which will be validated against experimental work in the laboratory based on metrological principle of gravimetric method.	1) Able to understand mass flow meter technologies; 2) Able to understand real-world implications of metrological challenges in low-carbon fuel applications; 3) Able to gain knowledge of how different materials affect measurement accuracy and uncertainty; 4) Able to learn how to validate simulation results against laboratory experiments based on the metrological principle	To develop flow measurement models using simulation tool and validated against experimental work based on metrological principle	Good in thermodynamics, Good in material engineering, Experience in Solidworks, Experience in Ansys, Basic statistics and Hands-on experience with lab	Unspecified	NMC	David Khoo	8 Cleantech Loop, #01-20 B, Singapore 637145	Engineering and Technology,Computer and Software Engineering,Mechanical Engineering,Physics	1
126	Efficiency in the Era of Foundation Models	This research project focuses on analyzing the efficiency of foundation models. We delve deep into various aspects including the efficiency of the model architectures, the datasets used, and the methods implemented during the training and evaluation phases. By investigating these components, the project aims to identify potential bottlenecks and areas for optimization in deploying foundation models in real-world scenarios.	1. Understand the intricacies and fundamentals of foundation model architectures. 2. Develop a deeper knowledge of dataset efficiency and its impact on model training and output. 3. Gain hands-on experience in evaluating and optimizing training methods. 4. Acquire skills in critically analyzing model evaluation metrics and their real-world implications. 5. Understand the challenges and trade-offs in achieving efficiency in model training and deployment.	1. Conduct literature review on the latest foundation models and their efficiencies. 2. Participate in data collection, preprocessing, and analysis to ensure dataset efficiency. 3. Implement, train, and evaluate different foundation models to benchmark their efficiencies. 4. Document and present findings, insights, and recommendations based on the research. 5. Collaborate with the team to brainstorm and develop strategies to optimize efficiency in future projects.	1. Basic understanding of machine learning and deep learning concepts. 2. Familiarity with common ML/DL frameworks like TensorFlow or PyTorch. 3. Strong analytical and critical thinking skills. 4. Good communication skills for effective documentation and presentation. 5. Previous experience in working with datasets is a plus.	Unspecified	IHPC	HE Yang	1 Fusionopolis Way, #16-16 Connexis, Singapore 138632	Computing and Information Sciences,Computer Science	2
127	Electric Fleet Scheduling and Digital Twin Development for Airport Ground Service Vehicles Using Reinforcement Learning	As airports transition towards greener, electric-powered ground service vehicles—including refueling trucks, air-conditioning units, and trailers—efficient scheduling and energy management have become vital. This project aims to design a digital twin framework combined with a reinforcement learning model to optimize the scheduling, charging, and operational efficiency of these vehicles. By simulating airport operations through the digital twin, the project allows for testing and refining strategies before real-world deployment. The reinforcement learning model within the digital twin will enable the balanced distribution of charging times, reduce power grid impact, minimize fleet size, and extend vehicle motor life—all while meeting operational demands.	Students will gain hands-on experience in (1) building and implementing reinforcement learning models for real-world optimization tasks, (2) developing digital twin frameworks and understanding their application in simulation and testing, (3) integrating reinforcement learning algorithms within a digital twin for dynamic decision-making, (4) analyzing and interpreting operational data for electric vehicle scheduling and energy management, (5) enhancing programming skills in Python and familiarity with key tools such as PyTorch, Jupyter Notebooks, and Linux, and (6) understanding airport logistics and energy management, with a focus on sustainable practices.	The student will play an active role in both development and experimentation within this project. Key responsibilities include (1) assisting in the design and development of a digital twin system that accurately simulates airport ground vehicle operations, (2) developing and implementing a reinforcement learning model within the digital twin to optimize scheduling and charging behavior, (3) conducting simulations to test various operational scenarios and refining control strategies, (4) collaborating with the project team to ensure that the digital twin framework is integrated with real-time data, ensuring accurate and responsive system behavior, and (5) analyzing model outputs to evaluate performance in terms of charging time distribution, grid load balancing, and fleet size reduction.	Ideal candidates should have a background in one or more of the following areas: computing, mathematics, engineering, or physics, with a strong focus on data-driven modeling and machine learning. Key technical skills include (1) proficiency in Python, with experience in Jupyter Notebooks and PyTorch, (2) familiarity with Linux, Bash scripting, and Numpy, (3) knowledge or prior experience with reinforcement learning, digital twin frameworks, or simulation environments, and (4) understanding of transportation systems or energy management, especially within logistics or sustainability contexts, is an added advantage.	Unspecified	IHPC	Wang Hongwei	1 Fusionopolis Way, #16-16, Connexis North Tower, Singapore 138632	Engineering and Technology,Electrical and Electronic Engineering	1
128	Electrical Characterization of Wafer-Scale Josephson Junctions.	This internship project focuses on the electrical characterization of wafer-scale Josephson junctions, essential for quantum device development. The intern will work with the R&D team, setting up and maintaining room temperature and cryogenic probe stations for accurate measurements. They will conduct resistance measurements on Josephson junctions and other devices at various temperatures, performing wafer-scale testing to assess performance and quality. The intern will analyse data, identify trends, document findings, and provide technical support and troubleshooting to researchers. This work will deliver crucial feedback to fabrication process development teams, aiding the advancement of quantum device technologies.	The intern will gain hands-on experience with electrical measurement systems, developing skills in experimental design and data analysis for superconducting devices like Josephson junctions. They will enhance their understanding of superconducting device behavior, learn to troubleshoot and resolve technical issues in a lab environment, and build a strong foundation in superconducting electronics and its practical applications.	Setting up and maintaining electrical measurement systems. Conducting wafer scale resistance measurements on Josephson junctions and other devices. Analysing experimental data and documenting results, troubleshooting technical issues and helping the researchers in the experiments.	Background in physics, electrical engineering, or related fields, Familiarity with electrical instrumentation and measurement techniques. Knowledge of data analysis techniques using Python (preferred). Understanding of superconducting devices (preferred but not mandatory).	Unspecified	IMRE	Victor Leong	Kinesis	Physical Sciences,Physics	1
129	Electronic lock for multiple frequency transfer systems	Optical fibers have enabled high accuracy and high stability transfer of frequency signals for various applications. However, these fibers are affected by various sources of noise. In practical applications, multiple of these signals are transmitted to different locations over different fiber links, each with their own noise sources. This project aims to develop a method of locking these signals to ensure their stability at the user end.	1) Understand the concepts of frequency transfer over optical fibers 2) Understand an implement a phase-locked loop 3) Learn and understand the figure of merits frequency stability measurements.	To develop a multi channel locking system.	Knowledge of basic electronics and electrical circuits.	Unspecified	NMC	Tan Yung Chuen	8 Cleantech Loop, #01-20 B, Singapore 637145	Engineering and Technology,Electrical engineering	1
130	Electro-thermal catalysis for production of green hydrogen	This project use novel Electro-thermal catalysis method to achieve green hydrogen production from various hydrogen carriers such as ammonia, methane, methanol, formic acid, as well as water splitting.	Master the basic principles of electrocatalysis and thermal catalsis; Apply the knowledge to green hydrogen technologies;	Conduct experiments and analysis data under the supervision of the supervisor, write report/manuscript for publication.	Canditate should have strong interst and background in Chemistry/Chemical Engineering/Material Science.	Unspecified	ISCE2	Gao Jiajian	1 Pesek Road, Jurong Island. S(627833).	Physical Sciences,Chemistry	1
131	Elucidating the role of non-coding genome in cancers with spatial omics	This project aims to spatially profile the non-coding genome using spatial omics approaches, such as Multiplexed Error Robust Fluorescence In Situ Hybridization (MERFISH). By applying unique labeling techniques, we seek to identify and map the role of non-coding genome in gene regulation and cellular function. This approach offers high-resolution insights into the spatial organization tissues, enhancing our understanding of how the non-coding genome influence gene expression across healthy and cancer tissues. Please visit our labwebsite to learn more: https://khchenlab.github.io/	1. Practical laboratory skills, including biochemical assays and advanced instrumentation: - Understand the principles of spatial omics and gain experience conducting advanced molecular and sequencing assays in cells and tissues. - Learn to optimize experiments using advanced imaging and sequencing instruments. 2. Data Analysis and Bioinformatics Skills: - Learn to process and analyze genomics data, utilizing bioinformatics tools (e.g., Python, R, or specialized genomic software). - Gain expertise in data normalization, quality control, and visualization techniques to interpret spatial omics datasets.	• Learn from and assist a research fellow in conducting experiments and data analysis. Establish ownership of a small scale project. Actively participate in scientific discussions.	• Currently pursuing or recently completed a degree in sciences, engineering, computer science, mathematics or a related field. • Eagerness to engage in training and learn new bioinformatics techniques. Programming proficiency in Python, or another relevant language, is a plus.	Unspecified	GIS	Chen Kok Hao	60 Biopolis Street, Genome, Level 5, Singapore 138672	Biomedical Sciences,Bioscience and Biotechnology,Bioinformatics,Bioengineering ,Mathematics	2
132	End-to-end pipeline for visual inspection with generative and deep learning AI	Generative AI models have recently demonstrated new capabilities for manufacturing. For visual inspection, it increases the efficiency of the process and facilitate defect detection. The project will focus on building a new framework that combine state-of-the-art AI models for defect detection and generative AI models to provide an exhaustive defect report on the samples. The scope will involve integrating foundational models such as SAM, or some versions of large language models. The internship will help the student to learn image pre-processing and gain hands-on experience in the implementation and improvement of the deep learning and generative AI algorithms. The student will work on a semiconductor project that used machine learning to improve its defect detection. It involves 3D data processing for deep learning algorithms in 3D semantic segmentation and defect detection. The student is expected to take an active role in the process of data understanding and preparation, learn relevant Deep Learning algorithms and experiment and benchmark performance measures with potential Conference or Journal paper publication.	The student will learn (i) the importance of data in the role of analytics including data selection, annotation. (ii) Deep learning model development and training (iii) Performance measures used for model evaluation.	The student will be involved in benchmarking deep learning models, prepare and annotate relevant data for model fine-tuning. He will also develop the application code snippets for pre or post processing and integration with other computer vision modules.	The students are expected to have experience with computer vision tasks such as semantic segmentation and related Deep learning based approaches. Having knowledge of OpenCV and 3D data is big plus. The students are also expected to perform data cleaning, management as part of data pre-processing and post-processing. The students are expected to follow flexible bi-weekly sprints and integrate the codebase with our current system setup.	2	I2R	Richard Chang	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Applied Mathematics	2
133	Engineering Robust and Versatile Injectable Hydrogels with Multifunctional Properties	Injectable hydrogels provide a minimally-invasive approach to administering sustained drug depots and regenerative scaffolds. These implants are required to adapt to the mechanical deformation of neighbouring tissues to avoid delamination and structural failure. However, most injectable gels do not have the mechanical resilience to match biological materials. Herein, we have developed a series of novel thermo-responsive injectable hydrogels capable of achieving strains exceeding conventional hydrogels. Students will be involved in materials synthesis and characterization of the temperature-dependent behaviour of these hydrogels.	Students will learn polymer synthesis and functionalization, spectroscopic characterization (e.g. NMR, FTIR), polymer self-assembly, and mechanical testing.	Synthesize and characterize chemical and mechanical properties of injectable hydrogels. To develop the students' knowledge, he/she student is expected to read widely, comprehend, and summarize the relevant literature.	B.Sc in Chemistry, B.Sc in Biology, B.Eng in Materials Engineering, or B.Eng in Chemical Engineering	Unspecified	IMRE	Rubayn Goh	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Chemical & Molecular Engineering,Chemistry	1
134	Engineering Two-Dimensional Material Heterostructures for Millimeter-Wave Applications	Two-dimensional (2D) materials, which are only one or two atoms thick, exhibit remarkable differences from their bulk counterparts, particularly in their electrical, optical, and thermal properties. Since the groundbreaking discovery of graphene by Novoselov and Geim in 2004, research in 2D materials has grown exponentially. These materials can be reassembled into custom heterostructures, precisely layered in a chosen sequence, making them especially suitable for terahertz (THz) applications. This project aims to develop a high-performance THz photodetector using innovative graphene-based stacked assemblies and other cutting-edge 2D materials.	In this project, the student will work with a dedicated team focused on developing terahertz detectors using two-dimensional materials. The student will explore two main areas: (i) the physics of two-dimensional systems such as graphene, and (ii) advanced material characterization techniques. By the end of the project, the student will gain hands-on experience in both the development of 2D materials and scientific research methods, while acquiring skill sets relevant to cleanroom fabrication and semiconductor industries.	•2D materials exfoliation and device fabrication •Optical characterization such as Raman, PL, Thz spectroscopy •Data analysis using programming such as python , matlab	Some experience on scientific projects. Pursuing degree in Physics/ Material Science/ Electrical/Electronics or related. Optional: Some prior knowledge of material physics/ characterization	Unspecified	IMRE	James Lourembam	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Materials Engineering,Physics	1

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
135	Enhancement of optical detector characterization at short wavelengths	Optical detector spectral responsivity measurement is a critical process in characterizing the performance of photodetectors across different wavelengths of light. Spectral responsivity refers to the ability of a detector to convert incident optical power into an electrical signal as a function of wavelength. Precision in spectral responsivity measurement is essential for applications such as imaging, spectroscopy, and optical communication systems, where the accurate detection of specific wavelengths is paramount. Advanced measurement setups, including monochromators and calibrated light sources, are employed to ensure accurate and traceable results in optical detector spectral responsivity characterization. In this project, the student is expected to work with staff to enhance the spectral responsivity measurement at shorter wavelengths	(1) Master optical detector principles and spectral measurement techniques (2) Develop practical skills in using advanced optical measurement equipment (monochromators, light sources) (3) Understand calibration methods and measurement uncertainty analysis	(1) Conduct spectral responsivity measurements focusing on shorter wavelengths (2) Assist in optimizing measurement setup and calibration procedures (3) Document experimental results and prepare technical reports on measurement improvements	Hands-on experience with optical components	Unspecified	NMC	Zhang Jing	8 Cleantech Loop, #01-20 B, Singapore 637145	Engineering and Technology,Electrical engineering,Physics	1
136	Enhancement of the Green Compass Sustainability Assessment Tool	Green Compass is an environmental sustainability assessment and strategic roadmapping tool that helps companies to become more environmentally sustainable by better managing their carbon emissions, energy, water, and waste impacts, as well as chart strategic roadmaps for their transformation based on their current environmental sustainability levels. This internship project centers on further improving Green Compass through various initiatives such as developing new features, enhancing the assessment, and developing new course material. Overall, this project aims to contribute to a more sustainable future by helping organizations understand and improve their environmental impact.	Students will gain first-hand experience in assessing the sustainability maturity level of companies. Through this, students will also gain a deeper understanding of sustainability concepts like life cycle assessment and carbon emissions accounting, learning how these concepts are applied to solve pertinent sustainability problems for organizations that want to undergo a sustainable transformation.	The students will be expected to a) assist researchers in projects to develop new features for Green Compass, b) assist with improvements to the Green Compass assessment, and c) prepare new teaching material for the course. Underpinning these tasks, students must learn about the Green Compass framework and develop a thorough understanding of the underlying concepts as well as collate relevant information. They may also drive their own independent projects in related areas if they wish to do so.	We are seeking students with a good understanding of environmental sustainability concepts and technologies, and with strong critical thinking skills to apply them. Experience in data analysis, machine learning, and python coding would be a bonus.	2	SIMTech	Zhaozhi Jonathan Low	Singapore Institute of Manufacturing Technology (SIMTech) @ Fusionopolis 2 2 Fusionopolis Way #08-04, Innovis Singapore 138634	Computing and Information Sciences,Computer and Software Engineering	1
137	Enhancing Quality and Diversity of Vision-Language-Action models through QD-Prompt Optimization	Vision-Language-Action (VLA) models directly fine-tuned VLMs for predicting robot actions. This project aims to improve the quality (performance) and diversity of the performance of VLA model when the collected human demonstrations are limited in quantity and diversity. To address this challenge, we propose a novel framework for automatic discrete prompt optimization, called QD-Prompt. QD-Prompt connects VLA with quality diversity optimization, yielding consistent performance and diversity improvements from limited human demonstrations.	1. Publish papers in top AI conference/journals. 2. Obtain experience in cutting-edge AI research. 3. Improve team working ability. 4. Improve scientific skills: scientific paper writing, presentation, coding, etc.	1. Conduct literature reviews . 2. Develop and implement quality diversity prompt optimization models. 3. Collaborate with team members and mentors to troubleshoot and refine models. 4. Present findings and progress in reports and presentations.	1. Pro-active. 2. Self-motivated. 3. Team working. 4. Research experiences in one or more of the following topics: machine learning, reinforcement learning, imitation learning, LLM, vision-language-action model, quality diversity optimization, prompt optimization. Previous paper submission or publication is a plus.	Unspecified	IHPC	Yu Xingrui	1 Fusionopolis Way, #16-16, Connexis North Tower, Singapore 138632	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering ,Natural Sciences	2
138	Enhancing Human-Robot Collaboration through Strategic Task Allocation	This project involves developing an optimization model to dynamically allocate tasks to human and robot teams within a manufacturing or logistics environment. The model will factor in ergonomic considerations for human workers and operational efficiencies of robots to optimize productivity and safety. The intern will test and refine the model based on feedback from simulated environments and actual operational data.	Understand the complexities of human-robot interaction in an industrial setting. Learn to develop and apply optimization models in task allocation. Acquire skills in data analysis and real-time system adaptation.	1) Perform mathematical problem formulation 2) Create data for test scenarios. 3) Develop optimization algorithm using specific optimization tools 4) Research on various techniques used for dynamic task allocation for human -robot teams.	Skills in optimization algorithms and mathematical modeling. Familiarity with data analytics tools and techniques. Competence in software development for simulation and model testing.	Unspecified	ARTC	Pranjal Vyas	Advanced Remanufacturing and Technology Centre (ARTC) 3 CleanTech Loop, #01/01, CleanTech Two, Singapore 637143	Computing and Information Sciences,Computer and Software Engineering	1
139	Enhancing Large Language Models with Medical Knowledge	Large language models (LLMs) like ChatGPT can understand and respond to everyday language with ease, making them great for general conversation and basic questions. However, when it comes to fields like medical or healthcare—where accuracy and specialized knowledge are crucial—these models often struggle because they lack in-depth medical knowledge and need improvements for safer use. This project will focus on enhancing LLMs to ensure they can recognize and apply relevant medical knowledge for specific tasks. We will explore ways to integrate medical information from trusted sources like medical knowledge databases and textbooks, helping the model become more accurate and reliable for healthcare-related applications.	Gain hands-on experience in working with state-of-the-art large langage models. Deepen your knowledge of machine learning, natural language processing, LLMs, and the healthcare industry. Work closely with a supportive team of experts who are passionate about AI and healthcare.	Literature review, Data Collection and Preprocessing, Model Development, Evaluation and Validation, Prepare reports, and contribute to research papers or publications resulting from the project.	Python programming and fundamental knowledge of Machine Learning (ML), Natural Language Processing (NLP), LLM, and Prompt Engineering; Ability to work effectively both independently and as part of a team.	Unspecified	IHPC	Song Yuting	1 Fusionopolis Wy, #16-16 Connexis, North Tower, Singapore 138632	Computing and Information Sciences,Computer Science	2
140	Enhancing Physics-Modeled OCT Angiography with Generative AI	This project aims to improve the imaging quality of Optical Coherence Tomography Angiography (OCTA) by integrating generative AI techniques with physics-based modeling. Students will develop and apply generative models to enhance the resolution and clarity of OCTA images. The project will involve training generative AI models on OCTA datasets, refining physics-based models for better coherence, and validating the enhanced images against standard benchmarks.	Students will develop skills in generative AI and physics-based modeling techniques, with a focus on enhancing medical imaging quality. They will gain hands-on experience training and refining generative models for image clarity and learn to validate model performance against standard imaging benchmarks, making their work relevant to clinical and diagnostic applications. They will also develop skills in scientific writing.	Literature review, propose methodologies, implementation, report writing	Coding, machine learning concepts, deep learning	Unspecified	IHPC	Tanvi Verma	1 Fusionopolis Way, #16-16, Connexis North Tower, Singapore 138632	Computing and Information Sciences,Computer Science	1
141	Enhancing Vibrothermography for Impact Damage Detection in Composite Materials: A Practical Approach for Structural Health Monitorin	This project proposes using vibrothermography to detect barely visible impact damage in composite structures, specifically carbon/epoxy plates. Vibrothermography, a non-destructive evaluation (NDE) method, effectively identifies damage like delaminations from low-velocity impacts, aligning well with traditional detection techniques. The main objective is to develop and refine basic modeling and simulation for vibrothermography, ensuring simulated results align closely with physical testing outcomes. The project will focus on creating efficient simulations and improving thermal and frictional modeling accuracy. Over six months, this study aims to advance vibrothermography's potential for practical applications in Structural Health Monitoring (SHM), offering a reliable, accessible inspection tool for composite materials.	1) Understanding of Vibrothermography Principles : Gain knowledge of non-destructive evaluation techniques, focusing on vibrothermography for detecting impact damage in composite materials. 2) Skills in Simulation and Modeling: Develop basic proficiency in modeling thermal and frictional properties of composites, aligning simulation results with experimental data for practical applications.	1) Conduct Experiments and Data Collection: Perform vibrothermography tests on composite samples, documenting results and analyzing impact damage patterns. 2) Develop and Validate Simulations: Create and refine basic models that simulate thermal responses in damaged composites, comparing simulated data with experimental findings for improved accuracy.	1) Basic Knowledge of Materials Science or Mechanical Engineering: Understanding of composite materials and their behavior under impact. 2) Familiarity with Simulation Software: Experience with modeling tools like COMSOL and MATLAB or similar software for creating and analyzing simulation data.	Unspecified	IMRE	Andrew Ngo, Sreedhar Unnikrishnakurup	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Mechanical Engineering	1
142	Enhancing Vision-Tactile based Manipulation using Reinforcement Learning and Knowledge Distillation	The primary objective of this project is to enhance the generalization capabilities and performance of visual-tactile policies for complex manipulation tasks. In this project, we propose to implement and evaluate a novel approach aimed at improving the generalization capabilities by utilizing the frameworks of Reinforcement Learning (RL) and Knowledge Distillation (KD). The proposed idea is initially implemented in the Nvidia Isaac simulation environment, followed by application in real-world scenarios.	Understand core robotics concepts and AI techniques like reinforcement learning (RL), knowledge distillation, and diffusion models. Apply advanced AI models to robotics arms with hands-on experience in Nvidia Isaac simulation tools. Develop critical problem-solving skills, focusing on real-world implementation.	-implementation of deep reinforcement learning (DRL) and generative deep learning algorithms such as Diffusion Models and Large Action Models -Conduct simulation at NVIDIA ISaac and the real-world environment with Emika Panda robots	Intereset in Robotic, Reinforcement Learning (RL), and Deep Learning Proficiency in at least one programming language commonly used in machine learning and AI, such as Python. Background in Robotics (Optional)	2	I2R	ACAR Cihan	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Computer Science,Electrical and Electronic Engineering	2
143	Enzyme-assisted plastic recycling	Enzymatic depolymerization may hold the key of sustainable plastic recycling. In recent years, tremendous advancement is made in enzyme-assisted polyethylene terephthalate (PET) recycling, thanks to highly efficient engineered enzymes. However, sustainable recycling of other major plastics (such as polyethylene, polypropelene, polyurethane, polyamides) are laaging due to unavailability of efficient enzymes. This project is about recombinant production of plastic-degrading enzymes in microbial hosts, characterization of the recombinant enzymes, and improving their activity by enzyme engineering through directed evolution and rational enzyme engineering approaches.	The student will be familiarized to the research lab environment. S/he will have opportunity of experiment designing and execution. The student will gain knowledge and develop technical expertise in multiple area of biotechnology. The student will have opportunity to learn most of the techniques listed below. Techniques: Preparing and maintaining microbial culture, working in aseptic environment, primer designing, PCR, gel electrophoresis, DNA isolation/purification, cloning, over-expression of gene of interest, enzyme engineering, site-directed mutagenesis, making enzyme library, protein production and purification, enzyme assay development, enzymatic reaction optimization	1. Designing and performing experiments, including preparing media and reagents 2. Record keeping 3. Contribute to laboratory operation, if needed 4. Strictly follow HSE rules	1. Willingness to learn 2. Willingness to work in a team 3. Cooperative and friendly attitude 4. Basic understanding of microbiology, molecular biology and protein/enzyme biochemistry, and preferably some hands-on experience in these areas.	Unspecified	SIFBI	Barindra Sana	31 Biopolis Way, Nanos Level 6, Singapore 138669	Biomedical Sciences,Bioscience and Biotechnology,Bioengineering ,Natural Sciences	1

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Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
144	Estimation of floating solar photovoltaic electricity generation: A deep learning-embedded remote sensing and GIS integration model	Nowadays, many countries or regions have abundant solar energy but limited land, which hinders the penetration of utility-scale solar photovoltaic (PV) farming. Thus, recent studies have explored the capacity of floating PV power plants, which can release the pressure on using additional land, generate a great amount of electricity, avoid the shadow effect, and cool down the photovoltaic surface temperature. However, there are three challenges in planning the PV installed capacity for grid operation. First, unstable weather causes a large variation in solar potential on the land/water surface. This considerably changes daily PV electricity production and makes load balancing difficult, which becomes one of the most critical barriers to penetrating intermittent renewable energy into the grid. Second, there is a lack of accurate daily water surface solar irradiation forecasts. Although several physical models have been developed to estimate historical solar potential, they cannot be used directly for forecasting short-term solar PV electricity generation. This indicates a research gap in near real-time PV potential forecasting. Third, high temperatures can significantly decrease PV transition efficiency and lose a striking amount of electricity that could be harvested. To address the challenges in Singapore and beyond, the objective of this project is to develop a deep learning-based electricity generation prediction method that will be able to (i) simulate long-term and short-term cloud cover and aerosol thickness, (ii) estimate hourly and daily solar potential influenced by dynamic atmospheric conditions and geo-environments, and (iii) quantify PV transition efficiency affected by the dynamic thermal environment. As such, we will be able to maximize PV electricity production and smartly operate daily PV electricity generation to support load balancing practices	1. gain professional experinece in processing GIS and remote sensing data; 2. obtain practial knowledge in cutting-edge Geospatial Artificial Intelligence; 3. build confidence and new visions on R&D technologies; 4. Strength effective communications and team work with colleagues at A*STAR	process data, development methods conduct experiments, and analysis results - under my dedicate supervision	Basic knowledge in computer programming (e.g., Python, Java, SQL), and Urban Informatics/ Geographical Information Science / Remote Sensing / Surveying / Urban Planning	Unspecified	IHPC	Rui Zhu	1 Fusionopolis Way, #15 Connexis, Singapore 138632.	Information Technology,Computer Science	2
145	Evaluating role of neurotransmitter signaling in immune cells regulation during viral infection	Neurotransmitters can modulate immune cell functions. Here, the project investigates the role of excitatory glutamate in regulating the activities of peripheral CD4+ T cells and macrophages during chikungunya virus infection. This project will generate critical knowledge on the neuroimmune circuitry during active viral infection leading to the potential identification of novel host-directed therapeutic targets.	At the end of the attachment, student should have obtained valuable experience in planning and executing experiments. Student will also be taught on documenting, analysing and presenting their results. Importantly, this attachment will also allow the student to develop critical thinking and improve on their presentation skills.	Students will work under a senior Scientist and assist in runnning experiments, analyses of data, troubleshooting, critical thinking and discussion, presenting, reporting and documenting of work done. This will train students for future FYP or PhD journey.	Eligible students should demonstrate a keen interest in ID research, possess a strong foundation in Immunology and Infectious Diseases, and be planning to pursue FYP or PhD studies in this field.	3	ID Labs	Lum Fok Moon	8A Biomedical Grove, Immunos #05-13, Singapore 138648	Biomedical Sciences,Infectious Diseases, Immunology, Virus-host interaction	1
146	Evaluation of age-related biomarkers and their role with disease outcomes.	Ageing biomarkers, including telomere length measurements, mitochondrial dysfunctions and epigenetic clocks have emerged as important tools that can be used to predict for disease outcomes (cancers, cardiovascular disease and others). The study will generate these ageing biomarker data in various datasets, including blood as well as disease relevant tissue samples (for eg. artery tissues) to evaluate their role in disease progressions and outcomes.	Student will become familiar with lab based protocols to determine ageing biomarkers.	Perform DNA quantification and perform lab-based assays to determine methylation marks and qPCR based measurements of telomere length and mitochondrial dysfunction.	Familiarity with qPCR techniques	Unspecified	GIS	Rajkumar Dorajoo	61 Biopolis St, Genome Building, 4th Floor, Singapore, 138672	Biomedical Sciences,Biomedical Sciences	1
147	Examining gene-by-environmental influences of parental factors on child outcomes	Research from GUSTO (Growing Up in Singapore Towards healthy Outcomes) has found that maternal distress during pregnancy—even at mild to moderate levels—can affect the cognitive and emotional development of the child. The project aims to use data international cohorts to identify factors related to parental mental well-being, parenting and their influence on child outcomes. These factors include genetics, interpersonal relationships and environmental factors.	Students may learn some basic machine learning techniques to distinguish factors related to parental mental well-being, parenting and child outcomes. Student will learn to run data analyses on factors related to parental factors such as their well-being, parenting and its influence on child neurocognitive and socio-emotional outcomes.	Student will be tasked to do some literature review and run data analyses on factors related to parental factors such as their well-being, parenting and its influence on child neurocognitive and socio-emotional outcomes.	Independent learner, proactive in communication, keen interest in data analyses on maternal mental well-being and child outcomes. Student should be experienced in R, Python or Mplus and well-versed in statistical techniques.	Unspecified	IHDP	Michelle Kee	30 Medical Drive. Brenner Centre for Molecular Medicine. Singapore 117609	Computing and Information Sciences,Statistics	1
148	Explainable predictive analytics in time-series	Predictive analytics from time-series is an important requisite in a multitude of applications including disease phenotyping and predictive maintenance of engineering assets. This project aims at developing explainable algorithms leveraging in-context learning for predictive analytics using GenAI models such as transformers for multivariate time-series data.	1. Explainable AI 2. Predictive analytics 3. Time-series data analysis	1. Develop modules for explainable AI 2. Develop modules for causality in predictive analytics using time-series 3. Coding to implement the above.	"1. Coding in python and pytorch 2. Good understanding of deep learning and transformers" 3. Explainable AI	2	I2R	Savitha Ramasamy	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science,Mathematics	1
149	Exploiting 2D Foundation Models for 3D Scene Understanding	In this project, we propose SAM3DProp, a novel framework for 3D point cloud segmentation that leverages the Segment-Anything Model (SAM) trained on RGB images, without requiring additional training or fine-tuning. Our approach begins by utilizing SAM to predict segmentation masks in 2D RGB images of a 3D scene. These 2D masks are then projected into the corresponding 3D point clouds using the known poses of the images. We employ a label propagation approach to iteratively combine 3D masks from adjacent frames using a bidirectional merging technique. This enables us to merge segmented masks across the entire scene, yielding accurate 3D masks. We will evaluate our approach on the ScanNet dataset, expecting to demonstrate that SAM3DProp produces fine-grained and accurate 3D segmentation without the need for training 3D-specific models.	Acuiqre experience in 2D image segmentation foundation models and label propagation techniques. Publish at top-tier AI conferences.	Develop algorithm and deep learning code to evaluate on public dataset. Benchmark against state-of-the-art methods. Write up an academic paper for submission to top AI conferences. Strong self-motivation in AI research and strong desire to publish at top-tier AI conferences are necessary.	Familiar with Python and PyTorch. Knowledge in machine learning and deep learning	2	I2R	Xu Xun	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science	1
150	Exploration of High-Entropy and Refractory Materials in Powder Bed Additive Manufacturing for Extreme Environments	We are seeking a motivated and innovative student to lead a research project focused on the utilization of high-entropy materials and refractory materials in powder bed additive manufacturing (PBF) for applications in extreme environments. This project aims to expand the possibilities of PBF by exploring novel materials capable of withstanding high temperatures, corrosive conditions, and extreme stress.	[1].An in-depth understanding of PBF technology and its applications. [2].Expertise in materials science, particularly high-entropy alloys and refractory materials. [3].Experience in designing and executing experiments with advanced materials. [4].Proficiency in data collection, analysis, and interpretation. [5].Skills in evaluating material properties under extreme conditions. [6].Effective communication and collaboration within a research team. [7].Presentation and reporting skills to convey research findings.	Literature Review: Conduct an extensive review of existing research and developments in the field of high-entropy materials and refractory materials, with a focus on their potential in extreme environments. Materials Selection: Collaborate with materials scientists to select appropriate high-entropy alloys and refractory materials for additive manufacturing, considering their suitability for extreme conditions. Experimental Setup: Plan and set up experiments to print parts using high-entropy or refractory materials in an PBF system. Configure the printer, powder beds, and process parameters. Data Collection: Collect data during the printing process, including in-situ monitoring data, process parameters, and any relevant sensor measurements. Material Characterization: Evaluate the physical and mechanical properties of the printed parts, particularly under extreme conditions. This may involve measuring properties such as strength, resistance to heat, and corrosion. Process Optimization: Investigate ways to optimize the printing process with high-entropy and refractory materials, ensuring the highest quality and performance of the produced parts for extreme environments. Data Analysis: Analyze the data collected during experiments, identify trends and insights, and use these findings to provide recommendations for further development.	[1]Grade Point Average above 4.0 [2]Mechanical / Materials Engineering knowledge [3]Currently pursuing or recently completed a degree in materials science, mechanical engineering, or a related field. [4]Strong problem-solving skills and attention to detail. [5]Ukeen interest in advanced manufacturing and materials science. [6]Effective teamwork and communication skills. [7]Knowledge of additive manufacturing processes is advantageous.	2	SIMTech	Wang Pan	5 Cleantech Loop, #01-01, S636732	Engineering and Technology,Mechanical Engineering,Physics	1
151	Exploration of self-cleaving ribozyme activity in cells for development of novel RNA theraoeutics	Comparing cleavage of self-cleaving ribozymes in cell-free assays vs in cells.	Cleavage assay, In vitro transcription, RNA detection, cell culture, molecular cloning, lentivirus transduction, and flow cytometry.	Read up on background material, design and carry out experiments, analyse data, present and share data with the lab	Biochemistry and molecular biology are preferred	Unspecified	IMCB	Sherry Aw/Samuel Kevin Pasaribu	61 Biopolis Drive, Proteos, #08-06, S(138673)	Biomedical Sciences,Biochemistry	2
152	Exploring Drug Interactions within Amphiphilic Hydrogels	Thermogels are amphiphilic polymers with the ability to form temperature-dependent supramolecular interactions that could lead to gelation. The advantage of a system whereby gelation happens with increasing temperature includes injectability and the potential to encapsulate heat-sensitive drugs and cells. By modulating the degree of hydrophobicity, we can tailor the degree of encapsulation and interactions with hydrophobic drugs. Students will be involved in materials synthesis, characterization of drug-hydrogel interactions through material characterization, and in vitro drug release.	Students will learn polymer synthesis and functionalization, spectroscopic characterization (e.g. NMR, FTIR), rheology, polymer self-assembly, physiochemical interactions between drugs and thermogels, and drug release mechanisms.	Synthesize and characterize chemical and mechanical properties of injectable hydrogels. Assist with in vitro drug release experiments. To develop the students' knowledge, he/she student is expected to read widely, comprehend, and summarize the relevant literature.	B.Sc in Chemistry, B.Sc in Biology, B.Eng in Materials Engineering, or B.Eng in Chemical Engineering	Unspecified	IMRE	Rubayn Goh	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Chemical & Molecular Engineering,Chemistry	1

