CENG Summer Research Internship 2025

Department	Project Title	Brief Project Description (50 - 100 words)	No. of Vacancy	Supervisor information	
				Name	email
Architecture and Civil Engineering	X-ray microtomography study on the micromechanics of sand	This project offers an excellent opportunity to the summer exchange students for their participation in the cutting-edge investigation of the micromechanics of granular soils using X-ray microtomography. The detailed research tasks may include: 1) CT image processing and analysis of sands; 2) development of image recognition and matching techniques for sand particles; 3) discrete particle tracking analysis of crushed particles; 4) DEM modelling based on CT results; 5) CT-based machine learning study.	6	Prof WANG Jianfeng Jeff	jefwang@cityu.edu.hk
	Development of force model for simulation of pedestrian movement and their interactions	Unlock the power of crowd simulation! Join our research group to learn how to build your own social force model from scratch. Move beyond theory and code a dynamic simulation that reveals how pedestrians navigate, collide, and evacuate under pressure. This training is your gateway to understanding complex systems, valuable for physics, computer science, and urban planning. Create a compelling visual of a crowd escaping a room and discover the scientist in you. No prior expertise needed—just bring your curiosity.	1	Prof LEE Wai Ming Eric	ericlee@cityu.edu.hk
	Carbon Neutrality in the Built Environment	This project explores carbon emissions in the transportation and building sectors (critical to built environment carbon neutrality) via life cycle assessment (LCA) tools. The student will receive systematic training and practical experience in literature review, data collection, data analysis, and research report writing—building a robust foundation for future work in sustainability or built environment research.	6	Prof LUO Xiaowei	xiaowluo@cityu.edu.hk
	Human-robot Collaboration	This project explores digital construction processes and the potential of human-robot collaboration. Students may engage in tasks like virtual model development, experiment design/conduct, data collection, experimental result analysis/interpretation, and report writing, fostering practical skills in construction innovation.	4	Prof LUO Xiaowei	xiaowluo@cityu.edu.hk
	AI for Construction	This project explores the integration of AI (computer vision, large language models, and machine learning) and digital twins to empower smart construction. We are looking for candidates with foundational programming knowledge, a curious mindset, and a strong drive to learn and apply emerging technologies in the construction sector.	6	Prof LUO Xiaowei	xiaowluo@cityu.edu.hk
	Building Energy Management	The project aims to investigate city - scale building energy management, devising advanced modelling tools for energy usage and mitigating carbon emissions through various technologies.	4	Prof LUO Xiaowei	xiaowluo@cityu.edu.hk
Biomedical Engineering	High-resolution functional brain imaging using light and ultrasound	The project focuses on using advanced imaging techniques to study brain activity. By combining optical and ultrasound methods, the project aims to achieve high-resolution imaging of the brain, providing detailed insights into brain function. Participants will engage in cutting-edge research, learning about innovative technologies and their applications in neuroscience.	2	Prof WANG Lidai	lidawang@cityu.edu.hk
	Assembly and manufacturing of biosensor systems for disease detection and monitoring	The project focused on assembling and manufacturing cutting-edge micro biosensor systems for rapidly detecting and monitoring diseases. This internship offers a unique opportunity to engage in hands-on experience with advanced technologies, collaborate with leading researchers, and contribute to real-world applications in healthcare. Students will gain invaluable skills in biomedical engineering, design processes, and system integration, preparing them for future careers in the dynamic field of biosensors and medical diagnostics.	2	Prof Bee Luan KHOO	blkhoo@cityu.edu.hk
	Imaging glucose utilization in the brain using magnetic resonance imaging (MRI)	Glucose is a major source of energy for the brain. Assessing its distribution and utilization in the brain plays an important role in understanding how our brain works. In this project, students will investigate the role of glucose in the brain using magnetic resonance images. Signals in MRI images could provide vast information about the brain, from structure to function to molecule. By studying the different types of MRI images of rodent brains, such as T1, T2, DTI, MT and CEST, students can develop various interesting ways to visualize the brain anatomy and glucose related events.	2	Prof Kannie CHAN Wai Yan	KannieW.Y.C@cityu.edu.hk
	Lipid nanoparticles for mRNA delivery	This project develops a formulation that can stabilize and protect mRNA. It will be used to deliver Luciferase and GFP mRNAs into cells and cell spheroids. The candidate will be responsible for the synthesis, purification, and testing of the formulations.	1	Prof XU Chenjie	chenjie.xu@cityu.edu.hk
