Personal Statement

Dear Admissions Committee of the Hong Kong University of Science and Technology (HKUST),

I am writing to express my strong interest in pursuing a direct Ph.D. in Robotics and Control Systems at HKUST. With a solid academic foundation, extensive project experience, and a deep passion for robotics and intelligent systems, I am eager to contribute to and thrive in the cutting-edge research environment at your esteemed institution.

Academic Interests and Professional Background

Since my middle school years, I have harbored a profound interest in the fields of Electronic Engineering and Computer Science, coupled with an eight-year experience in algorithm competitions. Notably, I earned the first prize in the National Olympiad in Informatics (NOIP), a prestigious competition among the five major academic competitions for Chinese high school students, organized by the China Computer Federation (CCF). This experience not only honed my problem-solving skills but also ignited my passion for algorithms and their applications in real-world systems.

During my undergraduate studies, I systematically acquired a solid theoretical foundation through courses such as Signals and Systems (95), Electronic System Design (95), Computer Principles and Embedded Systems (93), Computer Networks (96), Data Structures and Algorithms (97), and Modern Communication Principles (94). These courses equipped me with a comprehensive understanding of both hardware and software, enabling me to approach complex engineering problems from a multidisciplinary perspective.

In the Robogame competition organized by my school, which involved over two hundred participants, I integrated algorithms with hardware to design an efficient, stable, and cost-effective vision solution and code, contributing to our team's championship victory and gaining extensive practical experience. These experiences have deeply convinced me that the intersection of Electronics and Computer Engineering is a pivotal force driving modern technological advancements, and it is also the direction I aspire to explore further in the future.

Research Interests and Project Matching

My research interests lie at the intersection of robotics, intelligent perception, and control systems. I am particularly fascinated by the challenges of multi-modal sensor fusion, autonomous decision-making, and edge computing in robotics. My previous projects have provided me with a strong foundation in these areas:

1. 2024 RoboGame Competition - Mining and Transport Robot

In this project, I led the development of a vision system using RGB cameras to identify and locate blocks in a dynamic environment. By leveraging brightness differences and area-based segmentation, I solved the challenge of picking stacked blocks. Additionally, I addressed collision avoidance by implementing hardware solutions, demonstrating my ability to integrate software and hardware for robust system performance.

2. VSLAM Deployment on RDK X5

I deployed VINS-Fusion (a tightly coupled visual-inertial odometry algorithm) on an RDK X5 board, achieving trajectory estimation with less than 1% cumulative error in natural texture environments. This project deepened my understanding of sensor fusion and optimization under computational constraints.

3. Agent-Based Digital Human Development

As part of a university innovation project, I explored the use of retrieval-augmented

generation (RAG) techniques to develop an industrial-focused digital human. This project involved dataset construction, model fine-tuning, and backend deployment, showcasing my ability to apply machine learning techniques to real-world industrial problems.

4. Password-Protected Remote Controller Design

Within a tight two-week deadline, I designed and implemented a remote control system with password protection, integrating hardware components such as an LCD screen, light sensor, and motor. This project highlighted my proficiency in embedded systems and rapid prototyping.

HKUST's Department of Electronics and Computer Engineering is renowned for its cutting-edge research in areas such as the Internet of Things, Artificial Intelligence, Machine Learning, Computer Vision, and Embedded Systems. I am particularly drawn to your department's work on robotic systems, intelligent IoT, and intelligent control algorithms. I believe that under the guidance of your esteemed faculty, I can transform my interests into impactful research outcomes.

Faculty Strength and Academic Atmosphere

HKUST's Department of Electronics and Computer Engineering is home to world-class faculty and researchers who have made significant contributions to their respective fields. The collaborative and innovative academic atmosphere at HKUST is ideal for fostering groundbreaking research. I am particularly inspired by the work of Professors [insert specific professors' names if applicable] in [specific research areas, e.g., robotic perception, edge AI, or autonomous systems]. I am eager to learn from and collaborate with these experts, contributing to the advancement of knowledge in robotics and control systems.

Career Planning and Future Development

In the long term, I aspire to become a researcher and innovator in the field of robotics, focusing on intelligent perception and decision-making systems. I plan to pursue a Ph.D. to deepen my expertise in algorithm-hardware co-design and apply my knowledge to solve real-world problems. HKUST's graduate program offers the perfect platform for this journey, with its strong emphasis on interdisciplinary research, industry connections, and preparation for future technological demands.

Conclusion

I am confident that my academic background, project experience, and passion for robotics align well with the research goals and values of HKUST. I am eager to contribute to the vibrant academic community at HKUST and to advance the frontiers of robotics and control systems. Thank you for considering my application. I look forward to the opportunity to join HKUST and embark on this exciting academic journey.

Sincerely,

Lingru Kong

28/02/2025