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	Project Title	Project Description	Learning Outcomes for Students	Roles and Responsibilies of Student	Students' pre-requisites	Minimum Duration (Months)	Research Institute of Internship Supervisor	Name of Internship Supervisor	Workplace Address	What is the project's research category?	No. of Students Required
153	Exploring Key Gaps in Retrieval-Augmented Generator for Real-World Applications of Large Language Models	This internship offers an opportunity to contribute to cutting-edge research in Retrieval-Augmented Generation (RAG) using large language models (LLMs). The intern will investigate and address one or more existing gaps within RAG, with flexibility to select a specific area based on interest and potential impact. Potential research directions include enhancing retrieval efficiency, improving response accuracy, and enabling personalization. The intern may also explore methods to increase interpretability, reduce model hallucinations, or introduce privacy-preserving mechanisms for sensitive applications. The project encourages innovation and aims to produce advancements that make RAG systems more reliable, adaptive, and applicable across diverse real-world settings.	1. Understanding RAG Frameworks: Gain a comprehensive understanding of Retrieval-Augmented Generation systems, their architecture, and how they integrate with large language models. 2. Research Skills Development: Develop skills in conducting independent research, identifying gaps in existing literature, and proposing innovative solutions within the RAG landscape. 3. Data Handling: Learn techniques for efficiently managing and processing large datasets, as well as implementing retrieval mechanisms for enhanced data accessibility. 4. Evaluation Techniques: Understand various methods for evaluating the performance of RAG models, including metrics for retrieval accuracy, response quality, and model robustness. 5. Collaboration and Communication: Enhance collaboration skills by working with a research team, and improve written and verbal communication skills through presentations and	1. Literature Review: Conduct thorough reviews of existing research related to RAG, identifying key gaps and potential areas for innovation. 2. Research Design: Propose and design research experiments or frameworks to address selected gaps, with guidance from mentors. 3. Implementation: Implement algorithms or models to enhance retrieval efficiency, response accuracy, or personalization in RAG systems. 4. Data Analysis: Analyze the performance of developed models through rigorous evaluation, documenting results and insights. 5. Collaboration: Work closely with team members, attending regular meetings to discuss progress, challenges, and findings. 6. Reporting: Prepare and present research findings to the team and stakeholders, contributing to academic papers or presentations as appropriate.	1. Academic Background: Enrolled in a degree program in Computer Science, Artificial Intelligence, Data Science, or a related field. 2. Programming Skills: Proficiency in programming languages such as Python, with experience in relevant libraries (e.g., TensorFlow, PyTorch, Hugging Face Transformers). 3. Research Experience: Previous experience in conducting research projects or coursework involving machine learning, natural language processing, or AI is preferred. 4. Analytical Skills: Strong analytical and problem-solving skills, with the ability to critically evaluate research literature and methodologies. Communication Skills: Good written and verbal communication skills for effective collaboration and reporting of research findings. 5. Familiarity with RAG Concepts: Basic understanding of Retrieval-Augmented Generation concepts and large language models	Unspecified	IHPC	Gu Yuanlong William	1 Fusionopolis Way, #16-16 Connexis, Singapore 138632	Computing and Information Sciences,Computer Science	1
154	Exploring Synthetic Data Generation for Single Cell Analysis	Single-cell RNA sequencing or scRNAseq technologies measures high-throughput gene expressions at a single-cell resolution. However, the data generated are often noisy and heterogenous as many other cell types or rare cells may be sampled together. In the field of big data and artificial intelligence, synthetic data have been generated and used to investigate human behaviors and pattern recognitions. Synthetic data, as the name implies, is artificially created rather than being generated from actual events. It is a kind of data augmentation, created with the help of algorithms, and is used for a wide range of activities, including as test data for new products and tools, and for model training and validation without compromising privacy. It has also been shown to be inexpensive, as it reduces the number and time taken for experiments, and combines well with the real data to increase the overall number of observations. Therefore, synthetic data generation has been adopted for almost three decades across a variety of research fields, with more recent applications coming into clinical and omics fields. In the project, the student will explore an adversarial variational autoencoder (VAE) to generate synthetic RNA-seq data by training on given real cell-type scRNA-seq dataset. At the end of the project, the student will understand what is synthetic data, why we need it and how we could reliably generate it.	Learn skills in systems biology, dynamic modeling and machine learning techniques.	Literature survey, protoype model development, simulations and report writing	Requirement: R or python coding, deep knowledge of statistics or AI is an advantage	Unspecified	BII	Kumar Selvarajoo	30 Biopolis Street, #07-01 Matrix, Singapore 138671	Computing and Information Sciences,Biomedical Sciences,Computer and Software Engineering,Biomedical Engineering,Computer and Software Engineering	2
155	Exploring the Health Benefits of Bioactive Components from Fermented Plant-based Ingredients	This project aims to uncover health and wellness applications of fermented plant-based ingredients, focusing on their bioactive properties, eg. anti-diabetic, anti-obesity, anticancer, antihypertension, anti-inflammatory and antioxidant effects. High-throughput bioassays will be used to aid the discovery of these bioactive components.	By the end of the project, student will: (i) learn microbial and mammalian cell culture, fermentation, drying and extraction techniques (ii) develop practical skills in designing and conducting experiments through the use of high-throughput cell-based and biochemical bioassays (iii) learn how to analyse and interpret data effectively, and communicate results related to the bioactive components of fermented ingredients.	1. Aseptically cultivate and handle microbial and mammalian cell cultures to prepare fermentates, lysates and supernatants 2. Implement developed assays (cell-based, enzymatic, ELISA) for screening of extracts and strains for biological activities 3. Operate liquid handling instrumentation and plate readers 4. Analyse, interpret and record experimental results 5. Possibly, collaborate with ANLT group (chemical profiling methods) to identify bioactive components 6. Participate in lab housekeeping duties, such as waste disposal and lab cleaning and maintenance	•Bior experience in a microbiology or mammalian cell culture lab environment with excellent aseptic techniques. •Fāmiliar with sample preparation, dilution, and assay measurements. •Bior internship experience in high throughput screening and knowledge of lab automation would be an advantage. •Āble to multitask, work independently and as part of a team. •Gbod oral and written communication skills.	Unspecified	SIFBI	Sharon Crasta	Singapore Institute of Food and Biotechnology Innovation, 31 Biopolis Way, Nanos, #02-01, Singapore 138869	Biomedical Sciences,Bioscience and Biotechnology	2
156	Exploring the transition from a monocentric to polycentric firm spatial distribution	The spatial distribution of firms in cities evolves continuously. As cities expand, they often shift from a monocentric structure, with a single dominant business hub, to a polycentric structure, featuring multiple hubs. By using a model for the dynamics of firm spatial distributions, we will explore the conditions under which a polycentric structure emerges and how it depends on interactions between different firm sectors. Key questions include: How do interaction properties affect the formation of multiple hubs? Can a single hub support diverse sectors, or will multiple hubs arise naturally for different sector groups? How can new hubs be introduced and established successfully?	The student will learn how to analyze dynamical equations, build models, carry out simulations.	Perform simulations of dynamical models, analyze equations	Basic programming, calculus, enthusiasm and willingness to learn	Unspecified	IHPC	Guo Yipei	1 Fusionopolis Way, #16-16 Connexis, Singapore 138632	Computing and Information Sciences,Applied Mathematics	1
157	Fabrication and characterization of on-chip quantum light source using 2D ferroelectric materials	The miniaturization of quantum computing and communication systems necessitates the development of on-chip quantum light sources. This proposal aims to investigate the fabrication and characterization of such a light source using two dimensional (2D) ferroelectric materials with strong nonlinear optical properties. The research will focus on generating entangled photon pairs on artificial stacking and twisting devices, which can be seamlessly integrated into semiconductor chips. By leveraging the unique properties of 2D ferroelectric materials, this project aspires to create a scalable and efficient platform for integrated quantum photonic devices, driving forward the advancement of quantum technologies.	The student can learn many aspects of nanophotonic and nano-optics, include on-chip low-dimensional device fabrication, optical characterization for PL, Photodetector and SHG mapping, data analysis, and paper writing.	The student is responsible to optical characterization including light path build up, SHG mapping and SPDC characterization, also include data collection and data analysis.	Student should have basic trainning on optics, fundamental physics and coding (Python or matlab). Students with Master's degree are prefered.	Unspecified	Q.InC	Xuezhi Ma	3 Fusionopolis Wy, #09, Innovis, Singapore 138634	Physical Sciences,Physics	1
158	Fish cultivated adipocytes for novel food and consumer care ingredients	Fat is an important component of alternative meat products, yet has been understudied. It also has potentials for application into nutritional supplements and cosmetic products. Our lab established new fat-derived cell lines from edible fish species, stem cell culture and differentiation conditions into maure adipocytes. The student will take part in our project to study molecular and cellular characteristics of fish cell lines, develop optimal taste, texture, aroma and nutrition (esp. omega-3 fatty acids), and/or improve cell culture and differentiation media conditions that are serum-free, food grade, nutritional and cost effective. 3D and large scale culture system will also be explored that will enable commercial applications as manufacturing of novel food and consumer care ingredients.	This training will familiarize a student who is interested in pursuing research related professions in both academic and industrial settings. The student will have an opportunity to learn different biological and cellular techniques and apply the results ranging from fundamental understanding to commercial applications in the fields of food and nutrition. The student will have adequate opportunities in collaborating with academic and industry partners through this project.	The experimental techniques include, but not limited to, cell culture, gene / protein expression analysis, investigation of media and scaffold components, microscopy, imaging and cellular analysis, flow cytometry, and metabolomics. The student may collaborate with our partners in additional experiments. Training for these skills will be provided including biosafety observation. The student will work both independently and in the team, make presentations at weekly meetings, keep records, analyze data, and write reports.	Prior experience in cell culure and basic molecular biology analysis is preferred. Passion in this research area, team work abilities, and proactive learning attitudes are required.	Unspecified	SIFBI	Shigeki SUGII	Nanos #05-63, 31 Biopolis Way, S138669	Biomedical Sciences,Bioscience and Biotechnology,Bioengineering	1
159	Flexible Ion Sensors for Health Monitoring	There has been a surge in research on flexible ion-selective sensors for applications such as human, animal and plant health monitoring. These sensors can detect our bodies' physiological conditions by monitoring sweat ions, such as sodium or chloride for dehydration. In such measurements, sensor accuracy is highly dependent on the stability of the reference electrode. While there have been several reports of flexible reference electrode, most suffer from drift due to leaching of electrode components. This project aims to develop stable reference electrodes through different printing, polymerisation, and electrochemical techniques	1. Gain a good understanding of how ISEs work, and how ISE performance is measured 2. Independently perform experiments from formulation to fabrication and testing 3. Independently operate electrochemical testing equipment, and other basic chemical characterization tools 4. Independent and critical thinking skills, problem-solving skills, and teamwork are among the many other transferrable skills to be gained	1. Execute tasks assigned by the supervisor with due diligence. 2. Comply to laboratory safety rules set by the institute.	1. Pursuing undergraduate studies in Bachelor's Degree in Chemistry, Chemical Engineering, Materials Science or any relevant degree. 2. Possess a proactive and positive learning attitude 3. Able to work both independently and in a team	Unspecified	IMRE	Shermin Goh	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Materials Engineering,Chemistry	2
160	Forecaster for time and frequency steering	Optical fibers have enabled high accuracy and high stability transfer of time and frequency signals for synchronization and syntonization applications. However, these fibers are affected by various sources of noise. This project aims to develop an algorithm to forecast the effects of these noise on the signals based on past measurements and pre-emptively steer these signals.	1) Understand the concepts of time and frequency transfer over optical fibers 2) Utilizing python to implement a forecaster 3) Learn and understand the figure of merits of forecasting algorithms as well as time and frequency stability measurements.	To develop a forecaster for time and frequency steering of optical signals.	Knowledge and experience of basic computer programming in Python. Problem solving.	Unspecified	NMC	Tan Yung Chuen	8 Cleantech Loop, #01-20 B, Singapore 637145	Engineering and Technology,Computer and Software Engineering,Electrical engineering,Mathematics	1
161	Foundation AI model for digital pathology	The emergence of Artificial Intelligence (AI) has led to the develop of disruptive technologies in the clinical settings. In particular, in the area of digital pathology, AI will play increasing role in the diagnosis of biopsies as well as resection patients samples. Combinations of AI with the development of high throughput slide scanner will lead of big changes in clinical workflows in the pathology departments of hospitals. This PhD project strives to develop cutting-edge artificial intelligence technologies that can be translated into standard-of-care in the clinics.	To learn the domain knowledge of the project and to learn how to use AI methods to solve the related clinical problem	Develop AI code, prepare and clean data, perform experiments, report results	Able to code in python. Basic applied mathematics skills	Unspecified	BII	Hwee Kuan Lee	30 Biopolis Street, #07-01 Matrix, Singapore 138671	Computing and Information Sciences,Biomedical Sciences,Computer and Software Engineering,Biomedical Engineering,Computer and Software Engineering	2

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Project No.	Project Title	Project Description	Learning Outcomes for Students	Roles and Responsibilies of Student	Students' pre-requisites	Minimum Duration (Months)	Research Institute of Internship Supervisor	Name of Internship Supervisor	Workplace Address	What is the project's research category?	No. of Students Required
162	Foundation model enhanced robot navigation	"Foundation models (FMs) are large deep learning neural networks trained on extensive datasets, significantly changing how data scientists approach machine learning (ML). FMs demonstrate impressive generalization capabilities across various downstream tasks. However, their computational intensity often makes them unsuitable for robotic applications where power consumption is limited and environments are relatively fixed. In this project, we will explore how to leverage foundation models to help robots quickly adapt to new or highly dynamic environments, based on their excellent generalization performance, while also developing dedicated AI tools that are more cost-effective and perform better in specific environments.	Be familiar with the foundation models and domain adaptation framework. A demo to use the foundation model to assist robot navigation	Be a part of the project team to provide benchmark on a few foundation models; finetune or re-train deep learning model based on the foundation model	Programming language: Python Basic knowledge of the deep learning / AI; team work; Problem solving willingness to learn	2	I2R	LI Jun	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical and Electronic Engineering	2
163	Foundation Models for Embodied Artificial Intelligence	There are now many foundation models, such as LLMs (large language models) and VLMs (vision-language models). While there are now a few VLA (vision-language-action) models such as SayCan, PaLM-e, RT-1 and RT-2, these are focused on specific robotic hardware (such as robot arms), rather than generalizable models for embodied AI abilities such as navigation, physical commonsense, etc. Thus, this project aims to develop foundation models for Embodied AI more generally, which can then be adapted or finetuned for more specific hardware such as robots or drones.	Research experience with AI/ML. Potential submission or publication to top-tier AI conference.	Literature review. Algorithm design. Experiment implementation and analysis. Manuscript writing.	Strong programming background. Familiarity with Deep Learning.	2	I2R	Tan Yin Chet Cheston	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science	2
164	From Actions to Intentions: VideoQA and Causal Reasoning for Behavior Understanding	Are you passionate about understanding human behavior and the "why" behind people's actions? Join our research team as a student researcher and work on cutting-edge technology at the intersection of video question answering (VideoQA), causal reasoning, and human behavior understanding. This project aims to harness large language models (LLMs) and vision-language models (VLMs) to develop systems capable of interpreting complex human behaviors in video. Our goal is to develop AI systems that can understand video content at a deep level—not only recognizing actions but also reasoning about why they occur or intentions of humans. Student will work on creating models capable of causal reasoning and complex interpretations, bridging the gap between video and language in innovative ways. We aim to develop Video Question Answering models and datasets for this project.	This project offers a well-rounded learning experience, providing students with the opportunity to gain a diverse set of skills and insights. With a good mix of objectives, student will: 1. Be a part of complete ML/CV project from the ground up, covering all stages—from data collection to model benchmarking. 2. Gain hands-on experience with LLMs, VLMs, and causal reasoning, exploring how advanced AI models can interpret and answer questions about complex video content. 3. Work on multimodal data processing, combining visual and language-based data to create models that understand actions and intentions. 4. Develop practical skills in dataset construction and data annotation, essential for creating high-quality training data. 5. Collaborate with an interdisciplinary team, enhancing both your technical and teamwork	1. Dataset construction: help design and implement fast and efficient pipeline for building high-quality dataset for training models. 2. Model development: assist in designing and finetuning video question answering models 3. Documentation and collaboration: document findings and collaborate with the team to share insights and troubleshoot challenges.	Creativity Python Programming (Bonus) Familiarity with Datasets (Bonus) Familiarity with Machine Learning or Computer Vision	Unspecified	IHPC	Paritosh Parmar	1 Fusionopolis Wy, #16-34 Connexis, North Tower, Singapore 138632	Computing and Information Sciences,Psychology and Neuroscience,Computer Science	2
165	Frontend development of web-based tissue image analytics and visualization software tools	HistoPath Analytics (HPA) Platform is a web-based spatial omics and tissue image analytics and visualization software platform developed by BII. The platform is used by biologists and clinicians to process tissue images collected from cancer patients and find cancer biomarkers from multiplexed fluorescence (MxF) images and spatial transcriptomics data. The intern will participate in the frontend development of the HPA platform, including UI/UX, data visualization modules, and data processing modules.	The intern will have the opportunity to learn web application development, advanced programming skills, and data processing methods. He/she will have the opportunity to work in a highly interdisciplinary and stimulating environment, and learn how computational biology can help clinicians to fight cancers.	The candidate will design, program, and test Javascripts for processing and visualizing tissue images. He/she will also have to perform research on image and data processing, 3D graphics rendering algorithms (WebGL), and benchmark the performance of these methods.	The intern must have strong knowledge in web frontend development, know Javascript (Node JS), HTML, and CSS and be able to work under the Linux environment. Prior knowledge in Computer Networking and Database (SQL) is preferred but not required.	Unspecified	BII	Loo Lit Hsin	30 Biopolis Street, #07-01 Matrix, Singapore 138671	Computing and Information Sciences,Computer and Software Engineering	1
166	Front-end electronics	Breadboard and Printed Circuit Board Design for ultrasonic applications. FPGA programming using MATLAB HDL coder. Generation of Pulse Width Modulation signals.	PCB design. MATLAB HDL coder	PCB design. MATLAB HDL coder programming.		Unspecified	IHPC	Marvin Tan	1 Fusionopolis Wy, L15, South Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical and Electronic Engineering ,Physics	3
167	GenAI-Driven Fine-Tuning and AI-Assisted Reporting for Environmental Impact Assessments and Compliance	This project focuses on enhancing large language models (LLMs) for environmental impact assessments and developing AI-assisted tools for compliance reporting, incorporating Life Cycle Assessment (LCA) to ensure comprehensive sustainability analysis. The goal is to automate compliance reporting, reducing manual workloads and providing detailed insights into environmental metrics.	Students will learn how to fine-tune LLMs for sustainability contexts, develop AI models to generate regulatory compliance reports, and apply LCA for evaluating environmental impacts. They will also enhance their understanding of sustainability metrics and gain skills in automation for environmental assessments.	Students will be tasked with fine-tuning pre-trained language models, integrating them into reporting workflows, and developing user-friendly tools for generating compliance reports. They will also conduct testing to ensure the reliability of the generated data and evaluate ethical considerations in using AI for sustainability.	Familiarity with machine learning, particularly LLMs, and experience in Python programming are essential.	2	SIMTech	Yang Zhao	Singapore Institute of Manufacturing Technology (SIMTech) @ Fusionopolis 2 2 Fusionopolis Way #08-04, Innovis Singapore 138634	Computing and Information Sciences,Computer and Software Engineering	2
168	GenAI-Enhanced Web Application and Retrieval-Augmented Generation for Sustainable Industrial Resource Optimization	"This project aims to develop a web-based platform for facilitating circular economy practices while leveraging Retrieval-Augmented Generation (RAG) for optimizing sustainable resource use. The platform will use Life Cycle Assessment (LCA) methods for comprehensive environmental analysis, allowing companies to track resource exchange and reuse effectively. The integration of RAG will provide intelligent recommendations for resource management, enhancing the platform's capabilities in industrial symbiosis. "	Students will gain practical experience with full-stack web development, applying RAG models in industrial contexts, and conducting LCA-based analysis for sustainability. They will also enhance skills in analyzing resource reuse scenarios and collaborate in interdisciplinary teams to tackle sustainability challenges.	Students will be responsible for developing the platform's core functionality, including building the user interface, integrating RAG-based features, and ensuring seamless resource tracking. They will collaborate closely with team members, participate in code reviews, and contribute to the system's testing and optimization phases.	A background in programmin. Experience in Python, JavaScript, or similar programming languages is preferred.	2	SIMTech	Yang Zhao	Singapore Institute of Manufacturing Technology (SIMTech) @ Fusionopolis 2 2 Fusionopolis Way #08-04, Innovis Singapore 138634	Computing and Information Sciences,Computer and Software Engineering	2
169	Generalization in Machine Learning Models for AI Digital Pathjologic Diagnosis	Enhancing Model Generalization Through Regularization Techniques, Data Augmentation, Cross-Domain Generalization. 1). Explore advanced regularization techniques to improve the generalization capabilities of machine learning models. This includes methods such as dropout, weight decay, and adversarial training. 2). Data Augmentation for Robust Model Training Transfer Learning for Cross-Domain Generalization. Investigate the impact of data augmentation on model generalization. Develop new augmentation strategies and evaluate their effectiveness in training robust models. 3). Transfer Learning for Cross-Domain Generalization. Study transfer learning techniques to enhance the generalization of models across different domains. Focus on adapting pre-trained models to new tasks and domains with minimal retraining.	i). Enhanced generalization techniques. ii). Effective data augmentation strategies. iii). Transfer learning techniques for cross-domain generalization. iv). Models with improved robustness and generalization. Validation results demonstrating effective domain adaptation.	A). Technique Development: Research and implement various regularization methods. Design and implement novel data augmentation techniques. Research transfer learning methods such as fine-tuning, domain adaptation, and few-shot learning. B). Model Training: Apply these techniques to different neural network architectures. Train models using augmented datasets. Apply these methods to various cross-domain tasks. C). Performance Assessment: Evaluate the models on diverse and unseen datasets. Test the models' robustness and generalization on various benchmarks. Evaluate the transferability and generalization of the adapted models.	Nil	Unspecified	BII	YU Weimiao	Bioinformatics Institute 30 Biopolis Street #07-01 Matrix Singapore 138671	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Natural Sciences	1
170	Generalizing Tool Use in Bimanual Manipulation Sequence Generation	The generation of bimanual object manipulation sequences from text has broad applications in collaborative robots and augmented reality. However, existing works often struggle to generalize tool use for the same action. This limitation arises because these works rely primarily on object labels and shapes to learn the spatiotemporal relationship between how two objects, such as a knife and a fruit, interact during actions like cutting. This project aims to develop methods that incorporate material and object properties into the generation process to improve generalization across tool use. For instance, a model that has observed how a peeler peels a cucumber should be able to generate the motion of a knife peeling an apple.	1. Learn state-of-the-art bimanual manipulation generation algorithms. 2. Learn methods to encode object point clouds. 3. Learn methods to incorporate material information. 4. Learn methods for fusing multimodal data. 5. Learn skills in writing for a publication.	1. Review existing literature on the generation of bimanual manipulation sequences. 2. Review existing methods on point cloud encoding and extend them to include object material and properties. 3. Develop methods that learn the spatiotemporal relationship of objects during bimanual manipulation given their shape and material. 4. Evaluate the performance of the developed architectures against related works. 5. Deliver a framework (e.g. set of commands or scripts) that will oad the data, run the model, and evaluate the performance of the algorithms. 6. Assist the supervisor in writing for a publication.	Strong familiarity with PyTorch and Python. Strong interest in research. Ability to independently read and interpret research papers.	2	I2R	Main Sup: Xu Qianli Co-sup: Haziq Razali	Institute for Infocomm Research, 1 Fusionopolis Way, Connexis, #21-01, Singapore 138632	Computing and Information Sciences,Computer Science	1
171	Generation and measurement of entangled photon pairs	Entangled photons pairs play a pivotal role in photonic quantum information science and technology. Many nonlinear optical materials have been expoited to generate the entangled photons, but most of them are rather bulky, hindering the integration of quantum light sources. In this project, we will investigate the genertion of entangled photons using SPDC in an extremely thin a 2D crystal flake as the nonlinear optical medium.	The student will learn the basics of quantum optics and the relavant experimental techniques through this internship. The student will initially build the optical setup for the SPDC photon generation, and implement the coincidence photon counting measurement. In addition, the student will learn how to implement a quantum interferometer.	(1) Taking responsibility and weekly report. (2) Understanding physics (3) Taking experimental data and participating analysis	(1) Pro-active team player, (2) Good verval and written communication skills, (3) Not mandatory but prefer one who has background in quantum physics and quantum information. (4) Students who have experience on optics experiment are higly encouraged to apply	Unspecified	Q.InC	Young-Wook Cho	2 Fusionopolis Way, Innovis, Level 9, Singapore 138634	Physical Sciences,Information Technology,Electrical and Electronic Engineering ,Physics	1
172	Generative Artificial Intelligence for customer support in logistics	Customer support is an integral part of a company's logistics operations, as they help to address clients' general enquiries about the company's services, as well as respond to clients' requests and updates to delivery orders. While Generative Artificial Intelligence (AI) models has the potential to automate the customer service tasks and provide a personalized experience for each client, these Generative AI models are also prone to hallucinations and biases without the necessary context and historical customer support logs to refer to. To this end, this research topic aims to leverage on current generative AI technologies, historical customer support data, and real-time delivery information to develop a personalized AI assistant for customer support in logistics operations.	The intended learning outcomes are as follows: - How to incorporate generative AI models into an AI assistant framework for answering customer enquiries in a logistics operations context, and - How to determine the knowledge bases and databases needed for the AI assistant to answer a customer enquiry based on the nature of the enquiry.	Roles and Responsibilities of Student: The roles and responsibilities of the student are as follows: - Assist in developing a framework to determine the type of customer enquiry and the knowledge bases and databases needed to answer the enquiry, and - Assist in fine-tuning and adapting the generative AI models to answer customer enquiries using domain-specific data and knowledge.	Students' pre-requisites (if any): - Proficiency in Python is a plus - Familiarity with Large Language Models (LLMs) and existing AI assistant frameworks such as Rasa and Botpress is desirable but not necessary	2	SIMTech	Mingyan Simon Lin	Advanced Remanufacturing and Technology Centre (ARTC) 3 CleanTech Loop, #01/01, CleanTech Two, Singapore 637143	Computing and Information Sciences,Computer Science	1