	Microfluidic cell sorter for extracting critical functional cells	Precision medicine delivers the right drug to the right patient at the optimal time. Cancer treatment requires personalized approaches to address patient-specific and tumor diversity. Current single-cell assays focus on traits like size or surface markers, missing complex functions, and high-throughput options are lacking. Our project develops a microfluidic droplet screen (MDS) system to identify, isolate, and analyze rare functional cells, including aggressive, and metastatic subclones. MDS enables single-cell multi-omic profiling—combining transcriptomics, proteomics, and metabolomics—with machine learning and bioinformatics tools to uncover predictive biomarkers. This platform will advance precision molecular diagnosis and optimize cancer treatments by targeting cri	2	Prof Chia-Hung CHEN	chiachen@cityu.edu.hk
	Wearable biosensors for the detection of multimodal physiological information	In this project, we will investigate functional materials, such as carbon nanotubes, graphene, metal-organic frameworks, and conductive composite, from synthesis to performance characterization, to develop wearable biosensors with different manufacturing technologies. With the optimization on sensitivity and selectivity, the multimodal biosensors are expected to detect physiological information continuously, including body temperature, vital signs and sweat biomarkers.	1	Prof SONG Yu	yusong@cityu.edu.hk
	Single-molecule super-resolution imaging in live microbes for health and sustainable energy	Single-molecule super-resolution fluorescence microscopy is an advanced imaging technique with very high spatial and temporal resolution. Particularly, it is powerful in studying molecular mechanisms of critical biological processes in living bacteria. In this program, students will learn about this cutting-edge imaging technique together with many other experimental skills related to optical imaging, molecular biology and biomedical engineering. Based on their interests, students can choose projects related to infectious diseases or microbial biosynthesis for sustainable energy.	2	Prof FU Bing	bingfu@cityu.edu.hk
	Smart hydrogel for targeted cancer sonodynamic therapy	Sonodynamic therapy (SDT) utilizes ultrasound to directly activate sonosensitizers to generate reactive oxygen species (ROS). However, sonosensitizers that diffuse into healthy tissues may be accidentally excited to generate ROS, resulting in off-target toxicity. In this project, we will develop a smart hydrogel with tumor-confined ROS generation and stability for targeted cancer SDT.	2	Prof ZHANG Yong	yozhang@cityu.edu.hk
Electrical Engineering	RISC-V High-Level Synthesis and Architecture	This project focuses on the RISC-V High-Level Synthesis (HLS) and Architecture, aiming to optimize the design and implementation of RISC-V based systems. International Interns will explore advanced HLS techniques to convert high-level programming languages into efficient hardware descriptions. The project will involve designing, simulating, and verifying RISC-V architectures, emphasizing performance, power efficiency, and scalability. Participants will gain hands-on experience with state-of-the-art tools and methodologies, contributing to open-source RISC-V initiatives. This research will not only advance knowledge in computer architecture but also foster innovation in developing versatile, high-performance computing solutions. Ideal for students passionate about computer engineering and embedded systems.	2	Prof Ray Cheung	r.cheung@cityu.edu.hk
	Sports Performance Tracking and Analysis System	Develop computer vision algorithms to track atheletes' movements, and performance metrics in real-time. Using video analysis and machine learning, create automated tools to provide data-driven feedback for technique improvement and training optimization.	2	Prof Rosa Chan	rosachan@cityu.edu.hk
	Personalized Rehabilitation System for Stroke Survivors	Develop intelligent monitoring tools using computer vision and/or wearable sensors to track stroke patients' rehabilitation progress.	2	Prof Rosa Chan	rosachan@cityu.edu.hk
	Signal Processing for Neuromorphic Dynamic Vision Sensors	Traditional cameras are not well suited for deployment in IoT due to the high volume of data they produce,a lot of which is redundant since the change in scene is much less than frame rates. Hence, a new type of camera, inspired by human retinas have been developed. These neuromorphic cameras do not have frames -- instead, each pixel emits a pulse only if there is sufficient change in its contrast. Hence, pixels corresponding to background do not emit data while moving /changing parts of scene emit many events or pulses. There is a need to develop hardware friendly image processing algorithms for such cameras to enable low-power deployment in IoT. This project will explore algorithms such as noie removal and corner detection for these cameras.	1	Prof Arindam Basu	arinbasu@cityu.edu.hk

