Teaching Statement

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I. EXPERIENCE

A. Teaching Assistantship

HKUST ELEC1030: The Rise of Autonomous Robots   Spring & Fall 2018

- Managed course logistics, including distribution of learning materials, assignment design, grading coordination, and weekly office hours/recitations.
- Co-designed and implemented a hands-on term project using the VEX Robotics Kit, enabling students to build and operate mobile robots and to integrate perception, control, and autonomy in a capstone demonstration.
- Developed clear evaluation rubrics and safety/operations guidelines to support reliable lab execution and fair assessment.
- The acknowledgment letter from an HKUST undergraduate advisee is shown in Fig. 1.

UCL COMP0244: Legged Robotics Systems   Spring 2025

- Prepared lecture slides and supporting notes on SLAM and path planning tailored to legged platforms, emphasizing state estimation, mapping, and motion planning under real-world constraints.
- Co-designed the majority of laboratory experiments on a real Unitree GO2 platform, including bring-up, perception/planning pipelines, and benchmarking tasks; labs and materials were maintained in a public repository[1] to ensure reproducibility.
- Established a ROS-based navigation framework, documentation, and starter code for simulation-to-hardware workflows, alongside grading rubrics and checklists for safe operation and consistent evaluation.
- Collaborated closely with Prof. Dimitrios Kanoulas, Prof. Chengxu Zhou, and Prof. Amir Patel to align hands-on labs with learning objectives and to iterate on assignments based on student feedback.

B. Mentoring Experiences

My mentoring experiences include:

- Supervised two UCL master's students in the COMP0132 course for their master's theses, with one student receiving a distinction grade. These works led to one paper published in IEEE ICRA 2025[2] and three papers currently under submission to IEEE ICRA 2026.
- Mentored one UCL RA on the UKRI RoboHike project, resulting in one paper published in IEEE ICRA 2025.
- Guided five visiting students and eight Ph.D. students at the HKUST, whose research has produced the following publications:
  - Two papers in IEEE ICRA 2024[3]
  - Two papers in IEEE IROS 2024[4]
  - Two papers in IEEE/ASME Transactions on Mechatronics (IEEE/ASME TMech)[5]
  - One paper in IEEE Transactions on Intelligent Transportation Systems (IEEE TITS)[6]
  - One paper in The International Journal of Robotics Research (IJRR)[7]
  - One paper submitted to IEEE Transactions on Robotics (IEEE TRO)[8]

My mentoring philosophy is to provide high–level guidance at pivotal moments while giving students the space to explore, make informed decisions, and enjoy the research journey. The goal is independence: to help students grow into researchers who can frame problems, design rigorous experiments, and chart their own paths. The greatest reward is witnessing their transformation into confident, self-reliant thinkers. In practice, I will structure early stages with clear milestones, reading plans, and code reviews, then progressively step back as students demonstrate ownership. I emphasize rigor and reproducibility: version control, experiment logging, and open artifacts, together with the systems-level mindset essential in robotics and AI. I also coach scientific communication and leadership by encouraging conference submissions, research talks, and near-peer mentoring. Acknowledgment letters from previous mentored students are listed in Fig. 2–6.

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[1] https://github.com/COMP0244-S25/comp0244-go2
[2] IEEE ICRA: IEEE International Conference on Robotics and Automation.
[3] IEEE ICRA: IEEE International Conference on Robotics and Automation.
[4] IEEE IROS: IEEE International Conference on Intelligent Robots and Systems.
[5] IEEE/ASME TMech: IEEE/ASME Transactions on Mechatronics.
[6] IEEE TITS: IEEE Transactions on Intelligent Transportation Systems.
[7] IJRR: The International Journal of Robotics Research.
[8] IEEE TRO: IEEE Transactions on Robotics.

II. Teaching Philosophy

Teaching undergraduate and graduate students in robotics and AI is a responsibility I value deeply. I use instruction to clarify core concepts and sharpen research goals. My courses welcome students from electronic engineering, computer science, and mechanical engineering, promoting an interdisciplinary grasp of robotics and AI. To extend learning beyond the classroom, I organize seminars and roadshows that showcase work in the related fields, highlighting practical impact and immersing students in real-world applications. I emphasize collaborative learning, critical debate, and rigorous evaluation. Students work in teams to break down theories, build and test ideas, and propose solutions to current research problems. This approach equips them to progress academically and contribute meaningfully to the field.