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
173	Generative models for Inverse Probelms	The primary objective of this project is to develop and implement advanced generative models to address inverse problems in various scientific and engineering domains. By leveraging the latest advancements in machine learning, this project aims to significantly improve the accuracy and efficiency of solving inverse problems, which are crucial for applications such as medical imaging, geophysical exploration, and computer vision. We will propose method based on the generative modelsthat can 1)provide more accurate and stable solutions compared to traditional methods, 2) reduce computational costs and time required to solve complex inverse problems. 3) give uncertainty estimation for predictions	1. Students will gain practical experience with widely used general-purpose scripting languages, including Python and Pytorch, developing data-driven AI models. 2. Students will grasp the fundamentals of generative AI, focusing on the implementation of these models. 3.Students will learn probabilistic model for uncertainty estimation 4. student will learn the latest methods in inverse problems.	1) Literature review 2) Implement and run Python code for data processing . 3) Student can choose the inverse problem in either imaging or physicsal system. Both of them need to build the forward model model. 4) design and propose efficient and accurate probabilistic algorithm for inverse problem with supervisor 5) Reproduce the benchmark method and Implement proposed algorithm.	Python. Statistics. Deep learning. Pytorch	Unspecified	IHPC	Yang Feng	1 Fusionopolis Way, Connexis North, Singapore 138632	Computing and Information Sciences,Computer Science	2
174	Graph theory approach for fast solutions of heat equation problems in additive manufacturing	Metal additive manufacturing involves the selective melting of feedstock into complex geometries, typically achieved by using a laser to melt metal powder or wire. This process generates steep thermal gradients that significantly influence microstructure formation, defect development, and mechanical properties. Fast and accurate predictions of thermal histories are essential to optimize these outcomes. This project aims to apply graph theory methods to solve the heat equation, enabling the simulation of thermal profiles during the printing process for complex geometries.	The student will develop skills in advanced C++ programming techniques to create high-performance simulation code. They will also acquire a foundational understanding of additive manufacturing processes, with a particular focus on simulating these processes in relation to heat transfer problems.	Write a C++ program to solve a heat transfer problem in additive manufacturing using the graph theory method. Apply the program to study thermal histories during the printing of complex geometries. Assess the efficiency and applicability of this method in additive manufacturing problems. Compare the results with those from other existing tools at IHPC, such as finite element solvers. This project will involve coding in C++, parallel programming, running and analysing simulations, and conducting a literature survey on heat transfer solutions and additive manufacturing processes.	Having some experience with coding, for instance in Matlab or similar, and the strong desire to lear a more advanced programming langugage, specifically C++. Basic understanding of the physics of heat transfer is a benefit. Basic knowledge of linear algebra and calculus.	Unspecified	IHPC	Jakub Mikula	1 Fusionopolis Wy, #16-16 Connexis, North Tower, Singapore 138632	Engineering and Technology,Mechanical Engineering	1
175	Greener route to design of efficient heterogeneous catalysts for CO2 utilization and hydrogen production	The burgeoning CO2 concentration in the environment is one of the most formidable challenges mankind facing today, which requires urgent action to minimize the impact. Singapore aims to achieve net-zero by 2050. Key strategies in mitigating CO2 emission involves carbon capture and utilization (CCU). While the carbon capture technologies have significantly advanced in recent years, more efforts are required for efficient CO2 utilization. Hydrogenation of CO2 over metallic catalysts has been emerged as one of the most relevant strategies for its valorization. The project will involve the study of heterogeneous catalysts developed by novel and greener routes for gas-phase continuous flow CO2 hydrogeneration reaction. The work will entain synthesis of catalysts, their physicochemical characterization, and evaluation in CO2 hydrogenation and H2 production. Depending on the suitability of students and background project in the area of CO2 conversion or H2 production will be allocated.	During this internship, students will develop understanding of decarbonization challenge and will learn about how to convert this challenge into opportunity for making green chemicals and fuels (e.g., sustainable aviation fuel, SAF). They will learn the skills for heterogeneous catalyst, synthesis, characterization, and testing of CO2 hydrogenation or H2 production. Heterogeneous catalysis is key in industrial manufacture of chemicals, fuels, and pharmaceutical with more 80% share for all different types of catalysis. So, gaining hands-on understanding on it at this early stage will be important for the student for their future carrier. The student will be trained also for scientific writing, data processing and presentation.	Student will be involved in planning of experiment with the supervisor, and under supervision will perform catalyst synthesis and structural and porosity characterization such as XRD, N2 physisoprtion, scannign electron microscopy (together with the supervisor). Student will be trained on plug flow reactor and work under supervision and will be explosed to 16x parallel automated reactor system. The student is expected to be communicative and focused and have ability to work in the team. His/her teamwork skill will be further boosted during the internship.	Candidates with strong interest to contribute to sustainability mission will be preferable. The candidate should have background chemical engineering or chemistry. Should be familiar with common softwares/programs such as Excel, ChemDraw, Origin (will be trained if does not know).	Unspecified	ISCE2	Amol Amrute	1 Pesek Rd, Jurong Island. 627833	Engineering and Technology,Chemical and Molecular Engineering	2
176	Growth and characterization of non-collinear antiferromagnetic thin films	Chiral antiferromagnetic (AF) thin films with noncollinear spin order have attracted immense interest for the realization of highly scalable and fast switching memory and computing technologies. Mn-based thin films consisting lattices of 120° non-collinear triangular planes of Mn atoms exhibits chirality critical to its unique spin transport properties. This project involves the growth and characterization of Mn-based chiral AF thin films, and development of chiral AF device concepts.	The candidate will begin with relevant literature reviews to acquire fundamental understanding of nanomagnetism and chiral AF thin films. They will be trained on thin film deposition and characterization techniques. They will learn to acquire and analyse magnetic hysteresis loops and electrical transport data for the novel AF films.	1) Deposition of AF thin films and device stacks using high temperature physical vapour deposition 2) Characterization of AF thin films and device stacks using magnetometry and electrical probe station 3) Perform analysis of magnetometry and electrical data and interpretation of the results	Background on magnetism and experience in materials characterization and data analysis techniques will be preferred. Discipline: Materials Science and Engineering, Electrical and Computer Engineering, Engineering Science, Physics & Applied Physics	Unspecified	IMRE	Ho Pin	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Materials Engineering,Physics	1
177	Handy directional generation of biological synthetics with lazy experts	Synthetic biology refers to the systematic reverse engineering of biological systems toward specified functions. Existing technologies are mostly manual and emphasize domain expertise. Although generative models significantly simplify the process of biological product design, they provide little control over the synthetics, imposing strict restrictions. In this project, we will build upon our previously published AI/ML work on controllable generation (e.g., IMLR, TPAMI) and our collaborations in enzyme engineering optimization and antibody design to establish experiment-enhanced directed generative models. We aim to iteratively integrate scientists' feedback from wet lab experiments into the generative models to improve the success rate of synthetic compounds with desired functionalities. Our project is data-centric, designed to leverage patterns within existing biological datasets, and it also provides flexible controls to adjust the generation direction based on scientists' feedback on the intermediate	Cooperation with domain experts in AI, antibody design, and enzyme engineering. First/main-author papers published in JMLR, TPAMI, Nature Communications, Natural Machine Intelligence, ICML, ICLR, NeurIPS, etc	Model design, code implementation and regular meeting with bioscience collaborators	Pytorch, Deep Generative Model, Bioscience	Unspecified	IHPC	Pan Yuangang	C16-60, Level 16, 1 Fusionopolis Way, Connexis Sourth Tower Singapore 138632	Biomedical Sciences,Bioscience and Biotechnology,Computer Science	1
178	Hard Coatings for Cutting and Drilling Tools	Hard coatings have been extensively applied on cutting tools to extend tool life and to enhance machining productivity in precision engineering industry. The cutting tools' performance depends greatly on the coating quality prepared by Physical Vapour Deposition (PVD) process. The project aims to develop the advanced hard coatings by using PVD process for selected base materials and machining process to extend the cutting tool lifetime and improve the efficiency of the machining process.	The student will work on project to use PVD system to develop the advanced hard coatings for cutting tools application. Depends on the cutting tool base materials, material to be machined and types of machining process, various hard coatings will be developed. Interns will have the chance to conduct the coating deposition process, coating performance evaluation, etc	Help on coating deposition and coating characterization. Summarize the experimental results.	Students from engineering	2	SIMTech	Jiangfeng Hu	Singapore Institute of Manufacturing Technology (SIMTech) @ Fusionopolis 2 2 Fusionopolis Way #08-04, Innovis Singapore 138634	Engineering and Technology,Materials Engineering	1
179	Harnessing Synthetic Biology for Efficient Conversion of Next Generation Feedstocks into Valuable Chemicals	Non-food feedstocks have emerged as promising carbon sources for microorganisms to produce a variety of value-added bioproducts, such as platform chemicals (e.g., succinic acid), microbial lipids, bioplastics (e.g., polyhydroxyalkanoates), and biosurfactants (e.g., rhamnolipids). This project will develop microbial cell factories capable of converting non-food feedstocks into valuable chemicals by harnessing synthetic biology.	Student will learn basic skills in microbiology, molecular biology, and microbial fermentation. After the completion of the internship, students will have understanding of the basic concepts and application of microbial synthetic biology.	Students will participate in designing, performing and monitoring synthetic biology experiments	Candidates should have strong interest in molecular biology and microbiology. Having solid background in biochemistry, or microbiology will be a plus point.	Unspecified	ISCE2	Wong Fong Tian	1 Pesek Road, Jurong Island. S(627833).	Engineering and Technology,Bioengineering	2
180	High Performance Gallium Nitride Transistor Technology for RF/mm-wave Application	The next generation of wireless communication requires high bandwidth to handle the large amount of data traffic (>100 Gbps), as well as small-form factor RF front-end modules by scaling the antennae. Solid-state power amplifiers (SSPAs) which could deliver high output power at these frequency bands with excellent linearity (low intermodulation distortion) are highly desired. Among the various semiconductor technologies, GaN PAs have demonstrated record power levels at Ka band and below, but significant research is needed to allow GaN technology to realize its full potential. At the National GaN Technology Centre (NGTC) and IME, we seek to push the frontiers of GaN transistor and MMIC process technology for mm-wave (30-00 GHz) front-end modules, in the areas of power amplification, low noise, and linearity. This project will explore material epitaxy, transistor architecture, and emerging fabrication techniques. Proposed transistor designs will be simulated using industry-standard TCAD software. The experiments will leverage a dedicated 6 inch. GaN process line and a comprehensive suite of characterization equipment at NGTC.	Throughout the project, the student will be exposed to design/TCAD simulation and/or characterization of state-of-the-art GaN RF transistors. For example, in design/TCAD simulation, the student will understand the design space and trade-offs of the novel GaN transistor, therefore gaining a deep understanding of semiconductor devices.	The student will support TCAD simulation and/or characterization activities of state-of-the-art GaN RF transistors at NGTC. For example, in TCAD simulation, the student will build structures in industry-standard software, conduct parametric studies of the designs, and analyze the physical mechanims in the device. In characterization, the student will conduct DC and RF characterization of fabricated transistors and passive components, and extract key performance metrics.	(1) Strong interest in microelectronics and semiconductors (2) Understanding of solid-state device and solid-state physics (3) Prior research experience in compound semiconductor/GaN electronics (simulation, modeling, experiment) is a plus	3	IME	Xie Qingyun	Kinesis Building, Fusionopolis 2	Engineering and Technology,Electrical and Electronic Engineering	2
181	High RF performance GaN HEMT device through Gate profile optimization	The gate profile of RF GaN HEMT devices plays a crucial role in determining their high-frequency performance. The size of the gate contact opening directly influences the device channel length, which is critical for high-frequency operation. Additionally, gate resistance (Rg) significantly impacts the maximum operating frequency of the device. The shape and size of the gate metal also affect the electrical field distribution within the device channel, influencing breakdown characteristics and long-term reliability. By designing and achieving different gate profiles through process integration changes and etch stack modifications, we can optimize and enhance the RF performance of GaN HEMT devices. This project aims to refine the gate metal profile to achieve superior RF performance, leveraging advancements in process integration and etching techniques.	By the end of the project, the student will have knowledge in GaN HEMT device fabrication process, design and simulatation skills of different gate metal profile correlated the impact to device performance, understanding of how to achieve different gate metal profile throuh different process methods.	1. Paticipate different gate metal profile design 2. Perform simulation on the impact for various profile design 3. Paticipate in fabrication process to realize different profile design	1. Knowledge about GaN HEMT device 2. Knowledge about device/process simulation	3	IME	Xie Hanlin	Kinesis Building, Fusionopolis 2	Engineering and Technology,Electrical and Electronic Engineering	2

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182	High-performance van der Waals optoelectronic devices	Van der Waals materials and heterostructures have the potential to revolutionize various optoelectronic devices by offering strong light-matter interactions at quantum limits, wide-range tunability, flexibility etc. This project aims to develop high-performance optoelectronic devices that works in a broad range from far infrared to UV by taking advantage of the quantum degree of freedoms in van der Waal heterostructures. The heterostructures will also be engineered for dynamic control of device operation with electrical stimulus	Experiementally, the students will be able to use the state-of-the-art techniques to fabricate high-quality heterostrucutres and perform optoelectronic device measurements. Intellectually, students will gain understandings of cutting-edge research in optoelectornics.	Fabrication of high-quality van der Waals heterostructures, and optoelectronic characterizations of devices	Background in materials science, chemistry or physics, or electronics.	Unspecified	IMRE	Zhao Meng	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Materials Engineering,Physics	2
183	High-Throughput Screening for Optimal Delivery Vehicles for Prime Editing Components	While prime editing holds immense potential for precise genetic modification, one of the most significant challenges is the lack of efficient delivery vehicles to transport prime editing components into living cells. In this project, you will contribute to developing a high-throughput screening process to identify and optimize delivery systems for prime editing components in vivo. The intern will work on DNA cloning techniques to help generate the necessary constructs for screening, and will gain exposure to cutting-edge DNA sequencing technologies to analyze and validate the effectiveness of various delivery vehicles. This project offers a unique opportunity to work at the forefront of gene editing, helping to unlock the potential of prime editing by solving one of its most pressing challenges—effective in vivo delivery.	•□Understanding Challenges in RNA Biotechnology Development: Through hands-on work, you'll gain insights into the cutting-edge obstacles that researchers encounter in developing RNA-based therapeutics and the strategies being employed to overcome them. •□Hands-on Experience in Experimental Techniques: Gain practical experience in key biotechnology techniques, including RNA handling, DNA cloning, and cell culture. •□Experimental Planning and Troubleshooting: Learn how to design and plan experiments from start to finish, considering variables, controls, and potential challenges, troubleshoot experimental issues, refining your problem-solving skills and ability to adapt to unexpected results. •□Literature Review and Research: Enhance your ability to conduct thorough literature reviews, critically analyzing scientific papers to inform your own research. •□Data Documentation, Analysis, and Presentation: Develop strong skills in documenting experimental procedures and results in a clear, organized manner. You will also gain experience in analyzing data, using software tools to interpret results, and present your findings, honing your ability to	•□Ownership of Experimental Execution: Collaborate with the team to plan experiments and take full responsibility for executing them, ensuring that all steps are carried out with precision and scientific rigor. You will manage your own experiments from start to finish, ensuring consistent progress and high-quality results. •□Optimization of Protocols: Work closely with mentors to identify areas for improving experimental procedures, developing more efficient, cost-effective, or accurate methodologies. Your contributions will help streamline research processes and increase the reliability of experimental outcomes. •□Accurate Record-Keeping: Maintain meticulous and detailed lab notebooks, documenting every aspect of your experimental work. Ensure that all records are accurate, organized, and comply with regulatory and scientific standards, allowing for clear reproducibility and traceability. •□Data Presentation and Communication: Regularly present your experimental progress and findings at data update meetings and journal clubs, honing your ability to clearly communicate scientific concepts and results. •□Collaborative Problem Solving: Actively engage in brainstorming sessions, contributing innovative ideas and solutions to overcome challenges that arise in the course of research. Your creativity and critical		Unspecified	IMCB	Chermaine Tan	61 Biopolis Drive, Proteos, #08-06, S(138673)		2
184	Host determinants of susceptibility to mycobacterial infection	Mycobacteria are able to subvert the host immune response to drive tissue pathology and prevent the efficient clearance of infection by the immune system. This project will study the role of genes and molecular pathways that are hijacked during mycobacterial infection. We will then use genetic tools to manipulate the host immune response to modulate the immune response against infection.	Manipulate host immunity to infection. Perform infection studies. Assess role of host immune pathway(s) on infection outcome.	Experimentation. Record keeping.	Interest in infection biology necessary, prior experience with zebrafish model helpful but not necessary.	3	ID Labs	Stefan Oehlers	#05-13, 8A Biomedical Grove, Immunos, Singapore 138648	0,Biomedical Sciences,Microbiology	1
185	Human Behaviour Understanding in Collaborative Task-Based Settings	Understanding how humans collaborate to complete a task is essential in the development of more fluid, collaborative robots. This project aims to curate a dataset of two humans collaborating and to develop preliminary methods for recognizing and anticipating their behaviors, as well as identifying their individual roles.	1. Learn the process of recording and synchronizing data from multiple Orbbec Femto Bolt RGBD cameras. 2. Learn the entire process in the creation of a dataset, from determining appropriate labels to using a combination of few-shot learning and manual annotation via Amazon Turk for dataset annotation. 3. Learn the fundamentals of action recognition and anticipation algorithms.	The student will have various tasks depending on the stage of the project the student joins: 1. Brainstorm with the supervisor on a set of tasks such as that the two human collaborators will perform, the individual roles within each task, and the action labels for the dataset. 2. Explore methods to generate the annotations using a combination of few-shot learning and and manual labelling via Amazon Turk. 3. Investigate methods for single-person action recognition and anticipation and extend them to accomodate interactions between two people. 4. Deliver a dataset approximately 2 hours long, with preliminary methods developed for collaborative behaviour analysis. 5. Assist the supervisor in writing for a publication	Familiarity with PyTorch and Python.	2	I2R	Main Sup: Xu Qianli Co-sup: Haziq Razali	Institute for Infocomm Research, 1 Fusionopolis Way, Connexis, #21-01, Singapore 138632	Computing and Information Sciences,Computer Science	1
186	Hybrid Quantum Physics-Informed Neural Network for Solving Wave Propagation Problems	This project focuses on developing quantum computing algorithms for physics-informed neural network (PINN) based wave propagation solver. The aim is to develop efficient wave propagation solver on quantum computer.	1. Develop proficiency in developing quantum computing algorithms for PINN. 2. Gain skills in designing quantum circuits and evaluate its performance on quantum simulator. 3. Acquire research and analytical skills in quantum computing and physics-informed neural network.	1. Develop 1D/2D quantum computing algorithm and quantum circuits for implementing PINN on quantum simulator. 2. Assess the performance of the QPINN and optimize its efficiency. 3. Conducts literature reviews to understand theoretical foundations, analyzes simulation results, compares findings with existing classical techniques, and documents insights to identify areas for improvement and further development	1. Knowledge of machine learning/neural networks and quantum computing. 2. Good programming knowledge of Python, Pytorch/Tensorflow. Knowledge of Qiboj/Qiskit/Pennylane will be plus. 3. Good knowledge of linear algebra and calculus. Understanding of PDE will be plus.	Unspecified	IHPC	Ewe Wei Bin	1 Fusionopolis Wy, #16-16 Connexis, North Tower, Singapore 138632	Engineering and Technology,Electrical and Electronic Engineering	2
187	Hyperparameter tuning of optimization algorithms for predictive modeling of biological networks	The capacity to derive the underlying parameters of biochemical rate laws is essential for the predictive modeling of the dynamics of metabolic & signaling networks, with potential biotechnological and biomedical applications, such as biomanufacturing, aging, and cancer treatment. To obtain the parameter values, optimization algorithms are used for fitting time-series data to kinetic models, but there is a dearth of knowledge which optimization algorithms are the most effective and efficient for doing so, and their required hyperparameter values. The student will develop such proprietary optimization algorithms	Appreciation & skills in data science, systems biology modelling, and machine learning techniques.	Innovatively apply techniques, ideas, and concepts. Develop deployable, well-annotated, & neat codes based on interactive python notebook.	Experiences & skills in python coding. Willingness to explore, learn, and apply machine learning techniques. Take initiative & with 'can do' spirit!	Unspecified	BII	Yeo Hock Chuan	Bioinformatics Institute 30 Biopolis Street #07-01 Matrix Singapore 138671	Computing and Information Sciences,Biochemistry,Computer Science,Chemical and Molecular Engineering,Mathematics	1
188	Implementing Few-Shot Learning for Skill Recognition in Assembly Processes.	Recognizing specific operator skills is crucial in assembly processes for monitoring quality and providing real-time assistance. However, conventional AI models require large amounts of labelled data to recognise skills accurately, which is time-consuming. This project aims to explore Few-Shot Learning techniques to enable skill recognition from minimal training examples, making the model adaptable to new tasks and operators with limited labelled data.	1. To develop an understanding of Few-Shot Learning techniques 2. To understand training machine learning models. 3. To gain experience in dataset preparation and GUI development.	Need to work on completing the given work.	Python Programming, Basic knowledge of Computer Vision, Basics of deep learning	Unspecified	ARTC	Shin Horng Chong	Advanced Remanufacturing and Technology Centre (ARTC) 3 CleanTech Loop, #01/01, CleanTech Two, Singapore 637143	Computing and Information Sciences,Computer Science	1
189	Improving Efficiency of Photon Upconversion	Photon upconversion is a process of converting two or more low-energy photons into a higher-energy photon. Conversion of invisible infrared light into visible-wavelength light is particularly interesting, having potential applications in photodetection, 3D volumetric display, bioimaging, and photovoltaics. In this project, we will utilise materials engineering and optical cavities to increase the efficiency of upconversion.	The student will learn basic skills in fabrication and characterisation of thin-film optical devices.	The student will work with and learn from a stff scientist or a senior PhD student. The student will be expected to conduct literature research, help with experiments, and complete a project report.		Unspecified	IMRE	Wu Mengfei	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Materials Engineering	2
190	Improving training efficiency of physics-informed neural networks (PINNs)	A physics-informed neural network (PINN) is a promising method for addressing scientific problems involving partial differential equations. Despite the broad applicability of PINNs, several technical challenges, such as imbalanced gradients of loss terms and spectral biases, hinder training efficiency. In this project, we will explore a new preconditioning method aimed at improving PINN training effectiveness.	1. Acquire in-depth knowledge of PINNs. 2. Experience theoretica and empiricall work on PINN. \	1. Learn PINN theories and literature review. 2. Theoretical study on PINNs 3.. Conduce experiments to verify the theoretical findings.	1. Be able to read research articles and learn PINN theory 2. Knowledge of PINNs and related mathematics (optimization, PDE) 3. Pytorch	Unspecified	IHPC	Atsushi Nitanda	1 Fusionopolis Way, #16-16, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science,Mathematics	2
191	In vivo analysis of mycobacterial determinants of pathogenesis	The modern pathogenic mycobacterium faces an unprecedented number of selective pressures and must respond to maintain evolutionary fitness. In addition to the host immune system, factors such as deadly antibiotics, mutagenic cigarette smoke, and predatory bacteriophages are regularly encountered. This project will determine how genetic adaptation to stressors affects the pathogenesis of mycobacteria to provide insight into mycobacterial virulence and strategies to counter the damage caused by mycobacterial infection. We will use genetic manipulation of multiple species of pathogenic mycobacteria and hosts to study the consequences of genetic changes in relevant animal models.	Manipulate bacterial genes. Perform infection studies. Assess role of bacterial genes on infection outcome.	Experimentation. Record keeping.	Interest in infection biology necessary, prior experience with zebrafish model helpful but not necessary.	3	ID Labs	Stefan Oehlers	05-13 Immunos Building	0,Biomedical Sciences,Microbiology	1
192	Integrative analysis and AI modeling of multimodal datasets of diseases	We work closely with clinicians to explore personalized treatment options for patients of different diseases, including different cancer types and metabolic diseases. We use multi-omic and spatial profiling, and functional screening in patient-derived models. Data of multiple modalities are generated in the process, and we are developing systematic workflows to integrate and analyze the data to enable clinical-decision-making and drive translation research. The Research Data Integration group in BII is developing an end-to-end framework to analyze and integrate complex multimodal datasets to enable clinical-decision-making and drive translation research.	The candidate will have the opportunity to work in a multi-disciplinary team led by a senior Principal Investigator highly experienced in computational biology and biomedical data science and clinician-scientists of various specialization. Eventually, the candidate will receive training in both computational and translational biology. The candidate will gain experience in dealing with highly complex data science challenges in different disease domains.	The intern is expected to work on any of these tasks, depending on field of study and interests. 1) Develop, implement and benchmark executable workflows or AI methodologies for multi-omic datasets and images. 2) Organize and analyze in-house and publicly available datasets. 3) Develop visualization tools to visualize results in a meaningful way. 4) Curation of therapies and biomarkers, and patient clinical data.	1) The candidate should have basic programming skills (e.g. Python, R, RStudio, Jupyter Notebook, RShiny, SQL), except for curation tasks. 2) Familiarity with Unix/Linux environment or cloud architecture would be an advantage. 3) Strong analytical and problem-solving skills. 4) Excellent oral and written communication and presentation skills. 5) Able to work independently, and as part of a team.	Unspecified	BII	Woo Xing Yi	Matrix, Biopolis, L7	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Mathematics	2

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193	Intrusion Detection in Autonomous Robots (IDAR)	Exploratory project involving research and development of a PoC system. Building an IDS for simple robot platforms, program it to monitor sensor data and detect irregular patterns for specific use case.	Learn to build robots using simple kits. Learn about intrusion detection system as applied to robotics. Learn concepts in network security, anomaly detection for sensor data and building simple automated response system.	Student will be responsible for a subsystem development with guidance from supervisor. Should demonstrate independence in exploration and self motivation to learn fast and acquire skills in the relevant area. Responsible for building, configuring the basic robot using a simple kit, with guidance. Collection and analyzing sensor data and sharing with team. Simulating use case to demonstrate anomaly and detection. Demo and final report at completion.	Basic programming skills with Python(eg. sckkit-learn). Basic networking concept. Basic cybersecurity knowledge. Basic understanding of circuit connections, sensor, actuators, controllers, etc. Robotics background is not necessary but a plus. Machine learning knowledge is not necessary but a plus. Self motivated, teamplayer, interested in research. (Project requires minimum 4 months of attachment duration)	2	I2R	Anku Adhikari	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering	2
194	Inverse-Designed Photonic Integration of Stimulated Brillouin Scattering Lasers for Quantum PNT sensors	This project focuses on the design and optimization of on-chip Stimulated Brillouin Scattering (SBS) lasers, leveraging AI-based inverse photonic design to address key challenges. The primary objective is to reduce losses, optimize waveguide structures, and suppress high-order Stokes modes, all while balancing acoustic modes, waveguide resonance, and environmental factors. Conventional methods struggle to manage these complexities effectively, but "inverse design" provides a powerful approach to navigate and optimize such intricate conditions. In this internship, the goal is to train models using optical measurement results from photonic integrated cavity structures and secure unique designs through the inverse design method.	AI Application in Photonics Design, Understanding of Quantum Metrology, Skills in Photonic simulation tools	The student will be responsible for setting up and configuring the Stanford Photonics Inverse Design Software (SPINS), an AI-based inverse design simulation tool for photonics, to ensure it's fully operational for design tasks. They will also run initial simulations to validate the setup and participate in the inverse design process to optimize photonic structures. Additionally, they will document the setup process, simulation outcomes, and design insights to support project continuity and learning.	Proficient in Python, Proactive and team-oriented mindset, Background in Computer Science or Electrical & Electronic Engineering or Physics, Strong analytical thinking and effective communication skills, Experience or familiarity with AI learning methods is beneficial	Unspecified	Q.InC	Incheol Seo	2 Fusionopolis Way, Innovis Level 9, Singapore 138634	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering ,Physics	1
195	Investigating crosstalk between host immune response and metabolism in respiratory diseases	The main objective of research work is to investigate lung intrinsic functions that helps in restricting respiratory pathogens.	Mammalian tissue culture, design of experiments, maintainig lab records, bacterial culture techniques, preparing media, drug testing			3	ID Labs	Amit Singhal	8A Biomedical Grove, #05-13 Immunos, Singapore 138648		
196	Investigating the role of placental ABC transporters	The placenta serves as the functional interface between mother and child. Placental ATP-binding cassette (ABC) transporters regulate transfer of substances such as nutrients (eg. lipids and folate) and steroid hormones (eg. glucocorticoids and oestrogens) between mother and child. Some of these transporters show gestational-age dependent expression, suggesting they play a critical role in supporting a healthy pregnancy. Our lab is interested in investigating their role in regulating placental lipid metabolism and their relationship with maternal and child outcomes.	The selected student(s) will gain an appreciation for the study of human potential in the areas of developmental/reproductive biology and intrauterine programming of long-term health, while learning practical laboratory skills in cell/tissue culture, molecular biology (eg. extraction of RNA and protein, qPCR, immunoblotting, ELISAs), safe handling of human tissue samples as well as analytical skills in statistics.	'- Follow all lab safety rules - Perform experiments and data processing/analysis as guided by mentor - Regularly read the scientific literature and assist with literature reviews of scientific papers - Attend and participate in lab meetings - Have proof of Hepatitis B antibody titres to work with human tissue samples in the lab	- Undertaking biology subjects at the undergraduate level - Experience with using a micropipette	Unspecified	IHDP	Hannah Yong	Dry lab at Institute of Human Development and Potential, Brenner Centre for Molecular Medicine, 30 Medical Drive, Level 4, Singapore 117609 Wet lab at MD11, Level 4 (Prof Chan's lab)	Biomedical Sciences,Life Sciences,Natural Sciences	1
197	Investigating the role of polyamines in skin health	Aging is associated with a decline in eIF5A hypusination, a process that can be restored through dietary spermidine supplementation. This decline, alongside the depletion of spermidine, is likely linked to reduced activity of ornithine decarboxylase (ODC1), which is the rate-limiting enzyme in polyamine biosynthesis. Previous studies indicate that spermidine can enhance mitophagic processes and improve mitochondrial function in part through modulation of hypusination, autophagy, and mitophagy (Hofer, S.J. et al. 2022). The aim of this study is to investigate whether spermidine regulates autophagy and inflammation in keratinocytes through eIF5A hypusination. Techniques will include mammalian cell culture, real time PCR and Western blots.	The student will gain knowledge of skin biology and structure and the impact of aging on skin. They will learn how to grow and differentiate skin cells in the lab, harvest RNA and protein and determine expression levels of mRNA and protein. Through this attachment the student will learn to develop hypothesis, design experiments and analyse data.	The student is expected to read and gain an understanding of the subject from the literature, work closely with the postdoc to learn, adhere to all rules and regulations in the lab and remain curious about the studies they are doing.	Currently enrolled in a Life-Science or related course. Be able to commit to a minimum of 16 weeks and be on-site during workdays.	2	A*SRL	David CASTANO	8A Biomedical Grove, #06-06 Immunos, Singapore 138648	,Biomedical Sciences,Biomedical Sciences	1
198	Investigating the scalability of quantum natural language processing	Quantum neural network is a promising direction where we use quantum computing to perform natural language processing. This project aims to investigate the scalability of QNLP and compare its performance to a classical approach. Student will explore the state of the art of QNLP and investgiate the amount of text that it can manage and its performance	1.Develop better understanding in quantum computing and its application in natural language processing. 2.Develop skills such as software development.	Students will implement algorithms on quantum simulators or real quantum hardware where feasible, gaining hands-on experience in coding, simulating, and debugging quantum circuits related to game theory. Students will collaborate with peers and mentors, discuss findings, and contribute to regular project meetings. They will also document their work, present results, and participate in discussions on how the findings contribute to the broader field.	Students should ideally have a foundational knowledge of quantum computing concepts such as qubits, superposition, and entanglement. However, those without prior experience are welcome, provided they are eager to learn and engage with quantum computing principles throughout the project. Familiarity with natural language processing concepts is beneficial. Students without NLP background should be prepared to study these concepts. Student is expected to code in Python	Unspecified	IHPC	Goh Siong Thye Dax Enshan Koh	1 Fusionopolis Wy, #16-16 Connexis, North Tower, Singapore 138632	Computing and Information Sciences,Applied Mathematics	1
199	Investigation of Control Strategies for Perched Mobility of an Aerial Robot	This project focuses on exploring and evaluating control strategies to enable stable and precise perched mobility in aerial robots. Perched mobility refers to the ability of aerial robots, such as drones, to maintain stable positioning while moving with constrained mobility on various surfaces or structures. This capability enhances operational flexibility in tasks requiring close proximity or semi-stationary observation, making it especially valuable for applications in inspection, surveillance, environmental monitoring, and infrastructure maintenance. By simulating and experimentally validating various control strategies, the project aims to identify optimal methods to improve the robot's ability to perch and maintain balance across diverse environments.	1. Gaining hands-on experience with aerial robotics, drones, and various electronics. 2. Gaining theoretical & practical knowledge in control of drones. 3. Getting exposure in a professional robotics R&D environment.	The work of this project mainly includes developing and implementing control algorithms tailored for perched mobility in aerial robots. The work also involves simulating the control methods in MATLAB and hardware testing.	1. Coding skills (MATLAB/Simulink and C/C++ or Python) 2. Good knowledge of control theory 3. Experience with simulating the robots (good to have) 4. Good teamwork and communication 5. Hands-on experience in hardware testing (good to have) 6. Experience with drone control (big plus)	2	I2R	Nursultan Imanberdiyev	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical and Electronic Engineering	1
200	Investigation of retinal stem cell transplants in humanized immune system	There are no effective treatments for end-stage retinal degeneration, where there's profound reduction in the quality of life because of loss of central vision, secondary to an irreversible loss of RPE and photoreceptors cells. Stem cell derived retinal cell replacement is an emerging therapy for retinal degeneration, whereby clinical trials have demonstrated its safety, but not efficacy. The lingering and critical question remains whether we can further augment vision recovery via other adjunct mechanisms such as immuno-modulation of retinal cells. The proposed work seeks to address this unmet clinical need, and if successful, will provide novel ways to augment the outcome of retinal cell therapy.	Systematic understanding of relevant knowledge within the scope of their research project. The ability to identify and describe broadly accepted methodologies of science, including the basic tenets of comparative (observational) and experimental approaches. The student eventually will learn to design the experiment, keeping records of the same and to summarize and interpret the data in a scientific and logical manner. Gain specialised expertise in stem cells, retinal cell biology, and immunology.	1. Stem cell maintenance and differentiation to retinal cell types 2. Molecular characterization of the retinal cells 3. Functional characterization of the retinal cells 4. Evaluating the retinal cell transplant outcome in humanized mice	Basic wet lab and molecular biology techniques - pipette handling, aseptic techniques for cell culture, Immunochemistry, western blot .	Unspecified	IMCB	Bhav Parikh	05#15, 61 Biopolis Drive, Proteos, Singapore - 138673	Biomedical Sciences,Life Sciences	1
201	Knowledge Management and Platform Development to Promote Resource Circularity	Circularity is a key concept in reducing waste and minimising the use of virgin materials in industries. Industrial symbiosis, a practical application of circular economy principles, creates waste-to-resource networks between companies. A major challenge, however, is enabling companies to find suitable partners, as they may lack expertise in how their by-products could be utilized by other industries. To address this, the project aims to curate knowledge about by-product transformation processes and establish a reference system that companies can use to emulate and participate in the circular economy. The project will focus on knowledge acquisition, representation and recommendation of circularity practices, and facilitated through the development of advisory platforms such as matchmaking or marketplace systems. These platforms will recommend optimal resource pathways, helping companies source alternative raw materials and offset their waste more sustainably, ultimately closing their resource loops.	Students will gain hands-on experience in knowledge management and natural language processing techniques, including the use of knowledge graphs and large language models for resource circularity. They will participate in the development of platforms that leverage this knowledge and will apply these tools in real-world operational settings.	The student will enhance existing knowledge pipelines related to waste-to-resource transformations. This may involve sourcing additional knowledge from web scraping or research articles. They will also contribute to the development of frontend platforms that apply this curated knowledge to recommendation systems for companies.	Proficiency in Python programming. Experience in natural language processing or knowledge graph projects. Frontend development skills are highly desirable. Interest in sustainability.	2	SIMTech	Chuan Fu Tan	Singapore Institute of Manufacturing Technology (SIMTech) @ Fusionopolis 2 2 Fusionopolis Way #08-04, Innovis Singapore 138634	Engineering and Technology,Materials Engineering	1
202	Kolmogorov-Anold Neural Network for Automatic Speech Recognition and Audio LLMs	In this project we develop novel deep learning technology named Kolmogorov-Anold Neural Network with applications in automatic speech recognition and audio LLMs	Data processing for large scale AI model training/Advanced large scale deep learning model training/Large Language Models/RAGs	Take part in one or few tasks listed in J)	PyTorch/Deep Learning/Audio & speech processing	2	I2R	Tran Huy Dat	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering ,Mathematics	1
203	Large language models for taxonomy classification	Early diagnosis of infections is critical for the successful treatment of hospitalized patients, but the precise detection of causative pathogens remains an open challenge. Compared to current laboratory diagnostic methods, taxonomic classification tools that match sequencing reads with a reference database allow for the rapid identification of pathogens. In this project, we aim to develop deep-learning taxonomic classifiers (e.g., transformers) using long-read sequencing data. We plan to extend previous methods in directions such as representation learning and the detection of novel species.	After the end of this internship students will be able: 1) to develop deep learning pipelines to analyze rich and complex metagenomics datasets. 2) to get a deeper understanding of machine learning research in computational genomics. 3) to perform exploratory and statistical data analysis on metagenomics/microbial datasets.	• Process and perform integrative analysis on metagenomics datasets • Implement, train, tune, and debug deep learning classifiers for taxonomy classification. • Create pipelines for analyzing large biological datasets. • Perform exploratory and statistical analyses to elucidate biological significance from experimental observations	Requirements: • Self-motivated individual and willingness to self-learn • Good analytical, statistical and programming skills (Python or like) and ability to work in UNIX environment • Team player and good interpersonal skills Preferable skills (not required): • Knowledge of machine learning frameworks such as PyTorch or Tensorflow. • Basic knowledge of machine learning methods	Unspecified	GIS	Niranjan Nagarajan	60 Biopolis St, Singapore 138672	Biomedical Sciences,Microbiology,Bioinformatics	1