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	Neuromorphic Brain Machine Interfaces for Paralyzed patients	Implantable Brain machine interfaces (BMI) comprise technologies to read brain signals from a patient and use it to control an object. For paralyzed patients, these devices can allow motor prosthesis and allow the patients to move wheelchairs, or artificial arms or computers. To increase the dexterity of hand movement such as for tying shoelaces or buttoning a shirt, we need more fine grained brain data from more neurons. To make the implant comfortable, it also needs to be devoid of wires and emply wireless transmission. The increasing datarate from more channels poses a serious challenge in terms of power dissipation and bandwidth of wireless implants --hence, we need some form of compression. Neuromorphic sensing is a strategy where the sensor channels detect changes in the signal and only report events/pulses for changes in the signa exceeding a threshold. In this project, we will explore the possible compression achievable by applying such principles to BMIs by using pre-recorded brain data. Further, the effect of such compression on further signal processing blocks such as spike detection and spike sorting will also be explored	1	Prof Arindam Basu	arinbasu@cityu.edu.hk
	Energy-Efficient & Reconfigurable ADC using In-memory Computing	With the advent of deep neural networks over the last decade, it has become ever important to develop dedicated hardware to implement these networks with low-power and latency. The biggest bottleneck in implementing such systems with traditional computers is the von-Neumann bottleneck in accessing the memory. Hence, a new pardigm termed Compute In-Memory (CIM) has emerged where basic neural network operations are mapped to conventional memory blocks. In this project, the student will learn about volatile memory cells such as SRAM and how neural network operations like dot product can be mapped to memory arrays. It will involve simulation of circuits using IC design software such as Cadence.	1	Prof Arindam Basu	arinbasu@cityu.edu.hk
Materials Science and Engineering	Molecular Dynamics and Machine Learning Study of Lipid-Based Cartilage Lubrication	Cartilage surfaces in synovial joints exhibit ultralow friction (≈10^{-5}), unmatched by synthetic materials. With aging, this lubrication fails, causing osteoarthritis—an incurable disease affecting mobility and quality of life. While current treatments offer temporary relief, they do not restore natural lubrication. Lipid-based intra-articular injections have recently shown superior clinical efficacy, yet the molecular origins of lipid-mediated lubrication remain unclear. This internship will train students in molecular dynamics (MD) simulations and machine learning analysis to study mixed-lipid membranes. Participants will gain experience using high-performance computing, job scheduling, and data processing with BASH, Python, and MATLAB.	2	Prof JIN Di	dijin23@cityu.edu.hk
	Design of high strength and high toughness titanium alloy	The project intends to tune the composition of titanium alloy to trigger massive twinning and dislocation slip to simultaneously enhance the strength and fracture resistance of titanium alloy. The student will involve in alloy composition design and sample fabrication, mechanical behaviour investigation and microstructural characterization under the guidance of supervisor and team members.	1	Prof HAN Weizhong	w.z.han@cityu.edu.hk
	Design and preparation of radiative coolers for compact electronics	This project addresses challenges of heat dissipation in compact electronics via radiative cooling (RC), a passive, zero-energy cooling technology. It integrates optical-thermal modeling to design and fabricate high thermal conductivity, near-unity emissivity coolers using composite materials with SiC or graphene as filler. Performance is assessed in simulated electronic environments, compared with traditional methods to formulate effective RC strategies. Duration: June to August 2026. Expected outcomes include RC design methods, evaluation frameworks, and one academic paper.	1	Prof LEI Dangyuan	dangylei@cityu.edu.hk
	Patterning of functional materials via plasmonic photothermal printing	This project will apply a plasmonic printing method to pattern metal-oxide (MO) thin films. It uses femtosecond-laser-excited silver nanowires to generate photothermal local heating, enabling the fabrication of high-performance MO thin films at room temperature and in ambient air, without the need for photoresists or high-temperature annealing. Participants will learn the fundamental principle of plasmonic effects and gain experience in materials preparation, femtosecond laser processing system operation, and optical and electrical characterizations of materials.	1	Prof LEI Dangyuan	dangylei@cityu.edu.hk
	Screening and Design of Single- and Dual-Atom Catalysts for CO2 Reduction	In response to carbon neutrality goals, catalytic conversion of CO2 into high value products is a key strategy. Single- and dual-atom catalysts offer tunable active sites with high selectivity, making them a research hotspot. This project focuses on building a comprehensive database and developing machine learning (ML) models for catalyst screening and design. In this project, students will collect and clean data from multiple dimensions, construct a systematic single/dual-atom catalyst database, and apply ML or deep learning algorithms to explore the role of computation in materials science.	1	Prof SHEN Bo	boshen@cityu.edu.hk
