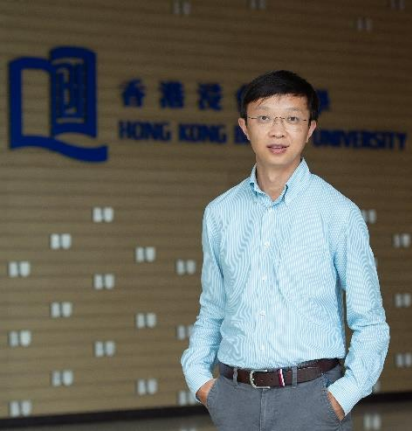


Project Abstracts for PhD Student Recruitment AY2025/26

Department of Computer Science

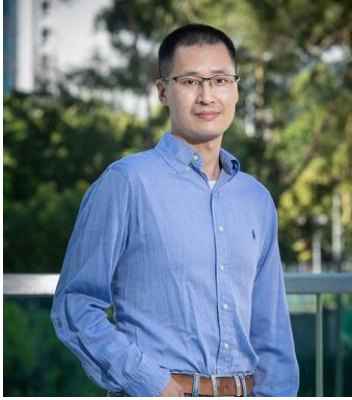
Project title	Improving the Performance of Extended Reality (XR) Systems	
Keywords	<i>Performance Optimization, Internet of Things, Bug Fixing</i>	
Project abstract	<p>Extended reality (XR) comprehends virtual reality (VR) and augmented reality (AR) to provide users with an immersive Mixed Reality (MR) experience. Despite the proliferation of extended reality (XR) devices, they also pose critical performance challenges and security concerns. To address these challenges, this project aims to investigate novel approaches to optimize system performance and mitigate the security issues of XR systems.</p>	


A portrait of Dr. DAI Hong-Ning, a man with glasses wearing a light blue button-down shirt and grey trousers. He is standing in front of a background featuring the Hong Kong Baptist University logo and name in Chinese and English.


Dr DAI Hong-Ning


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Learn more:
<https://scholar.google.com/citations?user=20aqGSoAAAAJ>

Project title		Towards Trustworthy Machine Learning and Reasoning with Foundation Models: Algorithm, Theory, and System	
Research Clusters	<input type="checkbox"/> Creative Media/Practice <input type="checkbox"/> Health and Drug Discovery <input checked="" type="checkbox"/> Data Analytics and Artificial Intelligence in X <input type="checkbox"/> Humanities and Cultures	 <p>Dr HAN Bo</p> <p><i>Email address:</i> bhanml@comp.hkbu.edu.hk</p> <p><i>Learn more:</i> https://bhanml.github.io/</p>	
Keywords	<i>Trustworthy Machine Learning; Machine Reasoning; Foundation Models; Large Language Models; Vision Language Models.</i>		
Project abstract	<p>We focus on the frontier research topics of trustworthy machine learning and reasoning with foundation models. Our mission is to approach system-2-level machine intelligence, enabling us to tackle challenges such as complex reasoning and strategic planning while accelerating discoveries in scientific fields like mathematics, biology, and chemistry. To reach these goals, we focus on developing innovative algorithms, mathematical theories, and efficient systems. We will delve into the latest technologies, including in-context learning, alignment post-training, unlearning, tree searching, retrieve-augmented generation, causal inference, and agent systems.</p>		

Project title		NLP and LLM: Fact-Checking, Multimodal Toxicity Detection and Coding	
Research Clusters	<input type="checkbox"/> Creative Media/Practice <input type="checkbox"/> Health and Drug Discovery <input checked="" type="checkbox"/> Data Analytics and Artificial Intelligence in X <input checked="" type="checkbox"/> Humanities and Cultures	 <p>Dr MA Jing</p> <p>Email address: majing@hkbu.edu.hk</p> <p>Learn more: https://majingcuhk.github.io/</p>	
Keywords	<i>Natural Language Processing; Large Language Model; Social Media Analytics; Verification; Safety</i>		
Project abstract	<p>We focus on the downstream research tasks of Natural Language Processing (NLP), Large Language Models (LLMs) and Vision Language Models (VLM). Key research areas include Fake News Detection, Rumor Verification, Rumor Stance Detection, Harmful Meme Detection, and Sarcasm Identification. Some projects aim to enhance the credibility of fact-checking systems by integrating text-based and image-based content analysis. Some projects investigate the development and evaluation of coding capabilities of LLMs, focusing on creating coding benchmarks and refining evaluation criteria to assess performance across programming tasks. This interdisciplinary work contributes to improving the reliability and safety of NLP systems across domains.</p>		

Project title		Online Network AI	
Research Clusters	<input type="checkbox"/> Creative Media/Practice <input type="checkbox"/> Health and Drug Discovery <input checked="" type="checkbox"/> Data Analytics and Artificial Intelligence in X <input type="checkbox"/> Humanities and Cultures	 <p>Dr WANG Juncheng</p> <p><i>Email address:</i> jcwang@hkbu.edu.hk</p> <p><i>Learn more:</i> https://www.juncheng-wang.com/</p>	
Keywords	<i>Artificial Intelligence, Networking, Distributed Machine Learning, Online Optimization, Communication Systems</i>		
Project abstract	<p>Modern artificial intelligence (AI) heavily relies on centralized data and computing power, overwhelming single servers. This research proposes decentralized machine learning to reduce data and computation burdens, promoting efficient and scalable AI across networks. However, network AI faces the challenge in adapting to various network dynamics, such as streaming data, communication channels, and network topologies. This research advocates for online optimization to effectively manage these variations while ensuring reliable AI performance.</p>		

Project title		Vector Similarity Search for Retrieval Augmented Retrieval (RAG)	
Research Clusters	<input type="checkbox"/> Creative Media/Practice <input type="checkbox"/> Health and Drug Discovery <input checked="" type="checkbox"/> Data Analytics and Artificial Intelligence in X <input type="checkbox"/> Humanities and Cultures	 <p>Prof XU Jianliang</p> <p>Email address: xujl@comp.hkbu.edu.hk</p> <p>Learn more: https://www.comp.hkbu.edu.hk/~xujl/</p>	
Keywords	<i>Vector Database, Generative AI, Big Data, Similarity Search</i>		
Project abstract	<p>Vector similarity search is crucial in various AI applications, including natural language understanding and recommendation systems. The rise of generative AI technologies, such as ChatGPT, has heightened the demand for efficient similarity search in high-dimensional spaces, particularly in Retrieval-Augmented Generation (RAG). However, challenges arise due to the curse of dimensionality, which complicates accurate and efficient searches. This research project aims to explore innovative approaches to enhance vector similarity search, focusing on improving retrieval accuracy and efficiency within RAG frameworks.</p>		