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
204	Learn-from-demonstration for polishing aircraft blades.	This project aims to develop an autonomous robotic system that polishes aircraft blades using the "Learning from Demonstration" (LfD) method. The goal is to teach a robot to precisely replicate the complex, high-precision polishing techniques demonstrated by human experts. Polishing aircraft blades is a delicate task that requires careful attention to detail and consistent results, ensuring the safety and performance of the blades. By leveraging LfD, the system will learn optimal motion patterns, force application, and surface interaction by observing human demonstrations, and then it will perform the task autonomously.	1. To design and implement robotics control systems. 2. To develop skills in integrating and calibrating sensors to create a robotic system that can perceive and interact with the physical environment. 3. To implement real-time control algorithms to ensure precise and adaptive behaviour in the robot.	Hardworking in completing the given jobs.	Robotics, force sensors, vision sensors, imitation learning, MATLAB, python.	Unspecified	ARTC	Shin Horng Chong	Advanced Remanufacturing and Technology Centre (ARTC) 3 CleanTech Loop, #01/01, CleanTech Two, Singapore 637143	Computing and Information Sciences,Computer and Software Engineering	1
205	Learning robust graph neural networks	Graph neural networks have achieved tremendous breakthroughs in various learning problems arising from diverse real-world applications. What makes graph neural networks effective is they generate representations to the downstream predictive tasks in a globally relational manner. In other words, representations are inferred via particular operations between themselves and their observed neighbors. However, prevalent functions for generating representations adopted by graph neural networks solely consider the effect brought by the information propagated within the neural architecture but overlook the knowledge hidden in the task-specific context. This may cause overfitting when training graph neural networks and consequently may reduce the generalization capability of the graph neural architecture. To overcome the previously mentioned problems, this project aims to develop novel and robust graph neural networks in two complementary directions. One is to design novel generating functions concerning the instant knowledge acquired from the task-specific context so as to locally consummate neural message passing. The other is to propose novel learning objectives that may seemly incorporate the learning modules for capturing the context-specific knowledge, achieving the improvement on the global neural architecture. The paradigms of learning graph neural networks and solving real-world applications are thereby expected to be fundamentally	Developing novel, generic graph learning models for various downstream tasks; paper/report writing.	Data preprocessing, design and development of computational models, and paper writing.	Familiar with Python, Pytorch, basic knowledge about graph theory, linear algebra, and statistics	Unspecified	IHPC	He Tiantian	C16-110, 1 Fusionopolis Way, Connexis North Tower Singapore 138632	Computing and Information Sciences,Computer Science	1
206	Learning with bio-theory-inspired graph neural networks	Biological graphs widely exist in scientific scenarios, such as biomolecular analysis, drug discovery, and medical imaging. These graph-structured data encompass rich information describing vital biological processes in diverse species. Analyzing biological graphs with modern AI technologies can significantly speed up the evolution of biological research and industry. Graph neural networks (GNNs) have been demonstrated as powerful tools for learning representations in biological graphs for various downstream applications. However, conventional GNNs are developed based on pure graph theory, lacking essential incorporations of critical scientific knowledge from the bio-applications themselves. In this project, we aim to develop novel GNNs to learn expressive representations in graphs from biological science. Novel paradigms and building blocks that are biology aware are designed in this project to guide GNNs to learn representations embedded with biological theories, thus enhancing their predictive performance and scientific significance in	Developing advanced approaches to solving graph learning problems in the areas of computational biology and bioinformatics; paper/report writing.	Data preprocessing, design and development of computational models, and paper writing.	Familiar with Python, Pytorch, basic knowledge about graph theory, linear algebra, and statistics	Unspecified	IHPC	He Tiantian	C16-110, 1 Fusionopolis Way, Connexis North Tower Singapore 138632	Computing and Information Sciences,Computer Science	1
207	Leveraging CRISPR/Cas12a gene editing to enhance CART efficacy in solid tumors	The hypoxic tumor microenvironment (TME) and persistent antigen stimulation induced CART cell exhaustion has been the major hurdle of CART therapy in solid tumors, and CRIPSR gene editing has been widely used in CART cells to overcome this problem to yield a higher therapy efficacy. Allpying an in vitro co-culture system which mimicks breast cancer microenvironment, We have identified a few gene targets that regulate T cell differentiation and exhaustion. Genetic ablation of these targets using CRISPR/Cas12 system reduced T cell exhaustion and boosted tumor responses to immunotherapies. We are currently validating the potential of these genes as therapeutic targets in mouse models	1) Molecular experimental skills, including western blot and flow cytometry to analyze protein expression, qPCR to analyze mRNA level 2) Processing of cultured cells and tissues for RNA/DNA isolation. Preparation of samples for genomic/transcriptomic sequencing.3) Basic skills for CRISPR gene editing system, including gRNA designing and sequence analysis.	Students will help process cell/tissue samples, extract nucleotides or proteins and run the downstream molecular experiments; Students will help with some data analysis of qPCR, RNA or Chromatin sequecing data; Students will help manage the daily running of the lab	Undergraduate in biomedical/life science	Unspecified	GIS	Jiang Zemin	60 Biopolis St, Singapore 138672, Genome-lvl6	Biomedical Sciences,Biomedical Sciences	1
208	Logistics supply chain modelling and optimization using AI	The global pandemic COVID-19 has disrupted many supply chains across numerous industries the world over. If not well contained and managed at an early stage, such unprecedented disruptions may lead to even more serious consequences in an era of supply chain re-globalization. In addition, increasing scale and complexity of supply chain leads to a large pool of shared information and complex information sharing processes. Proposed PhD research focuses on methods and techniques that effectively and efficiently capture and share manufacturing insights across the supply chain, in particular handling big amount of unstructured data from multiple sources. We have developed technologies for modelling disruption risk, capturing and managing such information in enterprises and supply chains. Moving forward, we are looking into the following research topics: 1) Supply chain resilience modelling and disruption risk mitigation techniques 2) Food supply chain modelling and price prediction using AI 3) Spatio-temporal pattern discovery to develop novel analytical methods and techniques capable to handle a huge data generated in logistics.	The proposed research aims to equip students with a deep understanding of how global events, such as the COVID-19 pandemic, disrupt supply chains and the importance of early management to prevent severe consequences. Students will develop skills in modeling supply chain resilience and applying risk mitigation techniques to enhance robustness. They will learn to effectively capture and share manufacturing insights, particularly handling large volumes of unstructured data from multiple sources. The research will explore the application of AI in supply chain management, including food supply chain modeling, price prediction, and solar energy production prediction. Additionally, scholars will acquire expertise in spatio-temporal pattern discovery to handle vast logistics data and understand the development of technologies for disruption risk modeling and information management within enterprises and supply	The students will help Scientists in programming, testing and the AI algorithms	Programming in Python	2	SIMTech	NengSheng Zhang	Advanced Remanufacturing and Technology Centre (ARTC) 3 CleanTech Loop, #01/01, CleanTech Two, Singapore 637143	Computing and Information Sciences,Computer Science	4
209	Low-dimensional materials for quantum hardware	The development of scalable, fault-tolerant qubit platforms remains a key challenge for building a universal quantum computer. While semiconductor spin qubits, which leverage the electron's spin as a two-level system with long coherence times, have been explored extensively, current systems have only produced a few functional devices. Layered 1D and 2D materials, such as graphene nanoribbons and MoS_2, offer promising properties like spin-valley coupling and high spin-orbit interaction, enabling fast qubit operations and long coherence times. The project focuses on using these materials to engineer quantum dots for spin qubits, aiming to overcome fabrication challenges and improve stability through innovative material processing.	The student will join a team of highly skilled researchers with diverse backgrounds in materials science, engineering, crystal growth, and quantum transport. They will actively participate in the fabrication of the van der Waals heterostructures in the inert environment of a glovebox assembly, equipped with a lithography setup, metal evaporation and ALD tools. The student then will carry out multterminal transport spectroscopy studies using the state-of-the-art millikelvin refrigerators with vector magnets, capable of handling low-noise DC and RF measurements.	Student responsibilities may include: • Developing a fabrication protocol for a quantum device based on low-dimensional materials; • Contribution to the electrical device measurements and data analysis; • Participation in weekly discussions on project progress with the Supervisor; • Presenting regular progress reports for the project timeline tracking; • Cooperate with all A*STAR health and safety policies and procedures.	Previous experience in device fabrication and/or electrical measurements is welcomed	Unspecified	Q.InC	Ivan Verzhbitskiy	2 Fusionopolis Way, #08-03, Innovis, Singapore 138634	Engineering and Technology,Electrical and Electronic Engineering ,Physics	2
210	Machine Learning analysis of Traditional Chinese Medicine (TCM) ingredients and their interactions against disease targets	Machine Learning analysis of Traditional Chinese Medicine (TCM) ingredients and their interactions against disease targets	Traditional Chinese Medicine (TCM) ingredients, Machine learning, protein-ligand interaction modeling	Verify TCM ingredients, explore machine leearning models for data analysis, perform 3D modeling of TCM ingredients against disease targets	good at linux, shell scripting, python/perl programming, have experience in machine learning, can work as full-time intern	Unspecified	BII	Hao FAN	30 Biopolis Street, Matrix #07-01, Singapore 138671	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Chemical and Molecular Engineering,Chemistry	2
211	Machine learning and AI for materials informatics	Materials informatics uses data science and AI techniques to develop advanced materials for technological needs, such as high-strength lightweight alloys for aerospace and transportation. The project aims to develop machine learning (ML) models to predict the properties of materials (e.g., tensile strength, conductivity) based on composition, processing, and atomic arrangements. Generative AI models will then be developed to discover new materials that meet target design criteria.	The student will obtain first-hand research experience in the emerging field of materials informatics. The student will develop expertise in constructing machine learning models to predict the properties of materials.	The student will work closely with computational materials scientists in A*STAR to develop machine learning models to predict the properties of materials. At the end of the internship, the student will provide documented codes and a report detailing his/her research findings so that the project can be incorporated into A*STAR's in-house platform for accelerated materials development.	Familiarity with Python or a similar programming language, so as to implement standard ML algorithms, such as those in scikit-learn. Familiarity with basic concepts in machine learning is preferred. Background in physical sciences or engineering is preferred, so that the student can better appreciate the datasets and ML models.	Unspecified	IHPC	Leong Zhidong	1 Fusionopolis Way, #16-16 Connexis, North Tower, Singapore 138632	Engineering and Technology,Materials Engineering	1
212	Machine learning surrogate models for materials repair	Additive Manufacturing (AM) is an important emerging technology for sustainability due to its potential to perform repairs for complex parts. However, the properties of the repaired material may be compromised due to defects introduced during the printing process. In order to intelligently design repair strategies that can lead to reliable structures, it is important to understand how these defects affect mecahnical properties. Unfortunately, high fidelity models are generally too slow to be practically usable. To this end, this project will seek to use data science tools to analyze simulation results and develop fast surrogate models that can be used in tasks such as optimization.	1. Student will learn basic numerical analysis to model the mechanical behavior of inhomogeneous materials 2. Student will learn mechanics concepts such as strength of materials 3. Student will learn statistical analysis and develop skills in tools such as python and Matlab	1. Implement and run python/Matlab codes simulating the properties of repaired materials 2. Implement and run python/Matlab codes for analysis of these models	1. Good knowledge of mechanics and materials properties 2. Experience with programming in python/Matlab and familiarity with statistics/probability theory	Unspecified	IHPC	Mark Jhon	1 Fusionopolis Way #16-16 Connexis North	Engineering and Technology,Manufacturing Engineering	1

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Project No.	Project Title	Project Description	Learning Outcomes for Students	Roles and Responsibilies of Student	Students' pre-requisites	Minimum Duration (Months)	Research Institute of Internship Supervisor	Name of Internship Supervisor	Workplace Address	What is the project's research category?	No. of Students Required
213	Machine Learning-Enhanced Quantum Communication and Metrology	We are looking for a motivated intern to join our research team on a pioneering project that integrates machine learning with quantum information science to advance quantum communication and metrology. This role involves leveraging machine learning models to enhance the reliability and accuracy of quantum information transfer and precision measurement. The intern will have the opportunity to work on developing innovative algorithms to optimize quantum channel capacities, improve teleportation fidelity, and implement robust error mitigation strategies. These advancements are vital for overcoming the noise and resource limitations inherent in quantum systems and pushing the frontiers of quantum technology. Ideal candidates should have a strong foundation in quantum mechanics and machine learning, along with proficiency in programming and data analysis, as they will be actively involved in both theoretical exploration and practical implementations.	Gain hands-on experience and deepen expertise in quantum communication, quantum metrology, and machine learning, with the potential to contribute to a research publication.	As the project supervisor, I will provide structured guidance and mentorship to the intern, ensuring they gain a solid understanding of both theoretical foundations and practical applications in quantum communication, metrology, and machine learning. I will support the student through regular discussions, helping them navigate technical challenges, refine their approach to algorithm development, and encourage critical thinking. My role also includes offering feedback on their progress and fostering an environment where they feel motivated to contribute creatively to research objectives. For students aiming to pursue publication, I will provide additional mentorship in research writing, analysis, and academic standards.	The ideal candidate should have a strong academic background in quantum mechanics, with a solid understanding of quantum communication and metrology concepts. Familiarity with machine learning techniques and algorithms is essential, as well as experience in coding, particularly in languages such as Python, MATLAB, or similar. The student should be comfortable working with data analysis tools and demonstrate critical thinking and problem-solving skills. While prior experience in quantum information science is beneficial, a strong interest in exploring the intersection of quantum physics and machine learning is key. The candidate should also be able to work independently, with a proactive attitude toward learning and contributing to the research process.	Unspecified	Q.InC	Xiao Yunlong	FP1, C16-81	Physical Sciences,Physics	
214	Maritime AI Excellence System	This project focuses on developing an integrated system with a suite of tools that supports the entire AI model-building lifecycle—from assessing and processing raw data to generating predictions based on the processed data. The system's capabilities will be demonstrated through an estimated time of arrival (ETA) prediction use case utilising Automatic Identification System (AIS) data.	Develop a comprehensive set of metrics to assess AIS data quality. Identify sources of data quality issues and propose effective mitigation strategies. Design data processing pipelines to facilitate large-scale assessment and processing of raw AIS data. Implement advanced hardware-acceleration techniques to enhance system efficiency.	1. Develop software packages / APIs for the data quality assessment and data processing 2. Experiment with hardware-acceleration to speed up computation 3. Implement Metaflow / dagster-based system for processing large amounts of data 4. Deploy machine learning models	1. Python for data science is a must 2. All of the following are not required, but highly appreciated: prior experience in systems design, ETL pipelines, MLOps, software engineering best practices, hardware acceleration	Unspecified	IHPC	Kelvin Lee	1 Fusionopolis Wy, #16-16 Connexis, North Tower, Singapore 138632	Computing and Information Sciences,Computer and Software Engineering	2
215	Mechano-chemical pre-treatment processes for value extraction from end-of-life products/components	Increasingly products and components are made of multi-material through overmoulding, coating or joining methods (direct or adhesive) so as to fulfill multiple functionalities, such as lightweight, good thermal conductivity or insulation. However, this make it very challenging when these products and components reach their end-of-life and thus, this project aims to pre-treat them without the use of harsh chemicals, enabling them to be segregated into their individual material streams and reach suitable 'r' paths or be cleaned sufficiently for reuse. There will be a need to optimise the process and characterise the effectiveness and efficiency of process.	Through this internship, the intern can expect to learn and improve laboratory techniques such as the use of scientific equipment, and also learn how to apply the knowledge learnt in school into projects and real-life application. Further, the intern is expected to present to project team and supervisor, refining their written and presentation skills.	Attend HSE induction and briefing to ensure that safety is of prority in lab works. Plan and conduct experimental works (process and characterisation) and document observations and findings. Compile and present results in report and presentation format.	N.A.	2	SIMTech	Xinying Deng	Singapore Institute of Manufacturing Technology (SIMTech) @ Fusionopolis 2 2 Fusionopolis Way #08-04, Innovis Singapore 138634	Engineering and Technology,Materials Engineering	1
216	Memristive nanophotonics: ultrafast control of light with memory	Combining nanophotonics and non-volatile memories to create tunable optic lenses	The student will learn about optical Imaging, memristors, neuromorphic systems, nanofabrication	Experiment design, simulation, nanofabrication	Knowledge of semiconductor physics and materials science. At least theoratical knowledge of nanofabrication	Unspecified	IMRE	Saurabh Srivastava	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Materials Engineering,Physics	1
217	MEMS levitation for precision sensing	Levitation, free from any physical constrains, opens new oppertinuties for next-generation actuators and sensors. Among different levitation methods, diamagnetic objects repel magnetic fields to achieve contactless levitation without any power consumtion. This project focuses on using light for precise control of these levitated objects through opto-mechanical interaction, aiming to develope ultra-sensitive sensors. Ideal for physics or engineering students, the project offers hands-on experience, skill development, and collaboration with experts in the field of applied physcis and precision engineering.	Develop hands-on experimental physics skills in a world-class group for quantum physics. Improve real-time control and data analysis abilities based on Python and FPGA. Prepare for future academic or industry careers.	Students will conduct literature reviews, assist in designing and setting up experimental apparatus including optical and electronic systems, and perform experiments to collect high-quality data. Responsibilities include understanind the physics of the experimental system, developing control algorism based on FPGA, analyzing data using MATLAB or Python, maintaining detailed documentation, and collaborating with the research team. Students will also troubleshoot issues, propose innovative solutions, and regularly update supervisors on progress.	Has backgrounds in physcis or engineering; highly motivated; GPA above 80%	Unspecified	Q.InC	Chen Xianfeng	2 Fusionopolis Way, Innovis, #08-03, Singapore 138634	Physical Sciences,Mechanical Engineering,Physics	2
218	Mental wellness detection and monitoring from lifestyle and wearable data	This internship project investigates the potential of AI methods to detect and monitor mental wellness by analyzing lifestyle and wearable data. The main activities include (1) data preprocessing, where students will clean and prepare datasets sourced from wearable devices and lifestyle metrics (e.g., sleep, physical activity, and screen time); (2) exploratory feature engineering to identify behavioral patterns and features that may correlate with mental wellness indicators; (3) model prototyping, where students will apply and test various machine learning algorithms for wellness classification; and (4) preliminary evaluation to assess the feasibility and limitations of using non-clinical data for mental wellness monitoring. This project provides hands-on experience in exploratory data analysis, feature discovery, and early-stage model development for health-focused AI applications.	By the end of this internship, students will have gained practical experience in data preprocessing, feature engineering, and machine learning model development, specifically within the context of mental wellness and health data. They will develop skills in handling and analyzing large datasets from wearable and lifestyle sources, extracting meaningful features, and applying AI algorithms for classification tasks. Additionally, students will learn to critically evaluate model performance and interpretability, gaining insights into the opportunities and challenges of using non-clinical data for mental health monitoring. This experience will enhance their technical abilities in data science while deepening their understanding of AI applications in healthcare.	Clean and preprocess wearable and lifestyle datasets. Conduct exploratory data analysis and feature engineering. Develop and test machine learning models for wellness classification. Evaluate model performance and document results. Collaborate with team members and present progress regularly.	Python programming and data handling skills. Basic statistics and machine learning knowledge. Interest in health data and AI applications.	Unspecified	IHPC	Gao Fei	1 Fusionopolis Wy, #16-16 Connexis, North Tower, Singapore 138632	Computing and Information Sciences,Computer Science	2
219	Metabolic rewriring of baker's yeast for food and consumer-care application	Metabolic engineering and synthetic biology transform microbes into efficient cell factories to produce natural products in a green and cost-effective manner. The baking yeast Saccharomyces cerevisiae has attracted great academic and industrial interests due to its generally regarded as safe property, accessible genetic engineering protocols, and easily modified to produce a large number of high-value products. However, the platform is still not fully available in our lab. This project targets to achieve high production of terpenoid-type products through S. cerevisiae synthetic biology platform and enrich the toolbox, including genetic modification, genome editing, pathway rewiring and fermentation.	1. Acquire basic molecular biology skills such as media preparation, yeast culture, growth curve, PCR, Restriction Enzyme digestion reaction, gel electrophoresis, bacteria transformation, plasmid extraction etc. 2. Learn analytical chemical technique, like HPLC and LCMS, and use them to qualify and quantify the synthetized products. 3. Yeast transformation, mutant screening and identification. 4. Gene expression and quantitative expression analysis. 5. Functional analysis of mutants.	Training the student on basic molecular biology and microbiology skills	1. Have learned molecular biology and/or microbiology; 2. Proactive learning attitude; 3. Postgraduate or higher degree	Unspecified	SIFBI	Zhang Congqiang	31 Biopolis way, Nanos #06-01	Biomedical Sciences,Bioscience and Biotechnology,Chemical and Molecular Engineering	1
220	Metal additive manufacturing with AI	We are seeking a talented and motivated student to join our research and development team in the field of laser powder bed fusion (LPBF) for additive manufacturing. In this studentship, you will work on innovative projects that leverage machine learning techniques to enhance the quality, efficiency, and reliability of LPBF processes. This project offers an excellent opportunity to gain hands-on experience in the intersection of advanced manufacturing and artificial intelligence. The advancement of LPBF has the potential to achieve adoption in various industries such as aerospace, space, oil and gas, automotive, medical and precision engineering	A deep understanding of LPBF technology Proficiency in machine learning, data analysis Hands-on experience in designing and conducting experiments with LPBF equipment. Effective data collection, analysis, and interpretation skills. Collaborative teamwork and communication within a research and engineering team. Presentation and reporting skills to convey research findings.	Process Parameter Optimization: Explore and experiment with process parameter optimization to determine the ideal set of parameters (e.g., laser power, scan speed, layer thickness) that result in improved part quality, mechanical properties, and production efficiency. Part Characterization: Physical part preparation and measurements for characterization of the part in terms of physical properties such as density, hardness, and mechanical strength. Data Collection and Preprocessing: Collect, clean, and preprocess data from LPBF machines, including sensor data, images, and process parameters. This will involve setting up data acquisition systems and ensuring data quality. Feature Engineering: Extract relevant features from the data, such as melt pool characteristics, powder distribution, and layer-wise variations, to create informative input features for machine learning models. Model Development: Develop machine learning models, such as deep neural networks, decision trees, or ensemble methods, to predict various aspects of the LPBF process, such as defects, mechanical properties, and dimensional accuracy.	Basic engineering domain knowledge, majored in material science, mechanical engineering etc. GPA higher than 4.0 Intern duration at least 6 months	2	SIMTech	Jason Ten	5 Cleantech Loop #01-01, CleanTech Two Block B Singapore 636732	Engineering and Technology,Computer Science,Mechanical Engineering,Physics	1
221	Metasurface-Based Technology for Multi-Channel Imaging System in High-Fidelity Facial Recognition	This research proposal aims to develop a novel metasurface-based multi-channel imaging system to enhance the accuracy and efficiency of high-fidelity facial recognition. By leveraging the unique properties of metasurfaces, this system will capture and process multiple spectral channels simultaneously, providing rich and detailed facial data that surpasses traditional imaging methods. The successful development of this metasurface-based multi-channel imaging system will revolutionize facial recognition technology, providing unparalleled accuracy and reliability. This advancement will have significant implications for security, surveillance, and authentication systems, contributing to safer and more secure environments.	By participating in this project, students will be well-equipped with the technical knowledge, practical skills, and research experience needed to excel in the fields of optical technologies, nanotechnology, and advanced imaging systems.	Students involved in the metasurface-based imaging system project will primarily focus on setting up and calibrating the imaging system, conducting experiments to capture multi-spectral images, and ensuring accurate data collection. They will implement and optimize image processing algorithms, analyze data to improve facial recognition accuracy, and develop software tools for efficient data processing. Additionally, students will maintain detailed documentation, prepare reports and presentations, and collaborate closely with team members, gaining hands-on experience in experimental research, data analysis, and interdisciplinary teamwork, thus preparing them for future careers in scientific and technological fields.	Student should have basic knowledge on programing language (python, etc) and image processing tool. Student in the field of STEM is highly wanted	Unspecified	IMRE	Ha Son Tung (Tony)	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Computer and Software Engineering,Physics	1