A. Undergraduate Teaching

I eagerly anticipate the opportunity to teach undergraduates in areas aligned with my research interests. I am prepared to offer courses in **C++/Python Programming**, **Computer Vision**, **Machine Learning**, and **Introduction to Mobile Robot and AI**. Among these courses, my most ambitious teaching endeavor involves leading a course on mobile robotics, a subject that combines mechanical design, circuit design, embedded systems, and advanced programming using knowledge from robotics, computer vison, and artificial intelligence. This dynamic course will culminate in a hands-on competition where students will be grouped to design and construct robots that will undergo various tests to earn scores. Such practical application of theoretical knowledge is designed to foster not only technical skills but also teamwork and problem-solving abilities.

Outstanding participants in this course will be encouraged to further their experience by joining prestigious competitions such as the National RoboCon[9] or RoboMaster[10]. I am confident that with proper guidance, undergraduates will develop the competencies in robotics necessary to undertake research projects that could lead to publication.

B. Graduate Teaching

At the graduate level, this course immerses students in advanced topics crucial to robotics and artificial intelligence, including state estimation, perception, optimization, planning, control, and machine learning. It is designed for students with a foundational background in linear algebra and programming. Throughout the course, students will engage in a hands-on project to develop an autonomous mobile robot. This practical approach is complemented by laboratory sessions, aligning with the course's goal of fostering a strong inclination towards research, particularly for those considering a Ph.D. The proposed project is structured across three terms:

- **First Term**: Students will build a mobile robot controlled via a remote. The robot will be equipped with a camera and an IMU, requiring careful calibration to function as intended.
- **Second Term**: The focus will be on developing algorithms for localization, perception, and planning. Students will apply these algorithms to enable the robots to autonomously navigate within a simulated environment, integrating the theoretical knowledge acquired in the course.
- **Final Term**: Students will implement their algorithms on physical robotic systems to evaluate the practical applicability of theoretical concepts. The course culminates with the students' robots autonomously completing a series of real-world tests. Students are encouraged to explore, test, and implement state-of-the-art algorithms recently published in the field and consider how to deploy these results on real-world robots to improve performance.

This structured approach not only deepens theoretical understanding but also enhances practical skills, preparing students to bridge the gap between academic theories and real-world applications.

III. Student Advising

As an advisor, I cultivate a lab culture that prizes curiosity and creativity [1]. I anchor mentoring in real-world robotics applications, guiding students to build or adapt tools that connect theory and practice. These hands-on projects prompt critical analysis and genuine innovation, often leading to new algorithms and insights. I hold regular one-on-one meetings to review progress, diagnose blockers, and set actionable milestones. To broaden their technical horizon, I lead weekly reading groups where students present and debate recent work in robotics, AI, and computer vision, strengthening both scholarship and collaboration. Beyond research, I coach professional skills: clear writing, effective presenting, reproducible workflows (version control and experiment logging), and networking, so students grow into confident, independent researchers prepared to contribute meaningfully to the field.

References

[1] S. A. Ambrose, M. W. Bridges, M. DiPietro, M. C. Lovett, and M. K. Norman, *How learning works: Seven research-based principles for smart teaching.* John Wiley & Sons, 2010.

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[9]https://www.cnrobocon.net

[10]https://www.robomaster.com/zh-CN

IV. APPENDIX: ACKNOWLEDGEMENT TO TEACHING

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THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

May 20, 2023

To Whom It May Concern,

I am writing to wholeheartedly recommend Dr. Jianhao Jiao for a professorship at your esteemed institution. As a former student under Dr. Jiao's guidance during a class called *ELEC1030: The Rise of Autonomous Robots*, I can attest to his exceptional teaching skills and dedication to student success.

Dr.Jiao helped me a lot during the final project of building a robot using the Vex Kit. His ability to explain complex concepts clearly and concisely enabled me to grasp and apply the underlying principles effectively. His teaching style is characterized by his approachability, patience, and willingness to provide guidance. He made himself readily available to answer questions and offer assistance, fostering an environment that encouraged open dialogue and active learning. His ability to break down complex tasks into manageable steps allowed me to develop a solid understanding of the subject matter and apply it to practical scenarios. Under Dr. Jiao's supervision, I and my teammates finally built up a gold mining robot and gain "A-" in the course's presentation.

