CENG Summer Research Internship 2027

Department	Project Title	Brief Project Description (50 - 100 words)	No. of Vacancy	Supervisor information	
				Name	email
Architecture and Civil Engineering	Thermal battery for advancing building energy flexibility	Thermal energy storage (THS) is critical to flexible and low-carbon building operation. Yet practical adoption of THS has been constrained by a fundamental challenge: existing LHTES systems are often difficult to scale and commonly lack the heat-transfer capability needed for high-power operation due to PCMs' low thermal conductivity. In this project, we will introduce a battery–module–system architecture for LHTES and develop a microchannel thermal battery as its core building block. By combining modular scalability with compact, high-rate thermal storage, we will advance thermal battery design for flexible building energy use and decarbonization.	2	Prof HUANG Gongsheng	gongsheng.huang@cityu.edu.hk
	Activity-Based Modelling for Healthy and Sustainable High Density Cities	High density cities provide a unique context for studying the complexity and diversity of people's daily activity patterns. Through an activity-based modelling approach, the project offers students an opportunity to explore how everyday activities relate to environmental conditions and health. Students will gain hands-on research experience through field data collection and analysis. The project will generate an integrated dataset and deepen students' understanding of urban dynamics from a behavioural perspective. It will also provide valuable insights into the development of healthier and more sustainable cities.	5	Prof WANG Qian-Cheng	qc.wang@cityu.edu.hk
	AI Adoption and Oversight in Urban Governance and Management	This project explores how city governments around the world adopt and oversee artificial intelligence in urban planning, public services and government operations. Students will identify documented AI applications, review policy and project materials, and compare organizational responsibilities, implementation support and oversight arrangements. They will contribute to a structured case database and prepare short comparative case studies, with opportunities to focus on particular regions or application areas.	5	Prof YANG Juncheng	juncyang@cityu.edu.hk
	Carbon Neutrality in the Built Environment	This project delves into the transportation and building sectors—the cornerstone of achieving carbon neutrality in the built environment. Using life cycle assessment (LCA) tools, students will gain hands-on experience in conducting literature reviews, collecting and analyzing data, and writing research reports. By contributing to pressing sustainability challenges, participants will develop a strong foundation for future careers in sustainable engineering and built environment research.	3	Prof LUO Xiaowei	xiaowluo@cityu.edu.hk
	Human-Robot Collaboration	Discover the future of digital construction through human-robot collaboration. This cutting-edge project offers opportunities to engage in virtual model development, experiment design, data collection, and result interpretation. Students will enhance their practical skills in implementing innovation within construction while contributing to transformative advancements in robotics-integrated workflows.	3	Prof LUO Xiaowei	xiaowluo@cityu.edu.hk
	AI for Construction and Asset Management	This project explores the intersection of artificial intelligence—spanning computer vision, large language models, and machine learning—and digital twins to revolutionize smart construction and asset management. Ideal for students with programming expertise and a passion for innovation, this opportunity nurtures curiosity and fosters skill development in applying emerging AI technologies to modern construction challenges.	3	Prof LUO Xiaowei	xiaowluo@cityu.edu.hk
	Building Energy Management	Shape the future of urban sustainability by developing advanced modeling tools for city-scale building energy management. This project focuses on optimizing energy usage and reducing carbon emissions by leveraging innovative technologies, offering students the opportunity to contribute to practical, impactful solutions for global energy challenges.	3	Prof LUO Xiaowei	xiaowluo@cityu.edu.hk
	Embodied AI	This project aims to use large-scale first-person vision data to build low-cost, highly realistic, and geometry-accurate (mesh) simulation world models. These models will support pre-training foundational AI for indoor and outdoor navigation and object manipulation or fine-tuning for specific tasks. Ideal candidates are skilled in ROS, Python, reinforcement learning, imitation learning, and edge-based model deployment.	3	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. Lidai WANG	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 Wai Yan CHAN	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. Chenjie XU	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 critical cellular subpopulations.	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.	2	Prof Yu SONG	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 Bing FU	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 Yong ZHANG	yozhang@cityu.edu.hk