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	Project Title	Project Description	Learning Outcomes for Students	Roles and Responsibilies of Student	Students' pre-requisites	Minimum Duration (Months)	Research Institute of Internship Supervisor	Name of Internship Supervisor	Workplace Address	What is the project's research category?	No. of Students Required
222	Microfluidic optical sensing platform based on the optical bound state in the continuum.	This project aims to build an efficient optical sensor for food safety and environmental monitoring based on the concept of bound state in the continuum and the lab-on-chip microfluidic platform. Bound state in the continuum is an exotic physical phenomenon first introduced in quantum mechanics in 1929 and recently used in various optoelectronic applications due to its exceptional capability in light trapping. The developed optical sensor platform can also be potentially used in various bio- and health applications or integrated into internet-of-thing (i.e., iOT) systems.	The student will learn the physics of optical resonance, especially the new concept of bound state in the continuum. He/she will also learn research skills in device fabrication and optical characterisation. After the attachment, the student will have hands-on experience in microfluidic device fabrication and microspectroscopy.	The role of the student is to fabricate a microfluidic device and integrate resonant nanostructure into that device. He/she will then have to characterise the sensing device with a micro-spectrometer and analyse the data.	Students will need to have a basic understanding of optical physics and material sciences. Thus, undergraduates with majors in Physics, Material Science, and Chemistry will be suitable for this job.	Unspecified	IMRE	Ha Son Tung (Tony)	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Materials Engineering,Physics	1
223	Modelling surface modification through ion bombardment	Ion bombardment, or ion implantation, is a key technique in semiconductor fabrication,for surface treatment by dopant introduction which result in modifying electrical properties, surface activation resulting in enhanced surface reaction improving adhesion and surface modification such as etching and deposition. As semiconductor devices shrink, ion bombardment's precision becomes increasingly critical in maintaining high performance and reliability in the electronics sector. This project aims at gaining insights in underlying physics that goven the ion-surface interaction through atomistic/continuum modelling resulting in various surface property modifications.	The student would gain insight into semiconductor fab processes and be exposed to programming tools, numerical techniques, visualization tools, parallel programming	As part of the project attachment, the student would be involved in some of the following tasks such as developing new subroutines, modify existing code, running simulations, collect and analyze results, evaluate and curate literature data. Towards the above tasks, the student is expected to maintain logs and periodically prepare report/updates on their project.	Self-Motivated, Enthusiastic attitude towards research, Eager to learn new skills and Team player; Exposure to Numerical analysis, Basic programming skills, Data analsyis would be desirable	Unspecified	IHPC	Ramanarayan Hariharaputran	1 Fusionopolis Way, #16-16, Connexis North Tower, Singapore 138632	Engineering and Technology,Materials Engineering	1
224	Modelling the dynamics of firm spatial distributions in Singapore	The spatial distribution of firms in Singapore is continuously evolving. These changes are driven by the birth of new firms, the closure of existing ones, and the relocation of firms. The rates and nature of these processes, which vary over time and space, are influenced by attractive and repulsive interactions between firms. In addition, firms from different sectors are known to interact differently. By using publicly available firm data, we will construct a model for the dynamics of firm spatial densities, allowing for the effect of pairwise interactions between sectors.	The student will learn how to build a data-constrained mathematical model and perform simulations.	Analyze firm data, build and calibrate model, run simulations	Basic programming, enthusiasm and willingness to learn	Unspecified	IHPC	Guo Yipei	1 Fusionopolis Way, #16-16 Connexis, Singapore 138632	Computing and Information Sciences,Applied Mathematics	1
225	Modular Multi-Plane Light Conversion (MPLC) Architecture for Efficient Matrix-Vector Multiplication	This project focuses on developing and simulating a scalable, modular Multi-Plane Light Conversion (MPLC) architecture for efficient matrix-vector multiplication in photonic in-memory neuromorphic processors. The aim is to design small-scale MPLC simulations and scale them up to analyze performance, efficiency, and accuracy.	1. Develop proficiency in designing and simulating photonic architectures for matrix-vector multiplication. 2. Gain skills in integrating optical components for scalable and modular photonic systems. 3. Acquire research and analytical skills in photonic neuromorphic computing, including performance evaluation and optimization.	Develops and tests small-scale matrix-vector multiplication (MVM) simulations for the Modular Multi-Plane Light Conversion (MPLC) architecture, and scales them to assess performance, efficiency, and accuracy, optimizing simulations to meet project objectives. Conducts literature reviews to understand theoretical foundations, analyzes simulation results, compares findings with existing photonic computing techniques, and documents insights to identify areas for improvement and further development.	1. Basics of Optics or Photonics – Understanding of fundamental optical concepts like light propagation and interference. 2. Introductory Programming – Familiarity with Python or MATLAB for basic simulations and matrix operations. 3. Linear Algebra and Calculus – Knowledge of matrix operations and basic calculus.	Unspecified	IHPC	LIM Soon Thor	1 Fusionopolis Wy, #16-16 Connexis, North Tower, Singapore 138632	Engineering and Technology,Electrical and Electronic Engineering	2
226	Multi-Camera 3D Object Tracking of Everyday Items	Object pose tracking is a critical component of many vision-based applications, especially in human-robot interaction. Tracking the object mesh in 3D offers additional benefits, including enhanced depth perception and more accurate interaction modeling with objects and environments. This project aims to develop a robust object tracker using multiple cameras to handle occlusions and improve accuracy.	1. Learn the process of recording and synchronizing data from multiple Orbbec Femto Bolt RGBD cameras. 2. Learn the working principles behind state-of-the-art segmentation and 3D object tracking algorithms. 3. Learn how to visualize and interpret point cloud data and object meshes using Blender or other 3D visualization tools.	1. Record and synchronize a small amount of data using Orbbec Femto Bolt RGBD cameras. 2. Run segmentation and 3D object tracking algorithms on the recorded videos. 3. Fuse the results across multiple cameras. 4. Store tracking results in JSON format. 5. Deliver a framework (e.g. set of commands or scripts) to execute steps 1-4.	Familiarity with PyTorch and Python.	2	I2R	Main Sup: Xu Qianli Co-sup: Haziq Razali	Institute for Infocomm Research, 1 Fusionopolis Way, Connexis, #21-01, Singapore 138632	Computing and Information Sciences,Computer Science	1
227	Multi-Camera Multi-Person 3D SMPL Pose Tracking in RGBD Cameras	Human pose tracking is a critical component of many vision-based applications, such as autonomous driving and human-robot interaction. Tracking in 3D and obtaining the mesh using SMPL provides additional benefits, including enhanced depth perception and more accurate interaction modeling with objects and environments. This project aims to develop a robust multi-person human pose tracker using multiple cameras to handle occlusions and improve accuracy.	1. Learn the process of recording and synchronizing data from multiple Orbbec Femto Bolt RGBD cameras. 2. Learn the working principles behind state-of-the-art 2D and 3D human pose estimation algorithms, and the SMPL data structure. 3. Learn how to visualize and interpret point cloud data and 3D SMPL poses using Blender or other 3D visualization tools. 4. Learn techniques to merge the pose estimations from multiple cameras.	1. Record and synchronize a small amount of data using Orbbec Femto Bolt RGBD cameras. 2. Run 2D and 3D human pose tracking algorithms on the recorded videos. 3. Fuse the results across multiple cameras. 4. Store tracking results in JSON format. 5. Deliver a framework (e.g. set of commands or scripts) to execute steps 1-4.	Familiarity with PyTorch and Python.	2	I2R	Main Sup: Xu Qianli Co-sup: Haziq Razali	Institute for Infocomm Research, 1 Fusionopolis Way, Connexis, #21-01, Singapore 138632	Computing and Information Sciences,Computer Science	1
228	Multi-language code-switch automatic speech recognition for Southeast Asian languages	In this project we develop commercial grade multi-language code-switch automatic speech recognition engines for SEA languages	Data processing for large scale AI model training/Advanced large scale deep learning model training/Code-switch data generation/Model optimization	Take part in one or few tasks listed in J)	PyTorch/Deep Learning/Audio & speech processing	2	I2R	Tran Huy Dat	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering ,Mathematics	2
229	Multimodal AI for Lymphoma	The percentage of cancers detected in Singapore between 2017-2020 for Lymphoma is about 6%. However, if detected early, Lymphoma can be effectively treated. In this project, our team of clinicians and data scientists has collected data from a large cohort of patients. These data includes CT/PET CT scans, biomolecular signatures, histology, patient data, treatment history etc. This constitute to a very rich source of data for each patient. In this project we will develop multi-modal AI to integrate data from disparately different sources to make effective predictions for the outcome of treatment and patient survival.	To learn the domain knowledge of the project and to learn how to use AI methods to solve the related clinical problem	Develop AI code, prepare and clean data, perform experiments, report results	Able to code in python. Basic applied mathematics skills	Unspecified	BII	Hwee Kuan Lee	30 Biopolis Street, #07-01 Matrix, Singapore 138671	Computing and Information Sciences,Biomedical Sciences,Computer and Software Engineering,Biomedical Engineering,Computer and Software Engineering	2
230	Multimodal Alignment for Large Language Models	The Multimodal Alignment for Large Language Models (LLMs) project focuses on enabling LLMs to understand and process information across different modalities, such as text, audio, images, and video, to improve their overall comprehension and interaction capabilities. It involves training and fine-tuning models to seamlessly align and integrate information from these diverse sources. The research will encompass a comprehensive literature review, algorithm development, implementation, and evaluation.	Students will learn to integrate diverse data types in AI models, conduct research, develop algorithms, preprocess multimodal data, and train/evaluate models. They'll enhance skills in technical communication and collaboration in AI model development.	One or a few of the followings: (1) Literature Review (2) Algorithm Development (Python) (3) Model Training (4) Model Evaluation and Analysis	(1) Basic Understanding of Machine Learning and AI (2) Programming Skills (Python) (3) Experience with model training, data cleaning pipeline and model evaluation and analysis are preferred.	2	I2R	Wang Bin	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science	2
231	Multi-Modal Image Alignment for 3D Defect Identification in SEM Images	In semiconductor device fabrication, the Back End of Line (BEOL) process is a crucial stage where metal interconnect layers are deposited onto a wafer that has already been patterned with devices during the Front End of Line (FEOL) process. This step is vital for establishing electrical connections between the various components on the chip. Early detection of defects in BEOL is important for identifying the causes of product failure and for providing essential insights to improve yield rates, product reliability, and functionality. Among the various tools used for failure analysis, scanning electron microscopy (SEM) is particularly notable due to its high resolution, surface sensitivity, and ability to work with different materials. Traditional defect detection methods often rely on identifying anomalous patterns in SEM images through object detection techniques, which require labelled defect images for training. However, this approach faces several challenges. Supervised methods struggle to generalize to novel defect patterns not represented in the labelled data, and detecting defects from SEM images alone does not ensure that the product aligns with its design specifications, such as the Avalon map. To address these issues, we propose developing unsupervised anomaly detection using the design map as a guide. Additionally, to make the most of limited labelled defect samples, we suggest a semi-supervised anomaly detection approach. Finally, to detect defects using the CAD map as a reference, we must also align the	Acuiqre experience in developing unsupervised and semi-supervised anomaly detection and cross modality image registration. Publish at top-tier AI conferences.	Develop algorithm and deep learning code to evaluate on public dataset. Benchmark against state-of-the-art methods. Write up an academic paper for submission to top AI conferences. Strong self-motivation in AI research and strong desire to publish at top-tier AI conferences are necessary.	Familiar with Python and PyTorch. Knowledge in machine learning and deep learning	2	I2R	Xu Xun	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science	1
232	Multimodal Large Language Model for Smart Robot Manipulation	This project aims to develop and integrate multimodal large language models into the field of smart robotics. The project will focus on enhancing robots' ability to understand and interact with their environment through the processing of multiple data types (text, visual data, and sensory feedback). By employing advanced machine learning techniques, particularly in natural language processing and computer vision, the robots will develop more intuitive interaction capabilities with human operators and improve task execution in complex environments. Students will engage in the development, testing, and refinement of these models throughout the project.	Students will participate actively in innovative research and receive practical training in a range of technologies, including advanced machine learning algorithms, multimodal data processing, natural language understanding, and robotics system integration. The experience will also cover programming in environments like Python, use of deep learning frameworks such as TensorFlow or PyTorch, and exposure to real-world robotic applications.	1. Task-specific finetuning of large language models that integrate textual, visual, and sensory data for robotic systems. 2. Implement and evaluate these models in real-world robotic tasks to assess performance and make iterative improvements.	Candidates should possess a solid understanding of Python programming and have experience with or a strong interest in natural language processing and computer vision. Prior exposure to deep learning frameworks like TensorFlow or PyTorch is highly advantageous.	2	SIMTech	Zhu Haiyue	Singapore Institute of Manufacturing Technology (SIMTech) @ Fusionopolis 2 2 Fusionopolis Way #08-04, Innovis Singapore 138634	Computing and Information Sciences,Computer and Software Engineering	2

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(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
233	Multimodal learning with diffusion models for medical data integration and interpretation	Integrating diverse data modalities, such as images, text, and clinical data, has become increasingly crucial in healthcare applications. However, aligning and interpreting multimodal data remains challenging, particularly when the data is incomplete, noisy, or complex. This project aims to leverage diffusion models in multimodal learning to address these challenges. By incorporating diffusion-based probabilistic modeling into multimodal architectures, our approach is able to enhance cross-modal relationship learning, improve data representation, and maintain consistency across different modalities.	1.Develop skills in integrating and analyzing diverse medical data; 2. Deepen understanding of AI through practical challenges encountered during the project; 3. Gain experience in publishing research findings in academic papers.	1. Preprocess multimodal datasets; 2. Conduct experiments to evaluate different methods; 3. Collaborate with team members.	Python, deep learning	2	I2R	Wang Xiaohong	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Bioinformatics	1
234	Multimodal LLMs	We are seeking motivated students to work on multimodal large language models (LLMs) focused on speech and audio-text applications. This internship offers a unique opportunity to contribute to the development of advanced methods that integrate audio and textual information for more sophisticated language understanding and human-machine interaction.	• Understanding and experience of AI research and publication process • Skills in presenting and communicating scientific findings	• Implement and develop algorithms • Curate datasets • Analyze experimental results • Prepare manuscript for publication at top AI conferences	• Familiarity with machine learning concepts • Familiarity with Python • Experience with deep learning framework e.g. PyTorch, TensorFlow • (Preferred) Experience with speech/audio models, NLP or LLMs	2	I2R	Zhang Wenyu	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science	1
235	Multi-Objective Personalized Recommendations: Harnessing the Power of Retrieval-Augmented Generation	Recommender systems play a vital role in our digital lives, offering personalized suggestions for products, movies, music, and more. But what if they could go further, using generative AI to create content uniquely tailored to our individual needs and preferences? By integrating Retrieval-Augmented Generation (RAG), we aim to significantly improve accuracy, ensure trustworthy recommendations, and introduce greater diversity in the content suggested to users. We will develop novel algorithms and models that utilize user data to generate content that is not only relevant and engaging but also reliable and diverse, addressing potential biases in recommendations. This multi-objective approach—enhancing accuracy, fostering trust, and promoting diversity—will create more holistic and responsible recommender systems. The project will focus on various domains, such as location and social recommendations.	1). Develop a prototype of recommender system and obain "hands-on" experiences of the generative AI techniques. 2). Submit one conference/journal paper when the project finishes.	1) Literature review 2) Implement the Generative AI algorithims with python and prompts 3) Prepare a report/paper draft based on the experimental results	python language, basic machine learning knowledge	Unspecified	IHPC	Shanshan Feng	1 Fusionopolis Wy, #16-16 Connexis, Singapore 138632	Computing and Information Sciences,Computer Science	1
236	Multiplex biosensor for pancreatic cancer screening	Pancreatic cancer ranks as the 7th leading cause of cancer-related deaths, with over 495,000 new cases reported each year as of 2020. Unfortunately, the survival rate for those diagnosed after one year is just 25%. Join us in developing a low-cost, early detection point-of-care device that will make a significant impact on the lives of patients, especially those at higher risk. Step into the fusion world between biomedical and microelectronics, where you will learn how the development of medical devices using bio-sensors, packaging and validation. There are diverse properties of polymeric materials used in microelectronic packages, and we characterize them chemically to have them ready for target sensing. In this project, you will also be given the opportunity to design and model the end-product for the challenges of next-generation applications.	In this project, the intern will: Student will learn to use various testing equipments for different stage of development of the biosensor, which is essential in order for them to conduct testing on material sample. Student will learn to analyze test data to gain a better understanding of the diverse characterisation and behaviors and their implications on the biosensor (observing increasing/decreasing trend, comparing differences between varying conditions, looking out for anomalies). The student will be given the opportunity to use various softwares like Solidworks and Autocad. The student will be also be involved in literature reviews on pancreatic cancer, its market	The student will be supporting literuature review on pancreatic cancer, market landscaping and benchmarking. The student will design the experiment, conduct protocol documentation, execution of experiment and data analysis The student will learn3D modeling of device using solidworks or autocad	Familiarity with Python for data analysis and automation tasks. Proficiency in MS Office Suite including Microsoft PowerPoint for creating engaging presentations and knowledge of Microsoft Excel, including functions, formulas, and data analysis tools. Biochemistry Knowledge: Added advantage: Previous coursework or experience in biochemistry, including laboratory techniques and methodologies. Strong verbal and written communication skills for presenting findings and collaborating with team members.	3	IME	Siti Rafeah	2 Fusionopolis Way, #08-02 Innovis Tower, Singapore 138634	Engineering and Technology,Biomedical Sciences,Computer Science,Electrical and Electronic Engineering ,Physics	1
237	Multirobot Coordination for Search and Rescue Operations	This project focuses on developing strategies for coordinating multiple robots in search and rescue missions within unmapped environments. The student will work alongside scientists and engineers to integrate information from aerial and satellite views, aiding in the planning and deployment of multi-agent systems. The project aims to enhance robots' ability to operate collaboratively, leveraging diverse perspectives to map unknown areas, assess conditions, and optimize search patterns. This research and development opportunity will deepen understanding in robotics, multi-agent systems, and data fusion for real-time decision-making in critical situations.	Understand principles of robotics and multirobot coordination methodology to deploy surveillance and rescue robots with various real world aspects. Apply advanced AI models to mobile robots with hands-on experience in Nvidia Isaac/robotcasa simulation tools. Develop critical problem-solving skills, focusing on real-world implementation.	Implementation of multiagent coordination, robotics in simulation and/or real environments	Passion in robotics. Experience in using ROS, proficiency in C++, and simulations will be useful	2	I2R	Albertus Hendrawan Adiwahono	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,computer and Software Engineering,electrical and Electronic Engineering	2
238	Multi-robot fleet deployment in manufacturing environments	This internship involves the end-to-end development and implementation of systems to manage a heterogeneous fleet of robots, including mobile robots, in a manufacturing pilot line. The project will focus on various aspects such as implementing ROS2 for robot coordination, setting up network infrastructure for robot and CNC machine interaction, developing human-robot interaction modules, and creating a comprehensive dashboard for real-time management of the pilot line.	- Master the integration of heterogeneous robot fleets using advanced robotic frameworks like ROS2. - Develop an understanding of network architecture in industrial environments involving robot-server and machine-server communications. - Gain expertise in human-robot collaboration techniques within a manufacturing context. - Learn to design and implement a real-time monitoring and control dashboard for industrial applications.	-Design and implement coordination algorithms for heterogeneous robot fleets using ROS2. -Ensure seamless communication and integration between robots, CNC machines, and industrial software. -Develop safe and efficient interaction modules for humans and robots. -Create and manage a real-time monitoring dashboard for overseeing manufacturing operations. -Conduct tests to optimize system performance and troubleshoot issues. -Maintain thorough documentation of all processes and progress reports. -Work closely with team members to share insights and refine project implementations.	Strong programming skills in Python and experience with ROS2. Knowledge of network protocols and experience with server-side technologies. Understanding of robotic control systems and human-machine interfaces. Skills in web development for dashboard creation, including JavaScript, HTML, CSS, and potentially backend frameworks.	Unspecified	ARTC	Pranjal Vyas	Advanced Remanufacturing and Technology Centre (ARTC) 3 CleanTech Loop, #01/01, CleanTech Two, Singapore 637143	Computing and Information Sciences,Computer and Software Engineering	2
239	Multi-Robot Navigation with Ground Robots and Drones	This project aims at achieving coordination and/or collaboration of multi-robots for navigating in unknown/partially-known environments using only onboard sensors. Our robot team is heterogeneous consisting of free-flying drones, tethered drones, wheeled ground robots, etc. Leveraging on each robot's strength, the robot team will learn how to navigate intelligently to achieve a task (searching for a target, mapping of an unknown area, etc.) in the best way possible, optimizing metrics such as time, energy, coverage, etc. The project will be mostly based on simulations (ROS-Gazebo, ISAAC), but the students will be involved in real robot experiments too towards the end of the project.	1. Gaining hands-on experience with high-fidelity ISAAC, Gazebo simulations and Robot Operating System (ROS). 2. Gaining hands-on experience with ground robots, drones, and various electronics. 3. Gaining hands-on experience with training deep neural networks for computer vision tasks. 4. Gaining theoretical & practical knowledge in navigation of drones and ground robots. 5. Getting exposure in a professional robotics R&D environment.	1. Support the engineers & scientists in the project while developing algorithms for autonomous navigation. 2. Assist the engineers & scientists during real robot experiments.	1. Excellent team player attitude. 2. Interest in drone research. 3. Codign experience (good to have). 4. Computer-Aided Design (CAD) experience (good to have). 5. Do-It-Yourself (DIY) experience (good to have). 6. Experience with Tensorflow/PyTorch (good to have).	2	I2R	Efe CAMCI	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Computer Science,Electrical and Electronic Engineering	2
240	multiscale diffusion model for time series	Recently, diffusion probabilistic models have gained prominence in generative time series forecasting for their ability to produce high-quality samples. Despite this, effectively harnessing their robust modeling capabilities for probabilistic time series forecasting is still a challenging issue. In this project, we will introduce a multiscale diffusion model designed to enhance predictive accuracy by utilizing the intrinsic granularity levels in the data. It uses specified targets at various intermediate diffusion steps to direct the learning trajectory of the diffusion models.	1. Students will gain practical experience with widely used general-purpose scripting languages, including Python and Pytorch, for processing real-world data and developing data-driven AI models. 2. Students will understand deep learning and acquire the skills to modify and execute these models based on the latest research. 3. Students will grasp the fundamentals of generative AI, focusing on the implementation of these models.	1) Literature review 2) Implement and run Python code for multiple scale decomposition for different time series data. 3) Explore some probabilistic model for uncertainty quantification of time series imputation and forecasting. 4) Reproduce the benchmark method and Implement proposed algorithm on public dataset.	Python. Pytorch. Statistics. Deep learning	Unspecified	IHPC	Yang Feng	1 Fusionopolis Way, Connexis North, Singapore 138632	Computing and Information Sciences,Computer Science	2
241	Nanocomposite coating for electrical contacts	Nobel metal plating have been extensively used in electrical contact applications. However, the plating process is not an environmentally friendly process, and the cost is too high. Furthermore, the commonly used Au plating coating has poor wear resistance. There is a huge local market on electrical coatings for pogo to ensure reliable and consistent performance in various applications. The project aims to use physical vapor deposition technology to develop the nanocomposite coatings with good electrical properties, good corrosion resistance, and durability.	The student will work on project to use PVD system to develop the nanocomposite coating for electrical contact application. Interns will have the chance to learn the basics of PVD process, conduct the coating deposition process, coating performance evaluation, etc.	Help on coating deposition and characterizations. Summarize the experimental results.	Student from Engineering	2	SIMTech	Jiangfeng Hu	Singapore Institute of Manufacturing Technology (SIMTech) @ Fusionopolis 2 2 Fusionopolis Way #08-04, Innovis Singapore 138634	Engineering and Technology,Electrical and Electronic Engineering	1
242	New molecular concepts for diagnostic accesibility	The lab focuses on developing innovation to increase the accessibility of nucleic acid diagnostics by making it faster, cheaper or more workflow-appropriate. The lab has had students develop new LAMP concepts (ANDgate LAMP) and optimize nucleic acid library preparation (for infectious disease sequencing) protocols in the past. The student will be involved in developing or optimizing specific aspect of a nucleic acid diagnostic concept we are working on at the time of attachment.	The student will learn to understand the application use case thoroughly before diving into problem-solving. The student will also learn how to diagnose, troubleshoot and resolve experimental problems in a systemic way.	Running wet lab experiments in a molecular biology laboratory and writing reports.	Molecular Biology / Biochemistry / Medicine / Bioengineering-related degree with a basic understanding of nucleic acid methods e.g. qPCR, cloning, restriction digest, etc.	Unspecified	GIS	Seow Yiqi	60 Biopolis Street, Genome, #07-01, Singapore 138672	Biomedical Sciences,Bioscience and Biotechnology	2

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
243	Next Generation Homogeneous Catalysts for CO2 Utilisation	Carbon dioxide, the largest by volume greenhouse gas, has recently reached its highest level in the earth's atmosphere in human history. This project will explore new approaches in the conversion of carbon dioxide to platform chemicals using homogeneous catalysts. The project will focus on the design and synthesis of novel molecular catalysts for this purpose, and evaluation of their structure using advanced characterization techniques. Selected complexes will be investigated in sustainable catalysis such as the hydrogenation of CO2.	Homogeneous catalysis covers aspects of the main branches of chemistry: inorganic, organic & physical. As phosphines and their metal complexes are air-sensitive you will be trained in advanced air-free synthetic techniques. After completion of the internship the student will have an understanding of the challenges and opportunities in the development of sustainable chemistry. They will have been introduced to important skills required for organometallic chemistry and catalysis. In addition the student will be mentored in areas such as scientific writing and oral communication.	Under supervision, design and synthesize a series of novel ligands and catalysts. The student will evaluate their structure using advanced characterization techniques. This will be followed by an investigation of their catalytic properties in the conversion of carbon dioxide to platform chemicals. The student will be expected to communicate their results through regular team meetings and reports. Attention to detail and a strong emphasis of safety are essential for this work.	The suitable candidate should have a strong interest in synthetic chemistry. For an example of the type of work we do please see our recent publications (Commun Chem 6, 85 (2023), https://doi.org/10.1038/s42004-023-00876-8).The candidate should have a background in organic or inorganic chemistry with basic laboratory skills in synthetic chemistry. Skills in NMR spectroscopy and scientific software such as ChemDraw, Mestrenova and SciFinder are desirable but not a per-requisite as adequate training will be provided.	Unspecified	ISCE2	James David Nobbs	1 Pesek Road, Jurong Island. S(627833).	Physical Sciences,Chemistry	2
244	Novel class discovery from time-series data	Time-series data is ubiquitous and the distribution of data keeps changing dynamically with time. In predictive maintenance applications and disease phenotyping, this includes new modes of failures causing new classes in the failures or new phenotypes of diseases. Detecting such new distributions and new modes of failures and learning to classify such multi-class classification is a challenge that needs to be addressed to enable widespread adoption of predictive maintenance solutions in industries. This proposal aims to develop such methods for time-series data.	1. Continual learning 2. Transformer models 3.	1. Develop modules for continual leanring 2. Develop modules for new class discovery from time-series data 3. Coding to implement the above.	1. Coding in python and pytorch 2. Good understanding of deep learning and transformers	2	I2R	Savitha Ramasamy	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science,Mathematics	1
245	Novel target identification for therapeutic development of NAFLD through a patient transcriptome-based in vivo functional genetic screening	Non-alcoholic fatty liver disease (NAFLD) is rapidly being recognized as the most common cause of chronic liver disease worldwide. However, unlike other highly prevalent diseases, it remains underrepresented with limited effective therapeutic. Therefore, there is an urgent need to prioritize novel and effective therapeutic development. To address this, we established an innovative therapeutic target identification and validation platform for NAFLD therapeutic development. We strategically combined in-depth transcriptomic profiling of NAFLD patient samples with in vivo RNAi screens in NAFLD mouse models to identify potential therapeutic targets, which is ultimately for fast translation to siRNA-based therapeutic development from the screening result. A list of target candidates was identified through our in vivo screening approach, and the promissing targets are now being validated utilizing our proprietary target validation platforms.	Our target identification and validation process for NAFLD therapeutics development is divided into three main steps: target selection through bioinformatics analysis of screening data, followed by in vitro validation, and finally, in vivo validation. Consequently, our lab conducts a wide range of experiments using bioinformatics tools, molecular biology techniques, human in vitro disease modeling, and in vivo mouse studies. However, the learning outcomes for students will vary depending on their interests. We will first discuss with the students to understand their areas of interest and then plan together to achieve the learning outcomes efficiently within the given timeline.	All data generated in the lab must be submitted to the supervisor. Confidentiality of the data will be requested if required.	Our team focuses on developing therapies for chronic liver diseases, particularly NAFLD. Therefore, we usually ask students to read relevant review papers to help them understand the disease.	Unspecified	GIS	Lee Yong-An	60 Biopolis St, Singapore 138672, 8th floor	Biomedical Sciences,Biomedical Sciences	2
246	Nuclear fusion	There are various experimental, computational, AI, and theoretical projects available. Broadly, the purpose is to understand the physics of fusion plasmas and thus contribute to making fusion power a reality. As this field has gained a lot of interested in recent years, the exact projects available change rapidly. A representative but not exhaustive list can be found here: https://valerian.hall-chen.com/open_positions.html	Learn how to understand complicated physical phenomena and how to communicate data.	Deepen our understanding of fusion science, develop new tools such as software, support other members of the team and external collaborators.	[Experimental project] Familiarity with Python and basic data analysis techniques [Computational project] Familiarity with Python or C++, some knowledge of numerical methods [AI project] Understanding of basic AI principles, techniques, and libraries [Theoretical project] Strong background in physics and mathematics, at least 1 year of time available	Unspecified	IHPC	Valerian Hall-Chen	1 Fusionopolis Way, #16-16 Connexis, Singapore 138632	Physical Sciences,Physics	2
247	On-chip angle twistable and gap tunable (ATGT) bi-layer metasurfaces for a miniaturized chirality-sensitive Light Detection and Ranging (LiDAR) system	We propose the first-ever on-chip, angle twistable and gap tunable (ATGT) photonic bi-layer metasurface platform for precise light manipulation. Superior to traditional tunable metamaterials, our platform offers greater tuning ranges (full 2π), continuous, reversible, high accuracy (<0.1°) and fast (MHz) operation. Using such platform, we aim to demonstrate a miniaturized chirality-sensitive Light Detection and Ranging (LiDAR) system. Potential future applications include on-chip chirality-sensitive quantum bits (qubits) distribution systems, biosensors, and exploration of fundamental phenomena such as flat band, slow light, light localization, and photonic Pashba effect.	The student can learn many aspects of nanophotonic and nano-optics, include nanofabrication and MEMS, optical characterization for PL, Photodetector and SHG mapping, data analysis, and paper writing.	The student is responsible to optical characterization including light path build up, PL or EL mapping and data collection and data analysis. The roles also involves the design and fabrication of MEMS chips and integration of atomic thin layer and MEMS system.	Student should have basic trainning on optics, fundamental physics and coding (Python or matlab). Students with Master's degree are prefered.	Unspecified	Q.InC	Xuezhi Ma	2 Fusionopolis Wy, #09, Innovis, Singapore 138634	Engineering and Technology,Electrical and Electronic Engineering	1
248	On-demand bonding and debonding polymer adhesives from renewable resources	This project is working towards the development of on-demand bonding and debonding polymer adhesives. Conventional adhesives often contain toxic monomers and are difficult to be removed after use. There is thus an urgent demand for non-harmful and renewable adhesives of which the bonding and debonding processes can be facilely controlled by external moduli. This work aims to use electricity as a trigger to achieve electroresponsive adhesives material, prepared using biobased polymers, offering a smart and sustainable material platform.	Students will learn basic synthetic chemistry techniques such as organic synthesis, polymer and materials synthesis.	Students will learn how to design, perform and monitor chemistry experiments, and subsequently purification and data characterization experiments may be performed.	Students should have background in chemicstry/material science.	Unspecified	ISCE2	Oh Xin Yi	1 Pesek Road, Jurong Island. S(627833).	Physical Sciences,Chemistry	1
249	Optical characterization of Rare-Earth doped ions in solid.	An optical quantum memory is an interface between light and matter that allows to store and recall the quantum information encoded in photons, as classical memories do. In this project, we will focus on the development of Erbium ion doped crystal quantum memory. We will investigate the coherence properties in the cryogenic temperature.	The student will learn the conecpt of coherence for the quantum technologies and the related measurement techniques. Along this internship, the sudent will design and implement an fiber optical packiage for hosting the RE crystals, and will perform the optical characterization measurement such as the absorption spectroscopy and pulse echo.	(1) Taking responsibility and weekly report. (2) Understanding physics (3) Taking experimental data and participating analysis	(1) Pro-active team player, (2) Good verval and written communication skills, (3) Not mandatory but prefer one who has background in quantum physics and quantum information. (4) Students who have experience on optics experiment are higly encouraged to apply	Unspecified	Q.InC	Young-Wook Cho	2 Fusionopolis Way, Innovis, Level 9, Singapore 138634	Physical Sciences,Information Technology,Electrical and Electronic Engineering ,Physics	2
250	Optimisation of RNA modifications for improved in-cell function of RNA therapeutics	Chemical modification plays a pivotal role in enhancing the stability and efficacy of RNA therapeutics, which are revolutionizing medicine. However, achieving the right balance of stability, potency, and minimal immunogenicity is a significant challenge. In this project, you will contribute to developing an RNA-based solution for cell-specific activation of RNA therapeutics by testing various chemical modifications to optimize their performance. The student will experiment with different permutations and ratios of chemical modifications, assessing their impact on stability, function, and immunogenic response through both cell-free assays and in mammalian cell culture. This project tackles some of the most critical issues in RNA therapeutic development, offering a unique opportunity to work on the cutting edge of molecular medicine and contribute to a solution that could drive the next generation of RNA-based treatments.	Cleavage assay, In vitro transcription, RNA detection, Northern blotting, cell culture, molecular cloning.	•Ownership of Experimental Execution: Collaborate with the team to plan experiments and take full responsibility for executing them, ensuring that all steps are carried out with precision and scientific rigor. You will manage your own experiments from start to finish, ensuring consistent progress and high-quality results. •Optimization of Protocols: Work closely with mentors to identify areas for improving experimental procedures, developing more efficient, cost-effective, or accurate methodologies. Your contributions will help streamline research processes and increase the reliability of experimental outcomes. •Accurate Record-Keeping: Maintain meticulous and detailed lab notebooks, documenting every aspect of your experimental work. Ensure that all records are accurate, organized, and comply with regulatory and scientific standards, allowing for clear reproducibility and traceability. •Data Presentation and Communication: Regularly present your experimental progress and findings at data update meetings and journal clubs, honing your ability to clearly communicate scientific concepts and results. •Collaborative Problem Solving: Actively engage in brainstorming sessions, contributing innovative ideas and solutions to overcome challenges that arise in the course of research. Your creativity and critical	Biochemistry and molecular biology are preferred	Unspecified	IMCB	Chermaine Tan	61 Biopolis Drive, Proteos, #08-06, S(138673)	Biomedical Sciences,Biochemistry	2
251	Optimized Privacy-Preserving Model Merging for Large Language Models	This project is dedicated to developing resource-efficient strategies for the training and deployment of large language models (LLMs). It specifically focuses on the implementation of privacy-preserving adaptive model merging techniques. This approach not only enhances the efficiency of LLM operations but also ensures the protection of data privacy during the model integration process.	1. Gain hands-on experience with state-of-the-art LLM architectures and training techniques 2. Develop skills in privacy-preserving machine learning methods 3. Improve problem-solving and analytical skills in AI and systems research	1. Contribute to cutting-edge research in LLM optimization and privacy preservation 2. Engage in algorithm design and implementation for AI system efficiency 3. Participate in data analysis and interpretation of experimental results 4. Collaborate on academic paper writing and research documentation	1. Strong programming skills, particularly in Python 2. Familiarity with PyTorch framework 3. Basic knowledge of natural language processing and LLMs 4. Good analytical and problem-solving skills 5. Excellent communication and teamwork abilities	Unspecified	IHPC	HE Xin	Centre for Frontier AI Research, 1 Fusionopolis Way, #16-16, Connexis North Tower, Singapore 138632	Computing and Information Sciences,Computer Science	1