In conclusion, I wholeheartedly endorse Dr. Jianhao Jiao for a professorship position at your institution based on his outstanding teaching skills. His ability to effectively communicate complex concepts, his approachability as a mentor, and his dedication to student success make him an exceptional candidate. If you require any additional information or have any questions, please feel free to contact me.

Sincerely,

Dr. Pang Cho Hei
chpangad@connect.ust.hk

Fig. 1. Acknowledgement letter from Dr.Pang Cho Hei at The Hong Kong University of Science and Technology.

v. Appendix: Acknowledgement to Mentorship

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To Whom It May Concern,

I am writing to formally express my gratitude and appreciation for the exceptional guidance and mentorship provided by Dr. Jianhao Jiao in my research journey. His deep knowledge and astute supervision have been instrumental in advancing and achieving success in my academic endeavors.

Under the mentorship of Dr. Jiao, my research focused on exploring camera exposure control for visual SLAM systems. Dr. Jiao's innovative techniques and meticulous scientific approach significantly expanded the scope and depth of our research.

Dr. Jiao excels in employing a supportive and collaborative approach to supervision. His skill in balancing directed guidance with personal independence has enabled me to enhance my analytical abilities and deepen my comprehension of the subject matter. His commitment to nurturing an environment of learning and research that promotes curiosity and critical analysis has been genuinely motivational. During our research, we faced numerous challenges, particularly in data collection and formulating research problems. Dr. Jiao offered strategic insights that significantly aided in overcoming these obstacles. His expertise was crucial in developing solutions that were both innovative and feasible. Whenever we encountered issues that were too complex for the team to resolve, Dr. Jiao was always ready to leverage his own resources, reaching out to relevant teams to address these challenges effectively.

Our collaborative efforts have yielded significant results, culminating in the publication of 4 papers that are either accepted or under review in prestigious conference and journals including IEEE International Conference on Robotics and Automation (ICRA), IEEE Transactions on Intelligent Transportation Systems (T-ITS), and IEEE/ASME Transactions on Mechatronics (T-MECH). These contributions have made a substantial impact in the field of robotics vision. These publications serve as a testament to Dr. Jiao's dedication to advancing knowledge and his commitment to mentoring emerging researchers in the field.

I am immensely grateful for Dr. Jiao's mentorship, which has been instrumental in my academic development. His guidance has not only enhanced my understanding of complex subjects but has also provided me with a robust set of analytical and research skills. I am confident that the knowledge and competencies I have acquired under his tutelage will prove invaluable in my future academic pursuits and beyond.

Sincerely,

Shuyang ZHANG
Ph. D. Candidate from The Hong Kong University of Science and Technology
szhangcy@connect.ust.hk

Shuyang Zhang

14 March 2024

Fig. 2. Acknowledgement letter from Mr.Shuyang Zhang at The Hong Kong University of Science and Technology.

香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

March 2, 2024

To Whom It May Concern,

As a PhD student who has worked closely with Dr. Jianhao Jiao over the past two years, I am writing this letter to express my sincere gratitude for the exceptional guidance and mentorship he has provided me throughout my research journey. His profound expertise and insightful supervision have been instrumental in shaping my academic growth and the success of my research endeavours.

Our joint research on innovative, cost-effective vision-based localization solutions for mobile robots has benefited immensely from Dr. Jiao's innovative and rigorous scientific approach. He has not only enriched the depth and breadth of our studies but also enhanced their relevance and impact within the robotics community.

Dr. Jiao's inspiring commitment to nurturing curiosity and critical thinking has created a remarkably supportive and collaborative research environment. I am deeply grateful for the way he skilfully encourages independence while providing essential guidance, which has significantly enhanced my analytical skills and understanding of complex technical subjects.