Electrical Engineering	Electrical Vehicle Smart Charging and Market Uptake Studies	Electric vehicles (EVs) play a key role in reducing emissions from the transportation sector, the second-largest global emitter. However, widespread EV adoption can strain power grids if charging demand is unmanaged or if electricity infrastructure lacks capacity. This project examines EV market uptake to develop a statistical adoption model, combined with an analysis of charging impacts under various strategies and grid conditions. Student(s) will study the market uptake of EVs in selected cities to develop market uptake model. Different EV chargig strategies will also be developed to consider maximizing the benefits of EVs and minimize the impact on the electricity grid. Programming with Python or Matlab is required; Excel based data analytics will also be required.	2	Prof DONG Zhao Yang	zydong@cityu.edu.hk
	SRAM In-memory computing for High efficiency Neural Network IC-1	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.	2	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. Depending on student interest, circuits to implement these sensing or In-memory computing circuits for spike detection may also be explored	1	Prof Arindam BASU	arinbasu@cityu.edu.hk
	Image processing for Neuromorphic event cameras	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
	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 while 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
	Hardware Architecture and Acceleration for Post-Quantum Cryptography (PQC)	This project focuses on the microarchitectural design and hardware acceleration of domain-specific coprocessors for Post-Quantum Cryptography (PQC). Hosted by the Architecture Laboratory for Arithmetic and Security (CALAS) at CityUHK, this internship offers international students hands-on experience in addressing next-generation hardware security challenges as computing systems transition to quantum-resistant standards. Participants will engineer Register-Transfer Level (RTL) architectures using Verilog/SystemVerilog, translating complex PQC algorithms like lattice-based primitives into high-performance, energy-efficient hardware modules on FPGA platforms. Interns will gain direct experience in custom arithmetic design, simulation, and FPGA prototyping alongside CALAS researchers.	2	Prof Ray Cheung	r.cheung@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
Mechanical Engineering	Development of an OpenFOAM-Based CFD Solver for Metal Additive Manufacturing: Melt-Pool Dynamics and Solidification	This project develops an OpenFOAM-based CFD solver for metal additive manufacturing, coupling heat transfer, phase change, free-surface flow, and surface tension/Marangoni effects. Students will implement laser/electron-beam heat sources, melt-pool solidification, dynamic mesh refinement, and prototype GPU acceleration for selected kernels. Benchmark validation and documentation are included. The project builds skills in numerical methods, fluid mechanics, HPC, and advanced manufacturing.	4	Prof. WANG Lu	lu.wang@cityu.edu.hk
	Simultaneous Magnetic Finishing of Inner and Outer Surfaces of Metallic Tubes	This project aims to develop a magnetic finishing method for simultaneously polishing the inner and outer surfaces of thin-walled metallic tubes. Students will design and fabricate novel polishing tools using 3D printing technologies and conduct preliminary finishing experiments. The main challenge is to achieve balanced material removal on both surfaces, preventing excessive polishing of the outer wall while ensuring effective finishing of the inner wall. The project involves tool design, experimental testing, and surface roughness evaluation.	1	Prof. ZHANG Jiong	jiong.zhang@cityu.edu.hk
	Design and Development of an Electromagnetic Actuation Module for Magnetically Driven Internal Finishing	This project aims to design and develop an electromagnetic actuation module for Magnetically Driven Internal Finishing (MDIF). Students will design and assemble a prototype using electromagnets and basic electronic components, and use Arduino programming to control the magnetic actuation. Through simple experiments, students will investigate how different control settings affect the rotation and movement of a spherical magnetic polishing tool inside confined spaces. The ultimate goal is to achieve fast and controllable tool rotation along internal surfaces, improving the flexibility and precision of the MDIF process.	1	Prof. ZHANG Jiong	jiong.zhang@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
	Reliability of AI systems	AI systems must perform consistently across changing conditions. This project will investigate some of the issues of AI system reliability, with the aim to help evaluate and improve AI implementations in real systems.	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. Jianxi LUO	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. Jianxi LUO	jianxi.luo@cityu.edu.hk
	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
	Process-Continuity-Aware Multi-Agent Reinforcement Learning for Joint Radio–Compute Orchestration in Industrial O-RAN	This project investigates process-continuity-aware multi-agent reinforcement learning for joint radio and edge-compute resource allocation in industrial O-RAN (open radio network). It addresses how consecutive deadline failures can disrupt industrial operations, a consequence that average latency and deadline-satisfaction metrics may overlook. The proposed framework incorporates failure history, application-specific tolerance, and resource constraints into allocation decisions, supported by a lightweight action filter. Simulation experiments will assess whether the approach reduces process interruptions and downtime while sustaining useful task completion and efficient resource utilization.	2	Prof. LI Tao	li.tao@cityu.edu.hk