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(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	Project Title	Project Description	Learning Outcomes for Students	Roles and Responsibilies of Student	Students' pre-requisites	Minimum Duration (Months)	Research Institute of Internship Supervisor	Name of Internship Supervisor	Workplace Address	What is the project's research category?	No. of Students Required
252	Overcoming Boltzmann's Tyranny with Quantum Tunnelling Transistors for Sustainable Next-Generation Nanoelectronics	The humble transistor lies at the core of all modern electronics and brought humanity from the Industrial Age to the Information Age. Increasingly complex capabilities will demand further transistor shrinking and architectures beyond traditional CMOS (Complementary Metal-Oxide-Semiconductor) technologies. However, conventional metal-oxide-semiconductor field-effect transistor (MOSFET) design relies on carrier thermionic injection, which is fundamentally limited by the Boltzmann distribution (poetically termed Boltzmann's Tyranny). Voltage scaling to improve energy efficiency is thus impossible unless we can address this limitation. Consider the rewards: a fivefold voltage scaling can offer a whopping 125-fold reduction in power dissipation!Worryingly, both Moore's and Dennard's laws have been under threat in recent years as transistor sizes shrink to the nanometre scale. Here, device physics is dominated by quantum mechanics, introducing a new problem. Electronic barriers that once blocked transistor currents are now so thin that electrons can 'leak' through them, a troublesome phenomenon known as quantum tunneling. Quantum tunneling leads to energy inefficiency and errors as currents 'leak' even when the transistor is 'off.' But what if we could harness quantum mechanics instead of being restricted by it? Unlike the fundamentally limited MOSFET, a tunnel field-effect transistor (TFET) instead exploits quantum band-to-band tunnelling to offer superior performance without being limited by Boltzmann distribution nor high leakage currents. In this project, we aim to achieve such next-generation devices by using	Students will have experience working in cleanrooms. They will be exposed to fabrication techniques and tools such as nanolithography lithography, thermal deposition systems, and 2D material stacking. They will learn and work with measurement tools like electrical probe stations and dilution refrigerators, which can cool samples to extreme temperatures colder than older space (-273 degrees celsius). Students will learn to process and analyze experimental data, and should be able to apply their class room learning on material and solid-state physics to real world experiments.	Students will be responsible for synthesizing and basic characterization of material properties, and assist staff in device fabrication. Students will be responsible for their sample and data.	Curious with a drive to learn more about science. Physics, material science, electrical engineering backgrounds. Python programming knowledge is useful.	Unspecified	Q.InC	Chit Siong Aaron Lau	2 Fusionopolis Way, Innovis, #08-03	Physical Sciences,Electrical Engineering,Physics	2
253	Perceptive Locomotion for Quadruped Robots in Outdoor Terrains	This project involves developing perceptive locomotion capabilities for quadruped (4 legged) robots to navigate challenging outdoor terrains autonomously. The student will collaborate with scientists and engineers to enhance the robot's ability to perceive, interpret, and adapt to diverse ground conditions. Using state-of-the-art sensors and machine learning algorithms, the goal is to improve the robot's stability and responsiveness across varied landscapes. This project provides hands-on experience in robotics and AI, particularly in developing algorithms for robust terrain adaptation in real-world outdoor environments.	Understand principles of legged robotics and AI, for robotics mobility in uneven and uncertain outdoor terrain Apply advanced AI models to legged robots with hands-on experience in Nvidia Isaac simulation tools. Develop critical problem-solving skills, focusing on real-world implementation.	Implementation of AI and robotics in simulation and/or real environments	Passion in robotics. Experience in using ROS, proficiency in C++, and simulations will be useful	2	I2R	Albertus Hendrawan Adiwahono	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical and Electronic Engineering	2
254	Photocatalytic H2O2 Generation Under Visible Light	Hydrogen peroxide is a versatile and environmentally friendly oxidant widely employed in various industries. While the demand for H2O2 continues to rise, its traditional production method, the anthraquinone process, is energy-intensive and relies heavily on organic solvents, making it unsustainable. This project aims to address these limitations by exploring a photocatalytic approach to H2O2 production, leveraging renewable solar energy. The primary focus of this research is the development of efficient photocatalysts capable of driving H2O2 synthesis under visible light irradiation.	Students will learn fundamental synthetic chemistry techniques for the preparation of inorganic semiconductor materials. They will gain hands-on experience in designing, executing, and monitoring chemical experiments, followed by rigorous data analysis. Additionally, students will be exposed to state-of-the-art instrument for materials characterization.	Student will participate in the design and synthesis of photocatalysts, followed by material characterization. Subsequently, the student will evaluate the photocatalytic performance of these materials for H2O2 production. The student should possess a strong desire for learning, effective communicate skills, teamwork abilities, and independent.	Candidates should have strong interest and background in chemistry or material science, along with basic laboratory skills.	Unspecified	ISCE2	Tan Hui Ling	1 Pesek Road, Jurong Island. S(627833).	Physical Sciences,Chemistry	1
255	Physics-AI Models for Improved Weather Now-casting and Forecasting	Weather prediction in tropical areas like Singapore is complex, and physics-based models like Numerical Weather Prediction and data-driven methods like Generative AI have been applied for fore-casting and now-casting for different time-scales respectively. We seek to develop a Physics-informed ML approach whereby we utilize physics-based model outputs in synergy with data-driven models to produce more accurate, blended outputs that combine the best of both approaches. Models and methods will be tested on Singapore-specific open-source data and on data from other collaborators.	1. Student will acquire experience working with widely used general purpose scripting languages such as Python and Tensorflow for processing numerical weather prediction outputs and building data-driven AI models. 2. Student will learn how neural networks work, and be able to edit and run such models based on latest literature. 3. Student will learn basics of generative AI, including the implementation of such models	1) Literature review 2) Implement and run Python code for data-driven now-casting of weather based on satellite and radar images and latest generative AI methods. 3) Implement and run Python code for processing outputs from numerical weather prediction for these systems and benchmarking of results to literature. 4) Implement and test methods to blend outputs and models from both physics-based models and data-driven AI models to improve predictive performance.	1. Able to read literature and do literature review. 2. Familiar with Python programming. 3. Knowledge of data science/engineering.	Unspecified	IHPC	Ooi Chin Chun	1 Fusionopolis Way, Connexis North, Singapore 138632	Physical Sciences,Computer and Software Engineering,Environmental Engineering,Natural Sciences	1
256	Physics-informed learning in fusion turbulence	Understanding the plasma dynamics in confined plasmas is crucial to the successful design of a nuclear fusion reactor, which promises sustainable baseload electricity generation. Machine learning tools, such as neural networks, can be combined with physics constraints and governing equations to accelerate understanding of these complex systems. We will use numerical simulations of reduced plasma systems derived from the gyrokinetic and Vlasov-Maxwell equations to train physics-informed neural networks and assess their effectiveness in modelling such systems.	Learn about numerical simulation and modelling Learn about plasma physics and machine learning	Conduct numerical simulation and modelling	Computational/programming skills	Unspecified	IHPC	Ronald Chan	1 Fusionopolis Way, #16-16 Connexis	Physical Sciences,Computer and Software Engineering,Electrical and Electronic Engineering ,Physics	1
257	Physics-Informed ML for Modelling our World	Many complex phenomena in nature of relevance to science and engineering (e.g. animal skin patterns / urban wind flow) are governed by dynamical systems and seemingly simple differential equations. While useful, identifying the exact parameters that describe these systems from limited data is very difficult, even as simulating these models themselves can be very computationally expensive. Hence, we seek to investigate the effectiveness of physics-informed ML methods as a potentially less computationally expensive and more accurate route to modelling such systems in both a forward meta-modelling setting and an inverse inference setting.	1. Student will acquire experience working with widely used general purpose scripting languages such as Python and Tensorflow. 2. Student will learn how neural networks work, and be able to edit such physics-informed models building on prior published work. 3. Student will also learn basics of differential equations and dynamical system modelling, and methods to solve them via numerical simulations.	1) Literature review 2) Numerical simulation of different real-world-inspired ODE/PDE-governed biological, engineering or dynamical systems (e.g. fluid dynamics, weather prediction models, Turing systems) 3) Train a physics-informed neural network for forward prediction of model systems (as in 2) and potential inverse inference of parameters defining these systems and benchmark to literature	1. Able to read literature and do literature review. 2. Familiar with Python programming. 3. Knowledge of data science, differential equations and numerical methods.	Unspecified	IHPC	Ooi Chin Chun	1 Fusionopolis Way, Connexis North, Singapore 138632	Engineering and Technology,Bioscience and Biotechnology,Computer and Software Engineering,Mechanical Engineering,Physics	1
258	Physics-Informed ML via Differentiable Physics Models for Inverse Problems	Inverse modelling is of relevance to many industries, including source/contaminant inference across diverse settings such as chemical dispersion in industrial plants, rotting food detection (ethylene gas dispersion) in Agritech, airborne infectious disease transmission in urban scenarios, and defect detection in non-destructive testing. However, the physics is complex while data (typically obtained via sensors) is scarce, and has uncertainty. Hence, this project will focus on using differentiable physics models to develop physics-informed ML methods to solve such inverse problems, and subsequently, to select optimal sensor/data locations for such inverse problems.	1. Student will acquire experience working with widely used general purpose scripting languages such as Python and Tensorflow. 2. Student should be able to explain how machine learning models such as neural networks work, and be able to write code to implement said techniques. This should be transferable skills for any future projects the student might be interested in. 3. Student will also learn basics of numerical simulation, including basic finite difference, and be able to modify said models in a differentiable physics framework.	1) Literature review 2) Implement and run Python-based numerical simulation of different ODE/PDE-governed engineering systems for inverse modelling 3) Train a neural network for inference of parameters based on simulated data for parametric set of scenarios from (2) 4) Implement algorithm to optimize sensor placements to minimize inversion error given limited sensor budget and prior on potential distribution of scenarios.	1. Able to read literature and do literature review. 2. Familiar with Python programming. 3. Knowledge of data science and analytics	Unspecified	IHPC	Ooi Chin Chun	1 Fusionopolis Way, Connexis North, Singapore 138632	Engineering and Technology,Bioscience and Biotechnology,Computer and Software Engineering,Electrical Engineering,Physics	1
259	Powder Bed Fusion for Refractory Metals and Alloys	Tungsten (W) and its alloys play a crucial role in high-temperature applications, especially in nuclear fusion reactors as Plasma-Facing Materials (PFMs). These materials must endure extreme conditions near the plasma, making material selection critical for reactor performance and efficiency. Due to the high hardness and melting point of W, manufacturing is challenging. This project aims to develop new W-based alloys and improve the powder bed fusion (PBF) process to produce crack-free parts. We will explore EB-PBF and L-PBF techniques, leveraging advanced monitoring data to predict and enhance the quality of printed parts, ultimately contributing to the advancement of nuclear fusion technology.	[1].Understand powder bed fusion (SLM & EBM) technology. [2].Learn about the microstructure characterization of refractory metals. [3].Master image processing and analysis techniques. [4].Gain skills in applying machine learning to materials science. [5].Collaborate with the supervisor to prepare a journal paper. [6].Develop research capabilities and scientific writing skills. [7].Experience a real R&D environment and participate in industry-related projects, including those related to nuclear energy.	The student will be engaged in the 3D printing study of refractory metals and alloys, with responsibilities including: [1]Demonstrate strong teamwork. [2]Conduct a literature review on the current state of the art. [3]Assist in the 3D printing process using PBF techniques. [4]Apply machine learning to analyze printing data and predict part quality. [5]Perform experimental validation of printed parts. [6]Prepare and analyze samples for microstructural studies.	[1]Grade Point Average above 4.0 [2]Mechanical / Materials Engineering knowledge [3]Currently pursuing or recently completed a degree in materials science, mechanical engineering, or a related field. [4]Strong problem-solving skills and attention to detail. [5]Keen interest in advanced manufacturing and materials science. [6]Effective teamwork and communication skills. [7]Knowledge of additive manufacturing processes is advantageous.	2	SIMTech	Wang Pan	5 Cleantech Loop, #01-01, S636732	Engineering and Technology,Materials Engineering,Physics	1
260	Precision Medicine: moving from average treatment effects to individualized treatment effects	This project aims to harmonize the use of artifical intelligence and statistical methods towards helping clinicians make better treatment recommendations for their patients. It aims to do so not only by obtaining estimates that are unbiased, but also by using statistical approaches to obtain confidence intervals that provide a high level of precision, and in so doing, giving doctors and patients more confidence in the estimates.	Student will help design an approach real world clinical settings, and develop software to execute these methods	Conduct extensive simulation study, test hypotheses and draw conclusions from data	Basic programming (or willingness to learn), statistics, hypothesis testing, confidence intervals	2	I2R	Benedict Wong	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Statistics,Mathematics	1
261	Preconception Screening Tool for Maternal Mental Health	Research from GUSTO (Growing Up in Singapore Towards healthy Outcomes) has found that maternal distress during pregnancy—even at mild to moderate levels—can affect the cognitive and emotional development of the child. The project aims to use data international cohorts to identify factors related to parental mental well-being, parenting and their influence on child outcomes. These factors include genetics, interpersonal relationships and environmental factors.	Candidates will be exposed to real-world data collection and analyses, and run data analyses examining factors that may be predictors to maternal mental health during pregnancy.	Student will be tasked to do some literature review and run machine-learning data analyses on factors related to prenatal maternal mood during pregnancy.	Independent learner, proactive in communication, keen interest in data analyses and experienced in machine-learning analyses. Student should be experienced in R, Python or MPlus.	Unspecified	IHDP	Michelle Kee	30 Medical Drive. Brenner Centre for Molecular Medicine. Singapore 117609	Computing and Information Sciences,Statistics	2

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Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
262	Predicting outcomes of labor (baby deliveries) using machine learning and artificial intelligence	Applications of Machine Learning and Aritificial Intelligence for predicting the outcome of baby delivery. There are several areas of applications that can directly help mothers who are in labour. In routine delivery ward, data such as blood pressure etc are collected at time intervals on the mothers. These data can be use to predict complications in the labour process. The clinicians can utilise these predictions to make key decision such as the need for emergency caesarean.	To learn the domain knowledge of the project and to learn how to use AI methods to solve the related clinical problem	Develop AI code, prepare and clean data, perform experiments, report results	Able to code in python. Basic applied mathematics skills	Unspecified	BII	Hwee Kuan Lee	30 Biopolis Street, #07-01 Matrix, Singapore 138671	Computing and Information Sciences,Biomedical Sciences,Computer and Software Engineering,Biomedical Engineering,Computer and Software Engineering	2
263	Prediction of Chronic Disease Risk based on Lifestyle Data and Wearable Recordings	There is increasing interest in leveraging wearable and lifestyle data from health and wellness programmes for proactive prediction and management of disease risks. However, as these tasks are characterized by multiscale and temporal interactions, long prediction horizons and data irregularities, prediction performance has been limited. This project seeks to develop transformer based approaches to address such challenges. The proposed methods will be evaluated on a variety of multimodal health and disease risk prediction tasks in relation to state-of-the-art methods.	The internship will provide opportunities to deepen knowledge of cutting edge predictive modeling techniques, and gain experience in experimentation with diverse real-world datasets. Students will also learn to co-author research papers and work in multidisciplinary project teams.	The student will develop and refine approaches for predictive risk modeling, and perform experiments on diverse datasets to demonstrate performance in relation to state-of-the-art methods.	Background in machine learning and computer science is a must. Experience with contemporary deep learning frameworks and time series or tabular datasets is required.	2	I2R	Pavitra Krishnaswamy	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Biomedical Sciences,Computer Science,Biomedical Engineering,Mathematics	1
264	Production of value-added lipids from yeast using protein and metabolic engineering	By 2050, the world would need about 1250 million tonnes of meat and dairy per year to meet the global demand. While the global consumption of animal meat is increasing, continued production of animal products is unsustainable. It is important to source for new, sustainable avenues of production in order to meet this growing global demand. With the expanding interest in cultured meats and alternative protein, the production of lipids from sustainable sources is concurrently growing in importance. Additionally, there is a demand for healthier food in terms of good quality fat from ethical and sustainable production. This project aims to produce animal fat analogues to boost the flavour and texture of alternative proteins. This would be done using techniques like genetic engineering, protein engineering and employing high throughput techniques on yeast.	The students would gain expertise in laboratory techniques for molecular biology, cloning techniques, protein engineering and metabolic engineering. Students would also learn about critical thinking, develop their scientific communicatoin skills, interconnect scientific concepts and apply it to find solutions to "real-world probelms".	•Plan and conduct research experiments. Acquire and analyse experimental data •Process and present research results •Work in close cooperation with the project team as well as in cross-department settings •Maintain detailed and accurate records •Gain proficiency in laboratory techniques for molecular biology and genetic engineering work.	Life sciences graduate. Possess theoretical and basic knowledge of molecular biology and genetics. Hardworking, enthusiastic and eager to learn.	Unspecified	SIFBI	Naazneen Sofeo	31 Biopolis Way, Nanos Level 2, Singapore 138669	Biomedical Sciences,Bioscience and Biotechnology	1
265	Profiling of End-of-Life Components and Processes for Circular Economy	As various products reaches their end of life (EoL), valuable components on scrap from these EoL products offer a potential source of high quality and green materials. With incresing complexity in the material composition use, the market lacks a material profiling framework to characterise the recoverable materials of the various components. In this project, profiling of the EoL components will be performed; the constituent materials of the components and the conditions of sub-components and materials will be examined. We will also be looking to develop a framework, build the knowledge graph and establish the database to assess its conditions, then recommend the suitable "r" route based on availability of the enabling "r" processes (reuse, repair, remanufacture, repurpose, recycle etc). Using specific use cases, the project will investigate for a particular EoL component - what materials it is made of , in a what condition or state is it in, and is suitable for reuse? Is reuse technical feasible?	The attached student will learn to improve research methodologies including data collection and intepretation, material characterisation and analysis through hands-on experience with laboratory techniques and equipment, and enhance his/her critical thinking and problem solving skills. Findings will need to be presented routine in wirtten and oral presentation, and the attached student can look to enhance written and oral communication skills for effective scientific communication.	The attached student should go through HSE induction and briefing and ensure safety compliance at all time during duration of attachment. Other than the relevant literature review, the student is expected to plan and conduct the relevant experiements for data gathering and document the observation and findings carefully. Results, discussion and conclusions should be organised, presented clearly in written form or oral presentation.	N.A.	2	SIMTech	Xinying Deng	Singapore Institute of Manufacturing Technology (SIMTech) @ Fusionopolis 2 2 Fusionopolis Way #08-04, Innovis Singapore 138634	Engineering and Technology,Materials Engineering	1
266	Propellor Scrubbing Robot	A ship's propellors must be cleaned regularly since they become rough with barnacles, sea-life, and ocean debris. Cleaning them is challenging and dangerous work, currently performed by divers or specialized teams. Rather than put humans at risk for the hazardous work, this may be an opportunity for robots to help. This project will investigate the feasibility of using a swarm of scrubbing robots to clean the propellor blades while in the undersea environment. The intern's target is to develop a mockup system that can be attached to the propeller in the lab and perform the basic scrubbing and locomotion actions.	The student will gain experience in designing, prototyping, and testing robots meant for use underwater. They will also gain an appreciation for the multiple subsystems needed to support the robot while functioning and working in an ocean environment.	The internship will work on the design, prototyping, and testing of the of experimental propellor scrubbing robots, with a specific focus on of the robots' subsystems.	A background in robotics, mechatronics, and prototyping will provide a good start. Some experience with electronics, control, and basic programming will also be needed.	2	SIMTech	Joel Stephen Short	Singapore Institute of Manufacturing Technology (SIMTech) @ Fusionopolis 2 2 Fusionopolis Way #08-04, Innovis Singapore 138634	Computing and Information Sciences,Computer and Software Engineering	2
267	Protein-protein interaction machine learning model	Developing protein-protein interaction machine learning model	protein-protein interface modeling, machine learning	collect data of protein-protein complexes, explore machine leearning models for data analysis	good at linux, shell scripting, python/perl programming, have experience in machine learning. can work as full-time intern	Unspecified	BII	Hao FAN	30 Biopolis Street, Matrix #07-01, Singapore 138671	Biomedical Sciences,Bioscience and Biotechnology,Bioinformatics,Biomedical Engineering,Natural Sciences	2
268	Pushing Boundaries in Metallic 3D Printing: Multi-Material Recoating Development for Laser Powder Bed Fusion.	Metal additive manufacturing, or 3D printing, is poised to revolutionize the landscape of production across a spectrum of industries, from aerospace to defense. Traditionally, laser powder bed fusion systems have been constrained to using a single metal powder, limiting their application versatility. This project seeks to break these boundaries by developing an advanced, selective powder recoating system capable of handling multiple metals simultaneously. The primary goal of this initiative is to pioneer a unique and novel recoating technology that supports the creation of complex, multi-metallic components. This breakthrough will open the door to bespoke, high-performance metallic products specifically tailored for cutting-edge military and satellite applications.	1) Enhance Product Design Skills: Interns will have the opportunity to refine and advance their product design skills specifically for engineering applications. By engaging in real-world projects, you will learn to design complex engineering products from concept through to completion. 2) Gain Hands-On Engineering Experience: Develop a deep understanding of the engineering process with firsthand experience in preparing products for deployment. This includes everything from initial sketches to final adjustments before market launch. 3) Master Project Management: Acquire essential project management skills tailored to engineering contexts. Interns will learn how to plan, execute, and monitor projects efficiently, ensuring timely completion of objectives while managing resources effectively. 4) Experience in Sourcing and Logistics: Learn the intricacies of sourcing mechanical parts and managing the logistical aspects involved in the development of engineering products. This includes vendor relations, cost negotiation, and supply chain management to ensure project materials are available when needed. 5) Explore Rapid Prototyping Techniques: Delve into the world of rapid prototyping, a crucial skill in today's fast-paced engineering environments. You will learn how to use cutting-edge technologies to create prototypes that test	1. Critically analyze and improve existing designs of multi-material recoating systems. 2. Collaboratively propose innovative solutions and enhancements to increase efficiency and effectiveness. 3. Assist in managing relationships with rapid prototyping vendors to ensure timely delivery of prototypes. 4. Source mechanical components needed for project development, including negotiating with suppliers to meet project budgets and timelines. 5. For students with a knack for programming: Receive training in Python and C++. 6. Contribute to the development and refinement of software code that controls and enhances the functionality of our systems. 7. Participate in the development of printed circuit boards (PCBs), from schematic design to testing. 8. Engage in troubleshooting and iterative improvements of PCB designs as part of the product development cycle.	Mechanical engineering, electrical engineering.	2	SIMTech	Aw Beng Loon	5 Cleantech Loop #01-01	Engineering and Technology,Manufacturing Engineering,Physics	1
269	Quantifing uncertainty of simulation models	Low-carbon fuels are being explored as energy sources for a sustainability-focused future. However, these fuels pose their own challenges for deployment and have different safety criteria. In this project, the student will be working with the team in the National Metrology Centre to evaluate and quantify the uncertainities of numerical simulations of cases.	1) Learn to create surrogate models 2) Learn to do simple gas dispersion models 3) Learn about uncertainity quantification	Evaluate the various methods to quantify uncertainity of simulation models	Knowledge of coding in python/matlab. Machine learning knowledge is a bonus	Unspecified	NMC	Ng Wee Hoe	8 Cleantech Loop, #01-20 B, Singapore 637145	Engineering and Technology,Computer Science,Electrical engineering,Mathematics	1
270	Quantum Computing-Driven Cell-Centric Immunology Research Using Image-Based Analysis	This project aims to harness the power of quantum computing to advance cell-centric immunology research through image-based analysis. By integrating quantum algorithms with high-resolution imaging data, the study seeks to enhance the identification of cellular patterns and immunological markers, enabling deeper insights into immune responses and accelerating biomarker discovery for translational research.	1, They can gain hands-on experience in handling real-world biological (imaging) data. 2. They can develop proficiency in analyzing cancer datasets and interpret the results. 3. They can enhance their capabilities in quantum computing technology. 4. They learn how to navigate various bioinformatics databases, resources, and tools. 5. Interns have opportunities to present their research findings.	1.Organizing their time well 2.Updating work progress on weekly basis 3.Reading papers to learn about quantum computing programming 4.Resourcing for software packages when necessary 5.Maintaining a positive learning attitude	1.Programming skill, quantum computing/ deep learning/ image processing skill will be a plus 2.Problem solving skill 3.Fundamental knowledge of biology/ immunology	Unspecified	BII	Mai Chan LAU	8A Biomedical Grove, Immunos, Level 4, Singapore 138665	Biomedical Sciences,Life Sciences,Bioinformatics,Chemical and Molecular Engineering,Mathematics	2
271	Quantum materials for next generation energy and sesing technologies	Radio-frequency (RF) technology, crucial to modern infrastructure and 5G networks, drives advancements in high-frequency microwave and millimeter-wave (mmWave) applications. This project aims to develop an innovative energy harvesting and mmWave sensing solution using quantum materials, capitalizing on their unique properties such as topology and dimensionality. By leveraging these intrinsic features, the project seeks to efficiently convert RF energy into DC signal to power small devices and sensors, enabling sustainable and scalable solutions for future technologies.	The student will join a team of highly skilled researchers with diverse backgrounds in materials science, engineering, crystal growth, and quantum transport. They will actively participate in the fabrication of the van der Waals heterostructures in the inert environment of a glovebox assembly, equipped with a lithography setup, metal evaporation and ALD tools. The student then will carry out multiterminal transport spectroscopy studies using the state-of-the-art millikelvin refrigerators with vector magnets, capable of handling low-noise DC and RF measurements.	Student responsibilities may include: •Developing a fabrication protocol for a quantum device based on low-dimensional materials; •Contribution to the electrical device measurements and data analysis; •Participation in weekly discussions on project progress with the Supervisor; •Presenting regular progress reports for the project timeline tracking; •Cooperate with all A*STAR health and safety policies and procedures.	Previous experience in device fabrication and/or electrical measurements is welcomed	Unspecified	Q.InC	Ivan Verzhbitskiy	2 Fusionopolis Way, #08-03, Innovis, Singapore 138634	Physical Sciences,Electrical and Electronic Engineering ,Physics	2

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Project No.	Project Title	Project Description	Learning Outcomes for Students	Roles and Responsibilies of Student	Students' pre-requisites	Minimum Duration (Months)	Research Institute of Internship Supervisor	Name of Internship Supervisor	Workplace Address	What is the project's research category?	No. of Students Required
272	Quantum nanosensing with diamond NV centers in scanning nanoprobes	This project will be integrated with our ongoing research efforts to perform quantum sensing using specially-designed diamond nanoprobes with nitrogen-vacancy (NV) centres. The NV centers are well-suited for high-precision quantum sensing, especially of magnetic fields. We are developing a quantum nanosensing platform based on these nanoprobes mounted on an atomic force microscope (AFM) platform, aiming to investigate novel sensing modes involving the coupling of the magnetic field to nanomechanical oscillations.	- In-depth knowledge of diamond colour centres and the mechanisms underlying their sensing capabilities - Experimental techniques, including optics, lasers, AFM - Experience in instrumentation design, building, automation, and testing - Able to plan and execute experiments, document and analyse data, and communicate results - Related engineering skills, e.g. electronics, programming, hardware assembly	- Diamond nanoprobe development, including design, assembly, and optical characterization - Upgrading of AFM platform, including the integration of necessary optics, electronics, RF components, software programming, etc required for NV centre investigations - Magnetic field sensing experiments to investigate the coupling of NV centres to nanomechanical oscillations	Physics or engineering	Unspecified	Q.InC	Victor Leong	4 Fusionopolis Way, Singapore 138635	Physical Sciences,Physics	1
273	Quantum Optimisation for the Shortest Vector Problem	The shortest vector problem is a well-known challenging problem that plays an essential role in crytography. This project aims to investigate how we can better encode the problem for the purpose of quantum computing. Student will also get to implement the algorithms on real quantum hardware.	1.Develop better understanding in quantum computing and its application in optimisation. 2.Develop skills such as software development.	Students are expected to review relevant research papers and textbooks on quantum computing and optimisation, developing a strong theoretical foundation to support their project work. Students will work on investigating which approach is the best approach for solving the shortest vector problem using quantum computing. Students will implement algorithms on quantum simulators or real quantum hardware where feasible, gaining hands-on experience in coding, simulating, and debugging quantum circuits related to optimisation. Students will collaborate with peers and mentors, discuss findings, and contribute to regular project meetings. They will also document their work, present results, and participate in discussions on how the findings contribute to the broader field.	Students should ideally have a foundational knowledge of quantum computing concepts such as qubits, superposition, and entanglement. However, those without prior experience are welcome, provided they are eager to learn and engage with quantum computing principles throughout the project. Familiarity with optimisation formulations, such as quadratic unconstrained optimisation and complexity theory, is beneficial. Students without such optimisation background should be prepared to study these concepts, as they are essential for understanding and analyzing the algorithms. Students are expected to be familiar with Python programming language.	Unspecified	IHPC	Goh Siong Thye Dax Enshan Koh	1 Fusionopolis Wy, #16-16 Connexis, North Tower, Singapore 138632	Computing and Information Sciences,Applied Mathematics	1
274	Rank Regression for Personalized Recommendation System and Decision Support Applications	Choice modeling techniques are of increasing relevance for emerging personalized recommendation system and clinical decision support applications. However, existing methods rely on implicit assumptions that may not hold in a number of real-world settings. To address these gaps, this project will investigate novel choice modeling and rank regression approaches. The proposed methods will be evaluated on public datasets for personalized ranking as well as on real-world health datasets for treatment advisory and lifestyle recommendation tasks.	The internship will provide opportunities to deepen knowledge of probabilistic machine learning techniques, and gain experience in experimentation with large-scale real-world datasets. Students will also learn to co-author research papers and/or intellectual property filings.	The student will develop and refine approaches for choice modeling and rank regression, and perform experiments on diverse datasets to demonstrate performance in relation to state-of-the-art methods.	Background in statistical learning, probabilistic machine learning and/or computer science. Experience with deep learning frameworks is required. Past work with tabular and time series datasets is a plus	2	I2R	Pavitra Krishnaswamy	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Biomedical Sciences,Computer Science,Biomedical Engineering,Mathematics	1
275	Ratonal Design of VH Enabled Protein Degraders	Project will entail the characterization of VH enabled protein degraders that target critical components of cap-dependent translation (4A and 4E). This will entail the biophysical and functional evaluation of a series of constructs and their ability to degrade and interact with the target protein.	Student will learn protein expression and purification Techniques. Additionally, the student will become familiar with protein crystalization and isotermal calorimetry techniques and basic cell biology techniques.	1) Student will performe protein expression and purification, 2) charaterize protein-protein interactions with isotermal calorimetry, and 3) carry out cell transfections to assess protein target deordation using FACs/western blot analysis.	Background in Biochemistry	Unspecified	IMCB	Christopher J Brown	#06-12B, 61 Biopolis Drive, Proteos, Singapore - 138673	Biomedical Sciences,Life Sciences	1
276	Reconfigurable Intelligent Surfaces for 6G wireless networks.	This research project focuses on the development of terahertz metasurfaces for 6G wireless communication systems. As the successor to 5G, 6G aims to achieve data rates in the terabit-per-second range and sub-millisecond latency, supporting technologies like Industry 4.0, autonomous vehicles, and immersive reality. However, controlling terahertz waves, which operate in the 0.1–10 THz frequency range, presents challenges due to weak material interactions and inefficient scaling of current technologies. This project explores electromagnetic metasurfaces integrated with microelectromechanical systems (MEMS) to enable on-demand control of terahertz waves, such as frequency, polarization, and temporal response. MEMS integration enhances tunability, energy efficiency, spectral scalability, and CMOS compatibility. The metasurfaces will be evaluated in Singapore using a 6G testbed to measure improvements in data rates for non-line-of-sight	The student will learn the basics of electromagnetic wave control using the novel concept of reconfigurable metasurfaces. The students will be taught CST simulation software to design and optimize metasurfaces for THz wave control. The student will also be involved in hands-on measurement of the fabricated metasurface samples at IME. At the end of the internship, the student will have a broad knowledge on the field of terahertz spectrum, metasurface concepts, measurement techniques and 6G communication requirements.	1. 1-on-1 knowledge sharing sessions and literature study by the student on reconfigurable intelligent surfaces for 6G communications 2: Preliminary simulation using CST software will be taught to the student 3 :Student will perform simulations of actual design and optimization by varying the design parameters through CST simulations 4: Student will perform dynamic THz beam steering measurement using TERAMETRIX spectrocopy system in IME for metasurface samples fabricated in IME 5: Student will be involved in detailed data analysis and re-optimization of device design using CST simulations 6. Students will prepare a report	Student should be motivated and willing to learn new concepts. Should have basic understanding of physics/engineering and specifically interested in electromagnetic wave concepts	3	IME	Prakash Pitchappa	2 Fusionopolis Way, #08-02 Innovis Tower, Singapore 138634	Engineering and Technology,Electrical and Electronic Engineering	1
277	Research and model development of AIS or ADS-B receiver de-collision Algorithm	The Automatic Identification System (AIS) and the Automatic Dependent Surveillance-Broadcast (ADS-B) are primary technologies which enables ships and aircrafts location to be tracked, respectively. Student will be required to do state of the art survey and identify one de-collision algorithm for AIS or ADS-B receiver to handle waveforms overlapping issues. The algorithm should be able to decode and extract more than one valid waveform with certain criterial met. He will also need to design and implement and validate the de-collision algorithm model	Understanding of AIS and ADS-B system. In addition, algorithm design and development using either matlab or c/c++.	1) Study the AIS or ADS-B receiver functionality. 2) Study the State of the art de-collision algorithms and propose 3) Design, implement and validate the algorithm using either matlab or c/cpp.	1) Knowledge of either C/CPP or matlab. 2) basic knowledge of network protocol communication.	2	I2R	Law Sie Yong	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Electrical and Electronic Engineering	2
278	Revolutionizing Mobile Robot Localization	In this exciting new project, interns will focus on pushing the boundaries of robotic localization technologies. Interns will have the unique opportunity to tackle the challenges posed by difficult environments where existing localization methods may likely fail. The goal of the project is to devise innovative solutions for localizing robots in challenging scenarios, ultimately expanding the reach of mobile robots beyond their current limitations. This work will be particularly impactful in public spaces, where robots can play a significant role.	You will learn about the latest state-of-the-art techniques used in robot localization and gain a deep understanding of their limitations when deployed in real-world scenarios.	In this role, you will actively engage with experts in the field, proactively seeking their insights to expand your knowledge and refine your understanding of the challenges faced in real-world robot deployments. Drawing upon your learnings, you will propose innovative solutions to address these challenges and push the boundaries of current methodologies. A crucial aspect of your work will involve validating your proposed hypotheses through real-world testing.	Our internship program is designed for students with a strong passion for computer programming and a solid understanding of mobile robot sensors. While prior knowledge of ROS (preferably ROS 2) and C++ would be very advantageous, it is not a mandatory requirement. If you already possess a foundational understanding of robotic navigation and localization, that's fantastic! Your prior knowledge will enrich your internship experience	2	I2R	Saurab Verma	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical and Electronic Engineering	2
279	Risk stratification of rare cancers using parametric time to event modeling	Due to the heterogenous nature of cancer, vast amounts of prognostic information is available, but no integrated risk stratification score has been proposed. In this project, the student will use parametric time to event modeling as a systematic way of evaluating each prognostic factor and its predictiveness in survival and relapse outcomes.	Through this project, the student will learn how to do database curation and management in R, and how to do semiparametric and parametric time to event analysis. The student will also learn about pharmacotherapy in oncology and pathophysiology of cancer that can affect patient outcomes.	Database curation, reproducible R pipelines	Basic understanding of pharamcology, PharmD or Bsc Pharmacy are a plus. Basic coding proficiency in R	Unspecified	BII	Janice Goh	30 Biopolis St, Matrix	Biomedical Sciences,Pharmacy,Bioinformatics,Biomedical Engineering,Natural Sciences	1
280	RNA Ligation for Generating High-Potency pegRNAs for Prime Editing	Prime editing offers incredible potential for precise genetic modifications, but one of the major hurdles in advancing this technology lies in the synthesis of long RNA molecules, particularly prime editing guide RNAs (pegRNAs), which are essential for insertion. These pegRNAs tend to be longer and require precise chemical modifications to ensure their potency and effectiveness. In this project, you will focus on RNA ligation techniques to generate a library of high-quality pegRNAs, enabling more efficient prime editing. The intern will work on developing and optimizing RNA ligation methods to create stable, chemically modified pegRNAs with improved functionality. This project will offer hands-on experience in RNA synthesis, ligation strategies, and the optimization of genetic tools for precision editing, contributing to the development of cutting-edge gene therapy solutions.	•Understanding Challenges in RNA Biotechnology Development: Through hands-on work, you'll gain insights into the cutting-edge obstacles that researchers encounter in developing RNA-based therapeutics and the strategies being employed to overcome them. •Hands-on Experience in Experimental Techniques: Gain practical experience in key biotechnology techniques, including RNA handling, DNA cloning, and cell culture. •Experimental Planning and Troubleshooting: Learn how to design and plan experiments from start to finish, considering variables, controls, and potential challenges, troubleshoot experimental issues, refining your problem-solving skills and ability to adapt to unexpected results. •Literature Review and Research: Enhance your ability to conduct thorough literature reviews, critically analyzing scientific papers to inform your own research. •Data Documentation, Analysis, and Presentation: Develop strong skills in documenting experimental procedures and results in a clear, organized manner. You will also gain experience in analyzing data, using software tools to interpret results, and present your findings, honing your ability to communicate your science.	•Ownership of Experimental Execution: Collaborate with the team to plan experiments and take full responsibility for executing them, ensuring that all steps are carried out with precision and scientific rigor. You will manage your own experiments from start to finish, ensuring consistent progress and high-quality results. •Optimization of Protocols: Work closely with mentors to identify areas for improving experimental procedures, developing more efficient, cost-effective, or accurate methodologies. Your contributions will help streamline research processes and increase the reliability of experimental outcomes. •Accurate Record-Keeping: Maintain meticulous and detailed lab notebooks, documenting every aspect of your experimental work. Ensure that all records are accurate, organized, and comply with regulatory and scientific standards, allowing for clear reproducibility and traceability. •Data Presentation and Communication: Regularly present your experimental progress and findings at data update meetings and journal clubs, honing your ability to clearly communicate scientific concepts and results. •Collaborative Problem Solving: Actively engage in brainstorming sessions, contributing innovative ideas and solutions to overcome challenges that arise in the course of research. Your creativity and critical thinking will help drive the project forward, fostering		Unspecified	IMCB	Chermaine Tan	61 Biopolis Drive, Proteos, #08-06, S(138673)		2