Dr. Jiao's strategic insights and expertise in multi-sensor mapping and localization were instrumental in overcoming research challenges, such as designing a multi-sensor synchronization solution and establishing reliable cross-modal data associations. Our collaborative efforts resulted in the publication of two papers in the prestigious IEEE International Conference on Robotics and Automation 2024, which not only make significant contributions to the fields of visual sensor control and vision-based localization for mobile robots but also underscore Dr. Jiao's dedication to advancing knowledge and nurturing the next generation of researchers.

The skills and insights I have gained under Dr. Jiao's mentorship are invaluable for my future academic pursuits, and I am deeply grateful for them. I am confident that Dr. Jiao's passion for research and excellence in mentoring will greatly benefit any academic institution. I wholeheartedly endorse him for any teaching role.

Sincerely,

Jinhao He
The Hong Kong University of Science and Technology (Guangzhou)
jhe438@connect.hkust-gz.edu.cn

Fig. 3. Acknowledgement letter from Mr.Jinhao He at The Hong Kong University of Science and Technology (Guangzhou).

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To Whom It May Concern,

It is with great pleasure and sincerity that I write this letter to recommend Dr. Jianhao Jiao, who has been an exceptional mentor and a guiding light in my research journey. His unwavering support, vast expertise, and strong leadership have not only enriched my academic experience but also shaped me into a more competent and confident researcher.

Dr. Jiao's unique taste in research directions and his ability to identify impactful work have been truly inspiring. He consistently encourages his students to think beyond trends and pursue meaningful, boundary-pushing research. This approach has instilled in me a deep appreciation for innovation and a drive to make significant contributions to the field of LiDAR-based robot localization and mapping. Throughout our collaboration, Dr. Jiao has demonstrated a remarkable ability to navigate challenges and provide strategic guidance. When faced with disappointing results or unexpected obstacles, his insightful advice and unwavering support have been invaluable. He possesses an uncanny ability to analyze complex problems, identify potential solutions, and guide his students towards success. His expertise in ground robot navigation, particularly in LiDAR-related localization and mapping, coding abilities, and research methodology, has been a wellspring of knowledge and inspiration.

One of the most admirable qualities of Dr. Jiao is his dedication to fostering a nurturing and intellectually stimulating research environment. He strikes a perfect balance between providing guidance and encouraging independence, allowing his students to develop their analytical skills and deepen their understanding of the subject matter. His door is always open, and he is ever-ready to offer valuable suggestions and constructive feedback, no matter how busy he may be. Under Dr.Jiao's mentorship, I have had the privilege of exploring the intricacies of LiDAR-based localization and mapping for ground robots, with a focus on addressing sensor degeneracy scenarios and uncertainty analysis in localization. His innovative approach and rigorous scientific methods have elevated the quality and impact of our research, leading to the publication of one paper in the prestigious 2024 IEEE Transaction on Mechatronics (TMECH) and one conference paper in IEEE IROS 2022.

Beyond his academic prowess, Dr. Jiao is a true leader and a role model for aspiring researchers. His passion for research, coupled with his genuine concern for his students' growth and well-being, creates an atmosphere of mutual respect, collaboration, and excellence. He has an innate ability to bring out the best in his students, encouraging them to push their boundaries and strive for greatness. As I reflect on my journey under Dr. Jiao's mentorship, I am filled with gratitude and admiration. The skills, knowledge, and research acumen I have gained under his tutelage will undoubtedly serve me well in my future academic endeavors. Dr. Jiao's impact on my life extends beyond the realm of research; he has instilled in me a lifelong passion for learning, a strong work ethic, and a commitment to excellence.

I wholeheartedly recommend Dr. Jianhao Jiao as an outstanding mentor, researcher, and leader. His exceptional guidance, unwavering support, and strong leadership make him an invaluable asset to any research team or academic institution. I am confident that he will continue to inspire and shape the minds of countless aspiring researchers, leaving an indelible mark on the field of robotics and beyond.

Sincerely,

Xiangcheng Hu
Ph.D. candidate
xhubd@connect.ust.hk

Fig. 4. Acknowledgement letter from Mr.Xiangcheng Hu He at The Hong Kong University of Science and Technology.

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April 25, 2024

To Whom It May Concern,

I am writing to express my profound gratitude and appreciation for Dr. Jianhao Jiao, whose outstanding mentorship has played a pivotal role in shaping my research career. His extensive knowledge and strategic guidance have been instrumental in elevating the quality of my scholarly work.