Mechanical Engineering	Smart Adhesives Using Liquid Crystal Elastomers with Tunable and Reversible Adhesion	This project aims to develop a smart adhesive based on the unique soft elasticity of liquid crystal elastomers (LCEs). The adhesive can achieve strong adhesion to both smooth and rough surfaces while enabling controlled and easy detachment. Potential applications include precision gripping systems, wearable devices, and other engineering scenarios that require high-performance, reversible adhesion. Participants will have the opportunity to gain hands-on experience in material synthesis, numerical simulation, and experimental design.	3	Prof Changhong LINGHU	clinghu@cityu.edu.hk
	Exploring the secrets of adhesive lifetime	Adhesives are commonly encountered in nature, industry, and daily life. However, people have been puzzled by how long an adhesive can stick to a wall. The lifetime of adhesion fundamentally determines the service life and reliability of the systems in which they are used. This project aims to explore the secrets of adhesive lifetime experimentally, and to develop a cross-timescale theoretical framework for adhesion lifespan by incorporating viscoelastic and soft-elastic effects, enabling more accurate prediction of adhesive performance under various conditions. The outcomes will provide guidance for designing more durable adhesive systems and give participants insight into the underlying mechanics of adhesion and detachment.	3	Prof Changhong LINGHU	clinghu@cityu.edu.hk
	Design and fabrication of bioinspired smart adhesives using shape memory polymers	This project aims to design and fabricate bio-inspired smart adhesives that combine strong attachment and easy detachment capabilities. Drawing inspiration from natural adhesion mechanisms found in snails and barnacles, the study will utilize shape memory polymers (SMPs) with reversible phase-transition properties to achieve switchable adhesion. The developed SMP-based smart adhesives will be integrated into robotic grippers to enable adaptive, controllable, and reusable grasping for advanced manipulation applications.	3	Prof Changhong LINGHU	clinghu@cityu.edu.hk
	Flexible microstructured arrays for vision-based sensing	This project introduces students to the design and fabrication of flexible microstructured arrays—tiny patterns on soft materials that can “see” and “feel” mechanical touch through optical signals. Students will learn how deformation of these structures’ changes reflect light, allowing a camera to detect pressure or motion. By combining basic molding techniques, mechanical testing, and ready-to-use optical and image processing system, participants will build a prototype vision-based tactile sensor. The project blends creativity and engineering, showing how soft materials and optics can work together to enable future robotic and interactive sensing technologies.	3	Prof Changhong LINGHU	clinghu@cityu.edu.hk
	Drop splashing and thin-film rupture	This project welcomes students interested in fluid dynamics and optical microscopy. Participants will use high-speed imaging techniques to investigate the dynamics of drop splashing and thin-film rupture.	1	Prof Jack Hau Yung Lo	jack.lo@cityu.edu.hk
Systems Engineering	System modelling and analysis with applications	This project focuses on building simple system block diagram and carrying out some analysis. It can be used to investigate and study the importance of system components.	1	Prof XIE Min	minxie@cityu.edu.hk
	Data Driven approaches for quality prediction	Investigate the data-driven approaches that can be used for quality related monitoring and for prediction.	1	Prof XIE Min	minxie@cityu.edu.hk
	Generative AI for 3D Printing	This project aims to explore the capabilities of generative AI in the design for additive manufacturing. Students will use generative AI to create novel, functional structures optimized for 3D printing and additive manufacturing.	2	Prof LUO Jianxi	jianxi.luo@cityu.edu.hk
	Flying Car Design & Assembly	The visiting student will join a team of CityUHK students from different departments to design and fabricate an electric vertical take-off and landing vehicle (eVTOL).	2	Prof LUO Jianxi	jianxi.luo@cityu.edu.hk

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	A deformed mirror by acoustic field	The project will design and construct a deformed mirror surface using piezoelectric actuators. The idea is to shape light using sound. The deformed mirror will also be tested for adaptive optics applications in imaging and material processing. Students with background and interest in applied physics, optics, mechanical or electrical engineering are welcomed to apply.	1	Prof DU Xiaohan	xiaohadu@cityu.edu.hk
	Vehicle Detection and Tracking using CCTV Images In Intelligent Transportation Systems	Metropolitan areas, such as Hong Kong, feature a high-penetration rate of CCTV surveillance cameras distributed across the road networks. A smart operation of this sensing infrastructure will significantly enhance the traffic agency's real-time situational awareness. This project aims to leverage computer vision and large language model technologies to detect and track individual vehicle on each road segment using live CCTV video frames. The objective is to etimate the traffic volume using the processed traffic data. Applicants experienced in YOLO and StongSORT are preferred.	2	Prof LI Tao	li.tao@cityu.edu.hk