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Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
281	Robotic Object Grasping Using Multisensory Feedback	Robotic grasping presents a significant challenge in the field of robotics, particularly when dealing with objects that appear visually similar but have different intrinsic properties such as weight, center of mass (CoM), mass/density distribution, and surface characteristics. Relying solely on visual information can lead to unsuccessful or unstable grasps, as vision does not provide sufficient data about these critical physical properties. To address this challenge effectively, a combination of sensory modalities is essential. While vision provides valuable global information about objects and their environments, tactile feedback offers detailed insights into the local interactions between the robot gripper and the objects. By integrating tactile sensors into the robot gripper alongside a vision system, the robotic system can gather both global and local information, enabling more informed and adaptive grasping strategies. In this project, the objective is to to design and implement a manipulation planning and control framework that utilizes multisensory feedback information (i.e., vision and tactile) to achieve stable and robust object grasping with a robotic gripper. The framework will be specifically applied to the task of grasping objects with different interior properties.	Ability to impletment sensor-based control in a robotic system. Develop algorithms suitable for robotic grasping with various objects. Learn to apply technical modules in the research project.	The work of this project mainly includes object grasping data collection and algorithm development for multisensory-based manipulation planning.	The student should have knowledge of robotics, machine learning and feedback control.	2	I2R	Liang Wenyu	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical and Electronic Engineering	1
282	Robust Language-Conditioned Imitation Learning for Robotic Manipulations	Language-conditioned imitation learning is a promissing direction for robotic manipulation, which train agents using demonstration datasets to overcome the limitations associated with reinforcement learning.Many language-conditioned imitation learning algorithms are developed from goal-conditioned imitation learning by alternative the goal to the language instruction. The goal-conditioned policy enables the agent to handle multiple language instructions. However, this assumption of perfect language commands might not always be true in practical applications. The imperfect language commands will result in incorrect robotic manipulations. The goal of this project is to propose a robust language-conditioned imitation learning method against imperfect language commands.	1. Publish papers in top AI conference/journals. 2. Obtain experience in cutting-edge AI research. 3. Improve team working ability. 4. Improve scientific skills: scientific paper writing, presentation, coding, etc.	1. Conduct literature reviews . 2. Develop and implement robust language-conditioned imitation learning models. 3. Collaborate with team members and mentors to troubleshoot and refine models. 4. Present findings and progress in reports and presentations.	1. Pro-active. 2. Self-motivated. 3. Team working. 4. Research experiences in one or more of the following topics: machine learning, reinforcement learning, imitation learning, LLM, language-conditioned imitation learning. Previous paper submision or publication is a plus.	Unspecified	IHPC	Yu Xingrui	1 Fusionopolis Way, #16-16, Connexis North Tower, Singapore 138632	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering ,Natural Sciences	2
283	Robust Quality Diversity Optimization from Noisy Feedback	Reinforcement learning from huaman feedback (RLHF) is commonly used to optimize for average human preferences in generative tasks that demand diverse model responses. Quality Diversity through Human Feedback (QDHF) is a novel approach that infers diversity metrics from human judgement of similarity among solutions, thereby enhancing the applicability and effectiveness of quality diversity (QD) algorithms in complex and open-ended domains. QDHF achieved success in automatic diversity discovery and matches the efficacy of QD with manually crafted diversity metrics on standard benchmarks in robotics, reinforcement learning and text-to-image generation. However, high-quality human preference data poses a bottleneck in practical applications. Noisy preference pairs in the dataset might degenerate the model performance under various diversity measurment. This project aims to propose a novel QDHF method that is robust to noisy feedback.	1. Publish papers in top AI conference/journals. 2. Obtain experience in cutting-edge AI research. 3. Improve team working ability. 4. Improve scientific skills: scientific paper writing, presentation, coding, etc.	1. Conduct literature reviews . 2. Develop and implement robust quality diversity learning methods. 3. Collaborate with team members and mentors to troubleshoot and refine models. 4. Present findings and progress in reports and presentations.	1. Pro-active. 2. Self-motivated. 3. Team working. 4. Research experiences in one or more of the following topics: machine learning, reinforcement learning, imitation learning, LLM, RLHF, quality diversity optimization. Previous paper submision or publication is a plus.	Unspecified	IHPC	Yu Xingrui	1 Fusionopolis Way, #16-16, Connexis North Tower, Singapore 138632	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering ,Natural Sciences	2
284	Role of potassium channel in infection driven pulmonary inflammation and fibrosis	Lysosomes are an integral part of the intracellular defense system against microbes. They can also promote cell death and tissue damage. Apart from several receptors potassium channels present on lysosomes are essential for their functions. In this project we will investigate the importance of KCNJ15, an inward rectified K+ channel, in lysosomal homeostasis in macrophages and epithelial cells and its role during bacterial infection and inflammation.	Mammalian tissue culture, design of experiments, maintaing lab records, bacterial culture techniques, preparing media			3	ID Labs	Amit Singhal	8A Biomedical Grove, #05-13 Immunos, Singapore 138648		
285	Safe and Robust Reinforcement Learning in Urban Environments	This projects seeks to implement and test safe and robust controllers for navigation and transport tasks in urban environments. The project will develop reinforcement learning algorithms with safety and robustness guarantees by designing effective shield and domain randomisation techniques and assess their performance in high-fidelity simulations.	the student will get experience with frameworks for reinforcement learning, robotics simulators, and setting up systematic simulation experiments	the student will implement reinforcement learning algorithms and expand a pre-existing code base for reinforcement learning on construction sites and related urban environments.	python and tensorflow; machine learning; robotics simulations and physics engines; experience with reinforcement learning is desirable;	Unspecified	IHPC	David Bossens	1 Fusionopolis Way #16-16 Connexis (North Tower) Singapore 138632	Computing and Information Sciences,Computer Science	1
286	Safe Quality Diversity Reinforcement/Imitation Learning from Human Feedback	Quality diversity reinforcement learning and imitation learning is emerging for learning diverse behaivors for robotic locomotion. However, the diverse bahviors learned through pure diversity-driven objectives may not all be safe or meet human preferences in practice. This project aims to use human preference data to design an archive improvement operator during QD optimization, which leads to safer policies. To achive this goal, we first construct a dataset with safety human feedback. Then, we propose to enable safety quality diversity from human feedback (SQDHF) through two novel approach, i.e., Safety Archive Improvement and Safety Behavior Exploration.	1. Publish papers in top AI conference/journals. 2. Obtain experience in cutting-edge AI research. 3. Improve team working ability. 4. Improve scientific skills: scientific paper writing, presentation, coding, etc.	1. Conduct literature reviews . 2. Develop and implement safe quality diversity reinforcement learning methods. 3. Collaborate with team members and mentors to troubleshoot and refine models. 4. Present findings and progress in reports and presentations.	1. Pro-active. 2. Self-motivated. 3. Team working. 4. Research experiences in one or more of the following topics: machine learning, reinforcement learning, imitation learning, LLM, RLHF, quality diversity optimization. Previous paper submision or publication is a plus.	Unspecified	IHPC	Yu Xingrui	1 Fusionopolis Way, #16-16, Connexis North Tower, Singapore 138632	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering ,Natural Sciences	2
287	Sensors and transducers enabled by smart materials	The project aims at achievements of intelligent electromechanical sensor and transducer devices enabled by smart materials, and demonstration of intelligent monitoring systems using the obtained sensors and transducers in combination with data analysis algorithms and artificial intelligence.	The students will have the chance to work in a research and development team with multidisciplinary expertise and experience. They will learn one or two of the skills below, depending on individual background and interests: (1) Preparation and evaluation of smart piezo-materials; (2) Fabrication and testing of electromechanical or ultrasonic sensor and transducer devices; (3) Development of intelligent systems using the obtained sensors and transducers in combination with numerical simulation, signal processing, data analysis algorithms and/or machine learning.	The students will conduct relevant literature study, receive and pass lab trainings from safety to use of facilities, plan and complete the experimental work with guidance of the supervisor and assistances of staff members. The work scope covers one or two items as described above, depending on individual background and interests.	Education on enigineering programme, with attachment time not less than 16 weeks; Passion for science or technical innovations	Unspecified	IMRE	Yao Kui	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Electrical & Electronic Engineering ,Physics	2
288	Shark-inspired Protein Self-Assembly and Biomaterials	Achieving precise control over collagen organization at the nanoscale remains a significant challenge in biomaterials research. The nanoarchitectured egg cases of elasmobranchs, such as sharks, leverage a hierarchically ordered collagen lattice for protection, serving as an exemplary model of nanoscale self-assembly. Through recombinant engineering, we will explore the in-vitro self-assembly of collagen proteins to replicate these highly ordered structures. Students will be actively involved in plasmid design, protein expression, and structural characterization, gaining hands-on experience in producing and investigating collagen-based biomaterials with applications in diverse fields.	Protein expression in E.coli and HEK293 cells, and purification, and characterization of proteins using affinity-binding columns, SDS-PAGE, polarized optical microscopy, and SAXS and TEM data analysis.	Student will be involved in protein purification, and characterization of molecular weights and self-assembly of these proteins under different pH, concentration, and ionic strength. To develop the students' knowlegde, he/she student is expected to read widely, comprehend, and summarize the relevant literature.	B.Sc in Chemistry, or B.Sc in Biology. B.Eng in Materials Engineering, or B.Eng in Chemical Engineering with background in Biology	Unspecified	IMRE	Rubayn Goh	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Bioscience and Biotechnology,Chemical & Molecular Engineering,Chemistry	1
289	Simulation and modelling of sediment transport in coastal regions	With the intensification of climate change and extreme weather events, coastal erosion presents increasing risks to Singapore and other island communities. An important fundamental process governing erosion is the saltation, or lift-off, of sediment particles from the seabed due to the overhanging fluid flow. We will use numerical simulations to measure and analyse the coherent structures formed by saltated particle clusters to determine how fluid flow affects sediment organisation. Understanding flow-sediment interactions improves our ability to dissipate incoming energy and mitigate erosion.	Learn about numerical simulation and modelling Learn about multi-phase flows and coastal dynamics	Conduct numerical simulation and modelling	Computational/programming skills	Unspecified	IHPC	Ronald Chan	1 Fusionopolis Way, #16-16 Connexis	Engineering and Technology,Environmental Engineering,Physics	1

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

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290	Smart materials based multifunctional platforms for bioapplications and sustainable bioplastics	We develop novel materials based multifunctional and smart platforms for biorelated applications, such as stimuli-triggered therapeutics delivery, biodegradable and sustainable bioplastics. In therapeutics delivery, external stimuli, such as light, ions, pH, small molecules, chemical/biocatalytic reactions, etc., could be used to trigger the assembly/disassembly of the smart platforms as well as the targeted release of therapeutics. In bioplastics, natural polymers from biomass resources will be developed into novel bioplastics with biodegradability, biosafety, recyclability, water-processability, and the capacity for reforming to contribute to the Singapore Green Plan.	• To demonstrate the right aptitude and mindset in planning and conducting effective scientific research. • To demonstrate the right skills for the required laboratory techniques, use/maintenance of cutting-edge lab equipment. • To exhibit the 'safety first' mindset by complying with lab safety protocols and standard operating procedures, aware of the relevant risk assessments. • To practice critical and creative thinking in trouble shooting and proposing solutions when experimental results produced are less than satisfactory and/or are not as hypothesized. • To protect the interest of research institute by not disclosing confidential intellectual property (IP) of the	• Design novel smart, sustainable, and functional materials. • Prepare and perform experiments. • Collect, analyze and communicate experimental results with mentor.	We are seeking students with a foundation in materials, chemistry, physics (optics), chemical engineering, biomedical engineering, or other related fields. We are looking for those who show a keen interest in scientific research, a willingness to learn and contribute productively, and the ability to be independent, mature, organized, proactive, and responsible team players.	Unspecified	IMRE	Hu Yuwei	2 Fusionopolis Way, Innovis, Singapore 138634	Biomedical Sciences,Bioscience and Biotechnology,Materials Engineering,Chemistry	3
291	Smoothed particle hydrodynamics solver applicable to additive manufacturing	In metal additive manufacturing, a focused heat source, typically a laser, is used to melt feed material, which is then deposited along a predefined path to create intricate geometries that are often unattainable with conventional manufacturing methods. This process involves the formation of a liquid phase within a small domain called the melt pool, the dynamics of which control microstructure formation, defect creation, and the material's strength. Developing fast and reliable fluid dynamics solvers is crucial for accurately predicting the metallurgical and mechanical properties of the alloy. This project aims to develop a smoothed particle hydrodynamics solver as a prerequisite for studying melt pool dynamics in additive manufacturing.	The student will develop skills in advanced C++ programming techniques to create high-performance simulation code. They will also build a foundational understanding of additive manufacturing processes, with a focus on simulating these processes, particularly regarding fluid dynamics. Additionally, the student will gain a solid grounding in the principles of continuum mechanics and numerical methods.	Write a C++ program to solve fluid dynamics equations using the Smoothed Particle Hydrodynamics (SPH) method. At this stage, the goal is to develop a fluid dynamics solver, test it, and compare the solutions with those from other existing methods available at IHPC, such as the Lattice-Boltzmann method. Conduct a literature survey of existing analytical and numerical solutions and compare them. This project will involve coding in C++, parallel programming, running an analysing simulations, and conducting a literature survey on simple fluid dynamics problems.	Having some experience with coding, for instance in Matlab or similar, and the strong desire to lear a more advanced programming langugage, specifically C++. Basic knowledge of continuum mechanics (physics of fluids or solids) is a benefit. Basic knowledge of linear algebra and calculus.	Unspecified	IHPC	Jakub Mikula	1 Fusionopolis Wy, #16-16 Connexis, North Tower, Singapore 138632	Engineering and Technology,Mechanical Engineering	1
292	Software development of power calibration system	Using Python tkinter or other GUI Programming to develop a power calibration system.	Acquire the skills of power calibration, Python-controlled testing via serials and GPIB, and Python GUI programming.	To built up the software of a power calibration system by using Python tkinter or other GUI Programming.	Knowledge and experience of basic computer programming in Python	Unspecified	NMC	Yang Yan	8 Cleantech Loop, #01-20 B, Singapore 637145	Computing and Information Sciences,Computer and Software Engineering,Electrical Engineering	1
293	Spin-based Synaptic Devices	Magnetic devices with fast access time, low energy consumption and scalable writing at small dimensions are promising for unconventional brain-inspired computing. The project will investigate all-spin device concepts which mimick synapses and neurons in neural network architecture. By characterizing their electrical switching and readouts, we elucidate underlying mechanisms and performance of the neural network. Test accuracies of the trained neural network will be ascertained using digit and object recognition tasks.	The candidate will begin with relevant literature review to acquire fundamental understanding of spintronics devices and unconventional computing concepts. They will gain hands-on experience on electrical testing and data analysis of the novel magnetic device neural network. They will also learn to train and test the network using in silico and live testing methods.	1) Design and setup of electronic platform 2) Electrical characterization and analysis of the all-spin neural network. 3) Perform training and testing using digit and object recognition tasks	Background on magnetism and experience in device electrical characterization and data analysis techniques will be preferred. Discipline: Materials Science and Engineering, Electrical and Computer Engineering, Engineering Science, Physics & Applied Physics	Unspecified	IMRE	Ho Pin	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Materials Engineering,Physics	1
294	Stem cell-derived antimicrobial peptides and EVs for cosmeceutical applications	We found a robust anti-bacterial effect of adipose-derived stem cells (ASCs) that undergo adipogenic differentiation under priming stimulation. Both proteins and extracellular vesicles (EVs; a.k.a. exosomes) have potent effects; we further optimized short peptides and conditions of EVs suitable for clinical and cosmeceutical applications. The student will help develop culture / differentiation conditions of ASCs, perform various microbiology experiments and test for healing of wound associated infection and other application models. The mechanisms of priming and bacteriacidal effects will also be studied. Both in vitro and in vivo wound models will be developed and employed together with our collaborators.	At the end of the project, the student is expected to master a number of techniques such as cell culture and engineering, microbiology, gene/protein expression, peptide/protein chemistry, EV isolation / characterization, imaging and cellular analyses. This training will familiarize the student who is interested in pursuing research related professions in academic or industrial settings.	The experimental techniques include, but not limited to, cell culture, bacterial assay, gene / protein expression analysis, microscopy, imaging and cellular analysis, flow cytometry, in vitro and in vivo wound models. The student may collaborate with our partners for additional experiments. Training for these skills will be provided including biosafety observation. The student will work both independently and in the team, make presentations at weekly meetings, keep records, analyze data, and write reports.	Prior experience in cell culure and basic molecular biology analysis is preferred. Passion in this research area, team work abilities, and proactive learning attitudes are required.	Unspecified	SIFBI	Shigeki SUGII	Nanos #05-63, 31 Biopolis Way, S138669	Biomedical Sciences,Microbiology,Bioengineering	1
295	Strategies Towards Sustainable AI for Urban Sustainability	Student will read literature on current state-of-the-art methods for assessing carbon emissions from AI model training and AI model inference and strategies for continual learning and training models with less computational cost. They will then apply it to a model urban layout dataset and assess the impact of various methods and algorithms on the carbon emissions incurred when training an AI model for urban planning and sustainability.	1. Student will acquire experience working with widely used general purpose scripting languages such as Python and Tensorflow. 2. Student should be able to explain how machine learning models such as neural networks work, and be able to write code to implement said techniques. This should be transferable skills for any future projects the student might be interested in. 3. The student will also learn to read literature and think more deeply about Greening AI models.	1) Literature review 2) Implement and train different ML model training strategies for a simple model system (e.g. in continual learning and curriculum learning) 3) Assess carbon emissions for different kinds of ML models for this model system	1. Able to read literature and do literature review. 2. Familiar with Python programming. 3. Knowledge of data analytics/engineering.	Unspecified	IHPC	Ooi Chin Chun	1 Fusionopolis Way, Connexis North, Singapore 138632	Computing and Information Sciences,Computer and Software Engineering,Environmental Engineering,Physics	1
296	Study the roles of RNA structure in disease associated RNA binding protein and their targets.	The correlation between RNA expression and protein expression is only 0.4, indicating post-transcriptional regulation. RNA structure play an important role in disease through the post-transcriptional regulation, and RNA binding protein (RBP) is one major regulator for the RNA structure dynamics of its targets. however, how does the RBP affect its targets through RNA structure-based regulation is still largely unknown. We plan to systematically study the relationship between RBPs and its targets through RNA structure-based regulation.	1)Molecular experimental skills, including cloning, cell culture, q-PCR, RNA extraction, RNA binding protein pull-down, Western blot. 2) Cell culture, RNA extraction, RNA structure probing. 3) Basic data analysis.	we will train the student step by step, and later the student should perform the experiments following guidance	Undergraduate in biomedical/life science	Unspecified	GIS	Wang Jiaxu	60 Biopolis St, Singapore 138672, Genome-lvl6	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Natural Sciences	1
297	Sustainable and green concrete	This project aims to develop innovative types of concrete that reduces environmental impact by incorporating eco-friendly materials and reducing carbon emissions.	Students will learn to identify sustainable materials for concrete production, reduce environmental impact, and apply alternative binders. They will develop skills in designing and testing eco-friendly concrete mixes, analyzing performance data, and understanding the environmental benefits of green construction, preparing them for sustainable engineering practices.	Students will research sustainable materials, develop and test eco-friendly concrete mixes, and evaluate properties like strength and durability. They will analyze results, refine formulations, and ensure energy-efficient processes. Additionally, they will document findings, collaborate with teammates, and present solutions that align with environmental goals and project objectives.	Knowledge in civil or environmental engineering concepts, especially sustainable construction practices, is essential. Familiarity with laboratory testing methods for materials (e.g., strength, durability tests) and basic data analysis is also beneficial.	Unspecified	IMRE	Li Junxia	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Materials Engineering	2
298	Sustainable and novel synthesis of functional polymers with homogeneous/heterogeneous catalyst	Functional organic polymers have wide applications across many different fields. Yet, the majority of the current synthetic routes to these materials tend to be low in recyclability and sustainability, with formation of significant amounts of wasteful biproducts. This project focuses on the achievement of cost-effective iterative C-C bond and/or C-N bond formation, by exploring the new capability of our homogeneous redox-neutral catalysis, as well as efficient and robust geminal-atom heterogeneous catalysts (GACs) towards the synthesis of functional materials. We will i) apply our homogeneous catalytic chemo-selective Guerbet reaction/amination reaction to the effective preparation of novel PVA/PEI analogs. ii) attempt to sustainably synthesize valuable conjugated polymeric products and explore their potential applications using heterogeneous GACs with earth-abundant metals.	Student will be performing stepwise organic synthesis of necessary monomers as well as optimizations of polymerization conditions for homogeneous/heterogeneous methodologies, towards polymeric products with high yield, high molecular weight and low polydispersity. Students would also learn to purify and fully characterize polymers, as well as techniques related to polymer applications such as spin coating and device fabrication. Based on the results achieved from research work conducted during this attachment, student will learn to collate and present the scientific data obtained.	Polymer synthesis Polymer characterization Device fabrication and performance study Data collection and presentation	Good understanding of organic chemistry, with some experience in organic synthesis and familiar with characterization equipment such as NMR, mass sepc, FTIR, UV-Vis absorption spectroscopy, fluorescence spectroscopy and electrochemistry being a bonus. Work well with others Safety awareness, critical thinker, good communication skills, proactive and willing to learn new skills.	Unspecified	ISCE2	Tao Ran	1 Pesek Road, Jurong Island. S(627833).	Physical Sciences,Chemistry	1