Under the mentorship of Dr. Jiao, our research team focused on complex challenges in the fields of autonomous robotic localization and navigational planning. Dr. Jiao's visionary leadership and unwavering commitment to scientific excellence significantly broadened and deepened our research endeavours.

Dr. Jiao excels in providing a nurturing yet challenging environment, skilfully balancing structured guidance with the freedom for independent exploration. This methodology not only enhanced my analytical abilities but also deepened my appreciation of the evolving landscape of contemporary research. Dr. Jiao's commitment to fostering an atmosphere that promotes intellectual engagement and critical analysis has been particularly enriching.

In addressing our research objectives, which involved advancements in conducting multi-sensor calibration, improving the accuracy and efficiency of SLAM algorithms, and integrating semantic information with the planning strategy, Dr. Jiao's expertise was crucial. His deep understanding of multi-sensor systems, SLAM, multimodal mapping, and navigation planning led us to develop innovative and practical solutions.

Our collaborative work under Dr. Jiao's guidance has resulted in the publication of three scholarly articles in prestigious conferences and journals, including IROS, TMECH, and TASE. These contributions have made a significant impact on the field of robotics mapping and navigation, highlighting Dr. Jiao's dedication to pushing the boundaries of academic research and his commitment to mentoring emerging scholars.

I am truly grateful to Dr. Jiao for his invaluable mentorship and am confident that the knowledge and insights I have gained under his tutelage will greatly benefit my future academic endeavours.

Sincerely,

Bowen Yang
PhD in ECE, HKUST
byangar@connect.ust.hk

Fig. 5. Acknowledgement letter from Mr.Bowen Yang at The Hong Kong University of Science and Technology.

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April 27, 2024

To Whom It May Concern,

I am pleased to express my deepest respect and gratitude for Dr. Jianhao Jiao, whose mentorship has profoundly influenced my academic and professional development. Dr. Jiao's extensive knowledge and meticulous guidance have played a critical role in my research achievements.

Under the mentorship of Dr. Jiao, our research focused on advanced sensor fusion techniques and multi-robot systems coordination. Dr. Jiao's innovative approach and rigorous scientific methods greatly enhanced the depth and breadth of our study.

Dr. Jiao's supervision style is characterized by a hands-on, supportive, and collaborative approach that perfectly blends theoretical instruction with practical application. His mentorship has been pivotal in honing my analytical skills and deepening my understanding of complex robotics systems. By encouraging a balance between guidance and independence, Dr. Jiao has fostered a research environment that not only challenges his students but also promotes their personal and academic growth. His commitment to nurturing curiosity and critical thinking among his mentees has profoundly impacted my approach to research and problem-solving in robotics.

Throughout the research process, we faced significant challenges, particularly in sensor calibration discrepancies and data integration complexities. Dr. Jiao's strategic insights were crucial in navigating these hurdles. His deep expertise in robotics, sensor technologies, and data analytics allowed us to develop innovative solutions that were crucial for our projects' success. For example, our work on extrinsic calibration of cameras and LiDAR significantly enhanced the accuracy of sensor fusion in autonomous systems, proving essential for advancing our research objectives.

The outcomes of our collaborative efforts under Dr. Jiao's mentorship have been notably fruitful. We have contributed multiple papers to prestigious journals and conferences, including the IEEE/ASME Transactions on Mechatronics (TMech) for our work on camera and LiDAR calibration, and IEEE IROS for our multi-sensor and multi-robot SLAM dataset. Additionally, we have submitted an extended version of our research to the International Journal of Robotics Research (IJRR), a top-tier global journal in the robotics. This submission highlights the high caliber of our collaborative research and Dr. Jiao's commitment to advancing the frontier of knowledge in robotics, while also nurturing emerging researchers in the field.

I wholeheartedly endorse Dr. Jianhao Jiao for any academic or professional endeavor he chooses to pursue. The expertise and skills I have acquired under his tutelage are invaluable assets that will undoubtedly enrich my future endeavors in academia and beyond.

Sincerely,

Hexiang Wei
HKUST MPhil Student
hweiak@connect.ust.hk

Fig. 6. Acknowledgement letter from Mr.Hexiang Wei at The Hong Kong University of Science and Technology.