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299	Sustainable and tailored production of fungal proteins to accelerate acceptance of alternative food	As part of Singapore's 30-by-30 initiative to strengthen food security through alternative proteins, this project aims to develop high-nutritional-value fungal proteins as sustainable food sources. While plant proteins currently dominate the alternative protein market, fungal proteins are gaining popularity due to their rich nutritional content and health benefits. This project involves optimizing fungal strains to improve their amino acid profiles through fermentation, refining them into SCPs or protein isolates. Molecular techniques, such as PCR, will be used for strain identification and validation to ensure effectiveness. The resulting biomass can be utilized in various applications, such as meat analog products, supplements for plant-based proteins, ingredients for healthy snacks, or nutritional supplements. Product development will focus on aligning these proteins with traditional Asian taste profiles, enhancing both their sensory and nutritional appeal.	By the end of this project, interns will be able to: Understand Fungal Protein Production: Gain knowledge of how alternative proteins, specifically fungal proteins, are developed as sustainable food sources, emphasizing their nutritional composition and health benefits. Apply Molecular Biology Techniques: Develop skills in molecular techniques, such as PCR, for identifying and validating fungal strains, understanding the principles behind genetic profiling and strain selection. Optimize Fermentation Processes: Learn to optimize fermentation conditions to enhance amino acid profiles, biomass yield, and product characteristics in alignment with desired nutritional and sensory outcomes. Contribute to Product Development: Understand the formulation and development of protein products tailored for Asian taste preferences, exploring how sensory attributes like flavor and texture can be manipulated through ingredient selection and processing. Enhance Analytical Skills: Develop analytical skills through hands-on experience with techniques for nutrient analysis, sensory evaluation, and product benchmarking.	Assist in Strain Optimization: Conduct experiments to enhance the growth conditions of fungal strains, focusing on maximizing biomass and protein yield. Adjust parameters such as carbon and nitrogen sources, pH, temperature, and fermentation time to improve the nutritional profile of the strains. Perform PCR-Based Identification: Use PCR techniques to identify and validate fungal strains. Participate in genetic analysis and interpretation of results to determine strain suitability for protein profiling and strain selection. Participate in Product Development: Engage in the formulation of mycoprotein-based products, specifically targeting Asian taste preferences. Contribute to sensory evaluation tests, helping assess the flavor, texture, and overall acceptability of the developed products. Conduct Nutrient Analysis: Support the analysis of protein content, amino acid profiles, and other nutritional components in the biomass. Document and analyze results to guide strain selection and optimization efforts. Maintain Laboratory Records and Reports: Keep detailed records of experimental procedures, results, and observations. Prepare reports summarizing findings, progress, and recommendations for further	Education: Currently pursuing or completed a diploma, bachelor's, or master's degree in Biotechnology, Microbiology, Food Science, or related fields. Basic Lab Skills: Familiarity with aseptic techniques, media preparation, and analytical methods (e.g., pipetting, pH measurement). Microbial Cultivation: Basic understanding of fermentation and microbial growth conditions. Molecular Biology: Knowledge of PCR, DNA extraction, and gel electrophoresis. Interest in Food Technology: Passion for alternative proteins and food formulation. Analytical Mindset: Ability to interpret experimental data and optimize processes.	Unspecified	SIFBI	Anuj Lipton	31 Biopolis Wy, #04-01 Nanos, Singapore 138669	Biomedical Sciences,Life Sciences	1
300	Synthetic biology for plastics production and degradation	Plastics are a versatile engineering material, but with environmental drawbacks. We will mine sequence databases for new enzymes and gene clusters for plastics bioproduction and degradation, coupled with targeted biochemical experiments	Navigate protein sequence databases, basic data processing and visualization, molecular cloning, enzyme purification and assays, E. coli strain engineering	Carry out bioininformatics analyses, and biochemical experiments	Basic chemistry and biology	Unspecified	SIFBI	Wei Yifeng	31 Biopolis Way, level 2, Nanos, Singapore 138669	Biomedical Sciences,Microbiology,Bioinformatics,Bioengineering , Chemistry	2
301	Tactile-Guided Cable Manipulation and Insertio	Today, robots are increasingly expected to perform manipulation and physical interaction tasks with various objects. Cable manipulation and insertion are critical tasks in various industrial applications, including electronics assembly, automotive manufacturing, and aerospace engineering. Traditional robotic systems often rely heavily on visual sensors, which can struggle with tasks requiring high precision or in environments where visibility is limited or obstructed. Also, visual sensors alone may not provide adequate information about the precise physical interactions and the complex dynamics involved in handling deformable objects. Consequently, these systems can experience difficulties such as cable routing, misalignment during insertion, and potential damage to delicate components. To address these limitations of current robotic systems, one solution is to integrate the tactile sensing technology into the robots, which enable robot to feel, react, and adapt to the physical properties and interactions of the objects like the cables. In this project, the objective is to develop an advanced control scheme using tactile feedback for a robotic manipulation system so that the system is capable of performing precise and efficient cable manipulation and insertion tasks. This system will leverage the tactile information to enhance accuracy and reliability in environments where visual feedback alone is insufficient. Furthermore, the proposed control scheme will be implemented and tested on a robot manipulator equipped with tactile sensors,	Ability to apply control with tactile perception. Develop algorithms suitable for tactile-specific manipulation. Learn to apply technical modules in the research project.	The work of this project mainly includes algorithm development of force/tactile control as well as system integration.	The student should have knowledge of robotics, machine learning and feedback control.	2	I2R	Liang Wenyu	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Computer and Software Engineering,Electrical and Electronic Engineering	1
302	Tailor design enzymes for natural product biosynthesis	Biosynthesis of natural products has emerged as a competitive alternative to produce chemicals in a green and cost-effective manner. However, one challenge is many pathway enzymes of natural products are unidentified. In this project, we address the challenge by designing artificial pathway(s) to produce natural products. It involves engineering non-specific enzymatic activity towards the desired activity, leveraging on high-throughput assay development and AI-assisted enzyme design. The established workflow enables engineering more efficient biocatalysts for sustainable production of natural products.	The students will be exposed to cross-disciplinary research areas spanning biochemistry, protein engineering, metabolic engineering, and analytical chemistry. He or she will be trained to be proficient in molecular biology techniques such as gene assembly workflows, enzyme purification and characterization etc. Moreover, the intern will be trained to analyze and present scientific data, troubleshoot experiments and hypothesis testing. Teamwork and communication skills will also be	•Perform basic lab protocols such as DNA purification, bacterial culture, sample preparation etc. •Learn and apply the techniques of gene assembly and mutagenesis and expose to lab automation. •Innovate to improve lab protocols such as enzyme assays. •Documenting experimental procedures, analyzing the data and updating the team members the consolidated results	Biomedical Engineering, Chemical Engineering, Bioengineering, Chemical & BioMolecular Engineering, Biochemistry, Life sciences, Computational biology, and related field	Unspecified	SIFBI	Chen Xixian	31 Biopolis Way, Nanos level 6,	Engineering and Technology,Bioscience and Biotechnology,Bioinformatics,Chemical and Molecular Engineering,Natural Sciences	1
303	Technologies to measure the temperature in a wind tunnel environment	A wind tunnel serves as a crucial tool for testing components in the aerospace industry. It allows the emulation of diverse testing conditions, including airspeed variations, ambient temperature simulations (including icing conditions), water liquid content, among others. Within the scope of this project, our objective is to measure the temperature of the parts undergoing testing in the wind tunnel. The student's role involves conducting a comprehensive literature review to identify suitable temperature measurement methods for this application. Ultimately, the student will write a review paper to consolidate the findings. This presents an excellent opportunity for the student to gain experience in write	(1) Master fundamental concepts of wind tunnel testing and aerospace measurement techniques (2) Develop research skills through systematic literature review and analysis (3) Gain professional writing experience in technical documentation and scientific papers	(1) Conduct comprehensive literature review on temperature measurement methods for wind tunnel testing (2) Analyze and compare different temperature measurement techniques for aerospace applications (3) Write and submit a scientific review paper summarizing the research findings	Knowledge and experience of programming with Python are preferred.	Unspecified	NMC	Zu Peng	8 Cleantech Loop, #01-20 B, Singapore 637145	Engineering and Technology,Computer Science,Electrical engineering,Physics	1
304	Terahertz (THz) Imaging and Simulation for Biological Sample Characterization	This project aims to explore Terahertz (THz) imaging and simulation methods to enhance the characterization and structural analysis of biological samples. By applying THz imaging, simulation, and analysis, we seek to advance non-invasive diagnostic tools that capture molecular composition, hydration states, and structural integrity, targeting applications in biological research, medical diagnostics, and pharmaceuticals.	Students will develop skills in THz imaging and spectroscopy for biological analysis, utilizing simulation tools to model THz interactions with biological materials. They will understand THz wave absorption, penetration, and scattering in various compositions, correlate experimental data with simulations, and identify diagnostic markers for biological and medical applications	Provide the lab THz spectroscopy, imaging system for the study; Data collection, analysis; Material growth and sample preparation; Together with the university supervisor to guide the student.	An excellent academic record from a Bachelor's or Master's degree program, along with a demonstrated publication record.	Unspecified	IMRE	Ke Lin	2 Fusionopolis Way, Innovis, Singapore 138634	Materials Engineering,Biomedical Engineering	1
305	The Social Influence of AI Agents in the Era of Generative AIs	With the advent of large language models (LLMs) like ChatGPT, AI agents have evolved into highly sophisticated systems capable of engaging in complex, human-like interactions. These models now play a pivotal role in shaping public discourse, influencing personal decisions, and guiding social behaviors. As AI agents powered by LLMs become increasingly integrated into everyday life, understanding their social influence is essential. This proposal seeks to explore how LLM-driven AI agents influence human attitudes, decision-making, and social norms. The research will examine the various ways these AI systems affect individuals' interactions, from content consumption to behavior reinforcement, as well as the ethical considerations surrounding their growing role in society. By analyzing the impact of LLMs on social influence, this study will provide critical insights into the evolving dynamics between humans and AI in contemporary digital ecosystems.	1). Develop a prototype of AI agents system and obain "hands-on" experiences of the generative AI techniques and AI agents behaviors. 2). Submit one conference/journal paper when the project finishes.	1) Literature review 2) Implement multi AI agents with python and prompts 3) Prepare a report/paper draft based on the experimental results	python language, basic machine learning knowledge	Unspecified	IHPC	Shanshan Feng	1 Fusionopolis Wy, #16-16 Connexis, Singapore 138632	Computing and Information Sciences,Computer Science	1
306	Thermo-Responsive MOFs/Polymer Composite Platform for CO2 Capture and Conversion	The continuous emission of greenhouse gases, notably carbon dioxide (CO2), exacerbates global warming, leading to erratic weather patterns and rising sea levels. Urgent action is imperative, with major governments,aiming to halve CO2 emissions by 2030 and achieve net zero by 2050. This project targets to develop a thermo-responsive metal-organic-frameworks (MOFs)/polymer composite system for the CO2 capture, release, and finalizing conversion CO2 into used chemical forms.	Student will be able to carry out synthesis experiment and perform characterization of compounds using various instruments such as SEM, NMR, UV-Vis spectrometer, Co2 captrue and release analysis techniques.	Perform literature review, synthesize composite materials, perform characterization, data collection, data analysis and data reporting	The student should have chemistry background with basic laboratory skills. Candidate with passion for science and eager to learn are preferred	Unspecified	ISCE2	Vu Thi Quyen	1 Pesek Road, Jurong Island. S(627833).	Physical Sciences,Chemistry	1
307	Time-variant semiconductor optical metasurfaces	One frontier in modern optical research is the study of metasurfaces that change on ultrafast timescales—faster than the time photons take to pass through them. This enables new physical phenomena, such as linear frequency and bandwidth conversion, that are impossible in static systems. This project focuses on developing innovative methods to dynamically control the spectrum and wavefront of light using time-variant semiconductor metasurfaces.	Students will become familiar with the literature on time-variant metasurfaces, gain hands-on experience in modern experimental techniques—such as ultrafast non-degenerate pump-probe spectroscopy and(or) back focal plane imaging—and develop skills in simulating the optical response of metasurfaces.	Students will review recommended literature, assist in optical experiments, and perform supervised numerical simulations.	Strong understanding of university-level optics and general physics, basic knowledge of Python programming	Unspecified	IMRE	Daniil Shilkin	2 Fusionopolis Way, Innovis, Singapore 138634	Physical Sciences,Physics	2

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	**Project Title**	**Project Description**	**Learning Outcomes for Students**	**Roles and Responsibilies of Student**	**Students' pre-requisites**	**Minimum Duration (Months)**	**Research Institute of Internship Supervisor**	**Name of Internship Supervisor**	**Workplace Address**	**What is the project's research category?**	**No. of Students Required**
308	Tolerogenic iPSC-NK development	The differentiation potential of iPSCs offers significant promise for regenerative medicine. iPSC-derived NK cells have already been tested in anti-tumor clinical trials, demonstrating notable efficacy and application potential. Recent research reveals NK cell heterogeneity, showing that hematopoietic stem cells can give rise to both cytotoxic NK cells with cell-killing activity and tolerogenic NK cells characterized by cytokine secretion and immune regulation, which are crucial for immune homeostasis. However, the mechanisms guiding stem cell differentiation into variant NK cell subsets are still unclear. Based on single-cell RNA-seq data obtained from NK cell development in a murine early pregnancy model, we have identified candidate transcription factors that may regulate tolerogenic NK cell differentiation. This project will combine our existing iPSC-NK developmental platform with CRISPR screening technology to define key genes and regulatory networks involved in NK cell subset differentiation. These insights will form the theoretical foundation for developing a stable tolerogenic iPSC-NK platform, holding great potential for clinical applications in autoimmune disease treatment and transplant rejection	Through this internship, the student will gain: - Enhanced cell culture skills, including the ability to independently maintain and expand cultures. - Familiarity with molecular cloning techniques, including plasmid construction and stable cell line development. - Insight into iPSC-NK cell developmental pathways, contributing to foundational knowledge in cellular biology. - Skills in experimental data collection and analysis to support scientific discoveries. - A strong foundation in laboratory practices and scientific habits beneficial for future PhD studies.	- Assist postdoctoral researchers or independently conduct cell culture activities to develop hands-on skills in cell maintenance and expansion. - Construct plasmids and develop stable cell lines, acquiring essential molecular cloning techniques. - Perform cell phenotyping using flow cytometry, analyzing and interpreting cellular characteristics. - Deepen knowledge in immunology and cell biology, supporting experimental design and data analysis. - Collaborate with the team on experimental objectives and contribute to data reporting and documentation..	- Research Passion: Curiosity about science and research-driven learning. - Immunology Knowledge: Basic understanding of immunology to aid in interpreting research objectives and experimental planning. - Laboratory Skills: Basic experience in wet lab work, including cell culture; familiarity with molecular biology, particularly in tasks like plasmid construction (preferred but not essential).	Unspecified	IMCB	Li Qi-Jing	Institute of Molecular and Cell Biology (IMCB) Agency for Science, Technology and Research (A*STAR) 61 Biopolis Drive, Proteos Room 5-12B Singapore 138673	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Natural Sciences	1
309	Towards Realistic Segmentation with the Use of Fundational Models	Big technical gaps remain when adopting deep learning to real world segmentation tasks due to major challenges from data annotation, representation learning and computational resources. Inspired by recent advances in foundational modeling approaches, the goal of this project is to develop a novel deep learning method for building segmentation capabilities on the basis of fundational models (such as SAM) with reduced annotation burden and resource requirements. Such capabilities could be further validated and evaluated for real work applications.	The internship will help the student to learn image pre-processing and gain hands-on experience in the implementation and improvement of the algorithms. The student will get familiar with deep learning applications on the medical images with potential Conference or Journal paper publication.	This project involves developing and implementing a 3D deep learning-based system and the intern's position is to: Task 1 -- Perform a literature review on the relevant studies. Task 2 -- Extend previous methods to further improve and develop a novel 3D deep learning-based approach. Regular meetings will be arranged. The student will deliver the documentation and source code on the method investigated at the end of the attachment. The presentation will be arranged to show the results and findings	1. Prior knowledge in Machine Learning, Deep Learning, Computer Vision, etc. 2. Sufficient experience in programming in python 3. Familiarity with PyTorch libraries 4. Good verbal and written communication and troubleshooting skills	2	I2R	Yu Yang	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science	1
310	Transcriptomic Synergy: Improving Short-Read Data with Long-Read Innovations	Long-read sequencing has ushered in a revolutionary era, offering an unprecedented level of accuracy in deciphering the intricate transcriptomic landscapes of various organisms. With the ability to identify novel isoforms, reduce transcript quantification ambiguity, and pinpoint major gene isoforms, it has undoubtedly transformed our understanding of genomics. However, despite these remarkable advancements, long-read data remains relatively scarce in comparison to the vast reservoir of historical short-read sequencing data. Regrettably, short-read data falls short of harnessing the full potential of long-reads. What if we could bridge this technological gap and harness the insights gleaned from long-read sequencing to enhance the value of existing short-read datasets? This exciting endeavor holds the promise of reinvigorating archived data, elevating its isoform-quantification capabilities, and paving the way for a cost-effective means of extending long-read experiments across multiple replicates. Join us in this transformative journey as we unravel the untapped potential of transcriptomic data, revolutionizing the way we explore	Bioinformatics Skills: Gain proficiency in bioinformatics tools and data analysis using Python and R. Transcriptomics Knowledge: Learn about transcriptomics, including sequencing technologies and gene expression. Data Analysis Expertise: Master data analysis, quality control, and differential expression analysis. Version Control: They may learn to use version control systems like Git to collaborate on code and track changes, ensuring reproducibility and collaboration with other team members. Data Handling: Students will become skilled in working with large datasets, including data cleaning, preprocessing, and transformation, which are important aspects of software engineering for data analysis.	Access large short and long read datasets Develop a method to use long-read annotations for short-read quantification Writing and iterating on unit tests Maintain detailed records of experiments, protocols, and results. Convey research insights to team members and, potentially, to the broader scientific community.	Bioinformatics Skills: Basic knowledge of bioinformatics tools and R is important for data analysis and processing. An elementary understanding of genetics is helpful	Unspecified	GIS	Jonathan Goeke	60 Biopolis Street, Genome, #02-01, Singapore 138672	Computing and Information Sciences,Bioinformatics	1
311	Translational PK-PD approaches in oncology	At present, there exist no systematic methods for translating results between in vitro and in vivo systems. Recent PK-PD modeling efforts suggest exposure-response relationships are a way of translating results across systems. The student will evaluate various modeling approaches and systems to find out which methods work best for subsequent in vivo predictions.	Through this project, the student will learn how to do database curation and management in R, and how to build structural pharmacokinetic models in either NONMEM or monolix. The student will also learn about pharmacotherapy in oncology and pathophysiology of cancer that can affect patient outcomes.	1) compile and curate databases 2) build PK and PK-PD models for evaluation 3) basic dataset preparation and data wrangling and visualization skills 4) basic machine learning techniques	Basic understanding of pharamcology, PharmD or Bsc Pharmacy are a plus. Basic coding proficiency in R	Unspecified	BII	Janice Goh	30 Biopolis St, Matrix	Biomedical Sciences,Pharmacy,Bioinformatics,Biomedical Engineering,Natural Sciences	1
312	Ultrafast Optical-Pump Terahertz-Probe (OPTP) Characterization of 2D Material-Based THz Detectors	To investigate the ultrafast carrier dynamics and THz response properties of novel 2D materials (such as MoS_2, WS_2, or WSe_2), assessing their potential as highly efficient THz detectors through a comprehensive Optical-Pump Terahertz-Probe (OPTP) study. By leveraging the unique electronic properties of these materials, this study aims to understand their carrier relaxation, recombination, and transport mechanisms to enhance THz detection capabilities.	Students will gain expertise in ultrafast Optical-Pump Terahertz-Probe (OPTP) techniques, understanding carrier dynamics in advanced 2D materials, particularly graphene. They will learn to analyze THz conductivity, assess detector performance metrics, and develop insights into optimizing material properties for THz detection applications in security, sensing, and imaging technologies.	Provide the lab ultrafast THz optical setup environment for study; Data collection, analysis; Material growth and sample preparation; Together with the university supervisor to guide the student.	An excellent academic record from a Bachelor's or Master's degree program, along with a demonstrated publication record.	Unspecified	IMRE	Ke Lin	2 Fusionopolis Way, Innovis, Singapore 138634	Materials Engineering	1
313	Unconventional Drones: Hovering at Arbitrary Orientations & Physically Interacting With the Environment	This project aims at developing a unconventional drones that can achieve more than simply hovering at free-flight. These drones will have various features such as tilt-rotors, thrust vectoring/differential, robotic manipulators, etc. Such features will allow the drones interact with the environment and with each other in a dexterous manner at different orientations. The whole project will involve several work packages, such as modeling & simulation, design & build, motion planning & control. Hence, several students will be recruited to work together, and they will be assigned to different work packages based on their skillset and interest.	1. Gaining hands-on experience with aerial robotics, drones, and various electronics. 2. Gaining theoretical & practical knowledge in autonomous control of drones. 3. Getting exposure in a professional robotics R&D environment.	1. Support the engineers & scientists in the various work packages mentioned. 2. Assist the engineers & scientists during flight experiments.	1. Excellent team player attitude. 2. Interest in drone research. 3. Codign experience (good to have). 4. Computer-Aided Design (CAD) experience (good to have). 5. Do-It-Yourself (DIY) experience (good to have). 6. Experience with Tensorflow/PyTorch (good to have).	2	I2R	Efe CAMCI	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Mechanical Engineering	2
314	Understanding viral-neuro-immune dynamics in Zika virus (ZIKV) neuropathogenesis	Elucidating the intricate mechanisms underlying Zika virus (ZIKV) neuropathogenesis is pivotal for developing effective therapeutic interventions and preventive strategies against this emerging global health threat. In this project we aim to study the differences in immunopathogenesis between different ZIKV isolates in both in vitro and in vivo models.	At the end of the attachment, student should have obtained valuable experience in planning and executing experiments. Student will also be taught on documenting, analysing and presenting their results. Importantly, this attachment will also allow the student to develop critical thinking and improve on their presentation skills.	Students will work under a senior Scientist and assist in runnning experiments, analyses of data, troubleshooting, critical thinking and discussion, presenting, reporting and documenting of work done. This will train students for future FYP or PhD journey.	Eligible students should demonstrate a keen interest in ID research, possess a strong foundation in Immunology and Infectious Diseases, and be planning to pursue FYP or PhD studies in this field.	3	ID Labs	Lum Fok Moon	8A Biomedical Grove, Immunos #05-13, Singapore 138648	Biomedical Sciences,Infectious Diseases, Immunology, Neuroimmunology, Virus-host interaction	1
315	Unified Generalist Robot Manipulation Policy: Control Across Various Soft Gripper and Robotic Arm Platforms	The project aims to develop a Unified Generalist Robot Policy (UGRP) to efficiently control a variety of soft grippers and robotic arm platforms for complex manipulation tasks. By leveraging advanced robotics and AI techniques, including reinforcement learning (RL), knowledge distillation, diffusion models, large language models (LLMs), and large action models, the UGRP will establish a unified framework for seamless operation across diverse hardware configurations. Using NVIDIA Isaac for high-fidelity simulations, the project will benefit from massive parallelization and realistic modeling of soft grippers and robotic dynamics, enabling faster training and testing cycles across varied gripper configurations. This approach is designed to ensure adaptability and high performance across a wide range of robotic embodiments, supporting efficient generalization and robust control in complex, dynamic environments.	Understand core robotics concepts and AI techniques like reinforcement learning (RL), knowledge distillation, and diffusion models. Apply advanced AI models to control soft grippers and robotic arms, with hands-on experience in robotic Nvidia Isaac simulation tools. Develop critical problem-solving skills, focusing on real-world implementation.	Participate in the development of the Unified Generalist Robot Policy (UGRP), focusing on applying reinforcement learning, knowledge distillation, and other AI techniques. Use robotic simulation tools, such as NVIDIA Isaac, to design and test various gripper configurations and control policies. Conduct experiments to evaluate the adaptability of the UGRP across different robotic embodiments.	Intereset in Robotic, Reinforcement Learning (RL), and Deep Learning Proficiency in at least one programming language commonly used in machine learning and AI, such as Python. Background in Robotics (Optional)	2	I2R	ACAR Cihan	1 Fusionopolis Way, Connexis, Singapore 138632	Engineering and Technology,Computer Science,Electrical and Electronic Engineering	2

รายชื่อโครงการวิจัยที่นักศึกษาสามารถเลือกไปปฏิบัติการวิจัย (SIPGA Project List) ประจำปีการศึกษา 2568 (ค.ศ. 2025)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Project No.	Project Title	Project Description	Learning Outcomes for Students	Roles and Responsibilies of Student	Students' pre-requisites	Minimum Duration (Months)	Research Institute of Internship Supervisor	Name of Internship Supervisor	Workplace Address	What is the project's research category?	No. of Students Required
316	Unlocking Sustainable Value: Enzymatic Valorization of Lignocellulosic Agrifood Waste	There is a growing demand for alternative protein sources globally, mainly driven by the need to sustainably feed the increasing population in a resource constrained world. Microbial proteins are potentially sustainable alternatives to traditional proteins as they provide equivalent nutritional benefit and can be produced using cheap and abundant resources such as lignocellulosic agri-food waste as feedstock. Lignocellulosic agri-food wastes are composed of lignin and various polysaccharides including cellulose and hemicellulose. Their effective utilization as feedstock requires hydrolysis of the polysaccharides to small sugars. However, the recalcitrant lignin acts like a natural glue that holds the lignocellulose matrix together and prevents access to the cellulose and hemicellulose components for efficient enzymatic hydrolysis. Currently, thermochemical processing is the most efficient way of degrading lignin. However, it generates toxic compounds that inhibit the growth of microorganisms on the hydrolyzed lignocellulosic feedstock. It is also a costly and energy intensive process. Biological processes potentially enable low energy, cost effective lignin degradation without generating toxic compounds. Nevertheless, natural lignin degrading enzymes are very slow and are not amenable for industrial application. This project aims to develop engineered lignin degrading enzyme cocktail(s) as a basis for platform technology for efficient conversion of agri-food waste into fermentation feedstock for producing microbial protein and other high value products. The project involves computational design and engineering of lignin-degrading enzymes to enhance their activity, AI-assisted enzyme cocktail optimization, evaluation of the enzyme cocktails for converting selected agri-food waste, evaluation of the hydrolysate and food waste for growing selected	The student will be familiarized to the research lab environment. S/he will have opportunity of experiment designing and execution. The student will gain knowledge and develop technical expertise in multiple area of biotechnology. The student will have opportunity to learn most of the techniques listed below. Techniques: Preparing and maintaining microbial culture, working in aseptic environment, primer designing, PCR, gel electrophoresis, DNA isolation/purification, cloning, over-expression of gene of interest, enzyme engineering, site-directed mutagenesis, making enzyme library, protein production and purification, enzyme assay development, enzymatic reaction optimization.	1. Designing and performing experiments, including preparing media and reagents 2. Record keeping 3. Contribute to laboratory operation, if needed 4. Strictly follow HSE rules	1. Willingness to learn 2. Willingness to work in a team 3. Cooperative and friendly attitude 4. Basic understanding of microbiology, molecular biology and protein/enzyme biochemistry, and preferably some hands-on experience in these areas.	Unspecified	SIFBI	Barindra Sana	31 Biopolis Way, Nanos Level 6, Singapore 138669	Biomedical Sciences,Bioscience and Biotechnology,Bioengineering ,Natural Sciences	2
317	Unlocking therapeutic potential of the gut microbiome	The gut microbiota is the major source of diverse environmental signals and is consistently shaped by various diets and nutrition. We recently applied a novel chemical approach to selectively remodel the gut microbiota and examine the contribution of specific types of bacteria during disease progression. Our result demonstrated that direct remodeling of the gut microbiota contributes to transcriptional reprogramming in both host and microbes as well as a reduction in atherosclerosis development via specific metabolites. We plan to develop and expand chemical toolkits based on the current foundation. The student will get the training in molecular and chemical biology as well as various next-generation sequencing techniques	This internship will have the opportunity to carry out the experiments as well as data analysis (depending on student's background and interest).	Assist and carry out assigned experiments	Background in molecular biology and microbiology. Team player with strong motivation to achieve the goals	Unspecified	GIS	Benson Chen	60 Biopolis Street, Genome, #04-01, Singapore 138672	Biomedical Sciences,Biomedical Sciences,Bioinformatics	2
318	Unraveling the determining factors involved in progression of MASLD patient derived liver stem cells	This project aims to investigate the progression of metabolic dysfunction-associated steatotic liver disease (MASLD) using patient-derived liver stem cells. Functional studies will be conducted to validate promising targets derived from our proprietary methodology. The outcomes of this research will provide insights into MASLD pathogenesis, potentially uncovering novel therapeutic targets for the treatment of this epidemic liver disorder.	This position is ideal for individuals interested in molecular biology, immunology, and hepatology. Students will not only contribute to scientific knowledge but also gain valuable skills and experiences that can be applied in their academic and professional pursuits.	This attachment will require students to acquire practical laboratory skills, deepen their intellectual understanding of Kupffer cells and MASLD disease. Students are required to work with team members and learn to conduct scientific research that ranges from hypothesis formulation to data analysis. Students will have chances to enhance their critical thinking, communication, and collaboration abilities while managing project timelines	Undergraduates or postgraduates Student will gain hands-on laboratory expertise, from cell culture to cutting-edge molecular biology techniques. He/she will be able to participate in the scientific process of learning to formulate hypotheses, design experiments, and analyze data. This research fosters critical thinking and problem-solving abilities, equipping students to address complex scientific questions	Unspecified	GIS	Lee Mei Chin	60 Biopolis Street, Genome, #07-01, Singapore 138672	Biomedical Sciences,Biomedical Sciences	2
319	Unsupervised Learning for AI Digital Pathology Diagnosis	This project aims to explore advanced structural based self-supervised/unsupervised learning methods to segment various regions of interest in pathology images, such as tumor areas or specific tissue types, without the need for annotated data. By leveraging self-supervised techniques, we aim to develop robust models that can identify and differentiate critical pathological features, enhancing the efficiency and accuracy of digital pathology workflows.	i). Development of effective self-supervised learning techniques tailored for pathology image segmentation, capable of functioning with minimal labeled data. ii). Creation of high-performing segmentation models that can reliably identify and segment pathological features, reducing the dependency on extensive annotated datasets. iii). Demonstration of the feasibility and advantages of self-supervised learning in the field of digital pathology, potentially setting a new standard for automated disease pattern recognition.	1.Self-Supervised Techniques: a).Implement cutting-edge self-supervised learning techniques, including context prediction, colorization, and contrastive learning, to learn meaningful and discriminative representations of pathology images. b).Experiment with various self-supervised pretext tasks to optimize the feature extraction process for different pathology image datasets. 2. Segmentation Models: a). Utilize the learned representations to develop sophisticated segmentation models capable of accurately delineating regions of interest within pathology images. b). Integrate these models with existing pathology analysis pipelines to streamline the segmentation process. 3. Evaluation and validaiton: a). Validate the segmentation results using expert annotations to ensure clinical relevance and accuracy. b). Perform comprehensive comparisons between self-supervised learning-based segmentation models and traditional supervised learning-based models to assess performance improvements. c). Analyze the robustness of the models across different datasets and pathological conditions.		Unspecified	BII	YU Weimiao	Bioinformatics Institute 30 Biopolis Street #07-01 Matrix Singapore 138671	Biomedical Sciences,Biomedical Sciences,Bioinformatics,Biomedical Engineering,Natural Sciences	2
320	Using AI for protecting quantum computers against noise	This project focuses on leveraging Artificial Intelligence (AI) to protect quantum computers against noise, which is one of the biggest challenges in achieving stable quantum computation. AI will be utilized to develop techniques for quantum error correction, error mitigation, and error suppression, creating more resilient quantum systems. By using AI-driven models, we aim to optimize the detection and correction of errors in quantum circuits, ultimately improving the performance and reliability of quantum computers	Students will gain a deep understanding of quantum error correction and mitigation techniques, as well as how to apply AI methods to tackle real-world challenges in quantum computing. They will also develop skills in programming and deploying machine learning algorithms, experience in simulating quantum systems, and the ability to analyze and interpret complex data from quantum experiments	Conduct research on AI-based error correction and mitigation strategies in quantum computing	Background knowledge in quantum mechanics and quantum computing fundamentals	Unspecified	Q.InC	Bharti Kishor	FP1, C16-112	Physical Sciences,Computer Science,Physics	2
321	Using generative AI to uncover high strength lightweight high entropy alloys for structural applications	AI and Materials development for alloys	Metallugurical techniques for alloy characterization	Literature Survey, Experiemnt, Report Writing	Mechanical and Materials Science Background	Unspecified	IMRE	Ng Chee Koon	2 Fusionopolis Way, Innovis, Singapore 138634	Engineering and Technology,Materials Engineering	1
322	Utilization of microfluidics for discovery of antibody-based therapeutics against viruses and antimicrobial-resistant organisms	This project seeks to identify novel vaccine immunogens for combatting emerging and re-emerging infectious diseases. Droplet microfluidics is capable of enabling high-throughput functional studies of monoclonal antibodies. By analyzing the targets of such protective antibodies, the antigenic targets conferring protective functional activity can be identified. This project will be conducted at the A*STAR ID Labs, within a multidisciplinary lab environment with lab expertise in bioengineering, virus biology, and antibody biology.	Students will learn wet lab skills in virological and/or bacteriological assays, antibody discovery wet lab and bioinformatic workflow, and biochemical interaction analysis. Students will also learn scientific critical thinking and presentation skills.	Students will be responsible for both wet lab experimentation under the guidance of a full-time staff, as well as experimental record-keeping, data analysis, and presentation of results.	Wet lab skills (cell culture, molecular biology) preferred.	3	ID Labs	Matthew Tay	#05-13, 8A Biomedical Grove, Immunos, Singapore 138648	Biomedical Sciences,Microbiology,Biomedical Engineering	1
323	Virtual Fortress: Strengthening Cybersecurity for AR/VR in Manufacturing through Simulation	Exploratory project focusing on exploring and addressing security risks with AR/VR headsets in manufacturing and use case and attack demonstration using simulation tools.	Learn cybersecurity fundamentals, application of AR/VR technology, acquire skills to use tools for simulating cyber-physical environments. Research on cybersecurity challenges for AR/VR and learn about manufacturing environments.	Student will be responsible for a simulator subsystem development with guidance from supervisor. Should demonstrate independence in exploration and self motivation to learn fast and acquire skills in the relevant area. Guided research on specific cybersecurity threats related to AR/VR technologies in manufacturing, such as data breaches and equipment tampering. Create a versatile, scenario-driven simulation framework using open-source tools that replicate AR/VR applications in manufacturing settings. Demo and final report at completion	Foundational understanding of cybersecurity and AR/VR technologies, programming skills (C#), and familiar with scripting for interactive scenarios. Understanding of manufacturing/factory floors is not necessary but a plus. Self motivated, teamplayer, interested in research. (Project requires minimum 4 months of attachment duration)	2	I2R	Anku Adhikari	1 Fusionopolis Way, Connexis, Singapore 138632	Computing and Information Sciences,Computer Science,Electrical and Electronic Engineering	2
324	Wind-assisted ship propulsion for sustainable commercial shipping	This study will investigate the feasibility of wind-assisted propulsion technologies as a mean towards greener shipping. In particular, the study will gather historical meteorological and oceanographic conditions of a few busiest shipping routes and estimate the maximum energy that can be harvested from energy-saving devices for each route. The results can be useful for shipping companies when deciding if an investment makes sense and/or whether wind-assisted propulsion is feasible for the routes that they operate.	1. Understand the motivation behind the resurgence of wind-assisted propulsion technologies under the context of net-zero emissions by 2050 2. Apply data-driven methods to quantify the benefits of wind-assisted propulsion systems to aid decision-making	1. Identify seasonal route patterns between any given port pair 2. Extract the corresponding weather conditions along common routes 3. Estimate the fuel savings with wind-assisted propulsion under various weather conditions and seasons.	1. Python for data science is a must 2. Prior experience with spatial data processing is a plus	Unspecified	IHPC	Kelvin Lee	1 Fusionopolis Wy, #16-16 Connexis, North Tower, Singapore 138632	Computing and Information Sciences,Computer Science	1
325	X-to-Power for the Utilization of Low-Carbon Energy	Synthesis of nanostructred catalysis, single atom catalysis. Preparation of homogenous complexes. Heterozenize homogenous complexes catalysts with suitable supports. Evalution of activity testing for prepared catalyst for CO2 conversion low carbon emmision products and biobased platform molecules to value addition.	Material syntheis, hands on activity evalution and anayltical tools. experince in green and sustainble chemistry	Conduct Activity performance, Study on project activity and material synthesis approach	Canditate should have strong interst in material chemistry. Also, he/she has background on chemical engineering/chemistry.	Unspecified	ISCE2	Amol Hengne	1 Pesek Rd, Jurong Island. 627833	Engineering and Technology,Chemical and Molecular Engineering	1