Xinyuan Sam Qiao

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Education

M.A.Sc. in Aerospace Engineering (Robotics) — *University of Toronto Institute for Aerospace Studies*
Majored in Robotics — *September 2023 – Present*
Principal Investigator: Professor Timothy D. Barfoot
Research Topic: **Offroad Robot Autonomy using FMCW radar**
Teaching Assistant: AER301: Dynamics; ROB521: Mobile Robotics and Perception

B.A.Sc. in Engineering Science — *University of Toronto*
Majored in Robotics; Minored in Artificial Intelligence; Business Certificate — *September 2018 – June 2023*
Graduated with **High Honours**; AGPA: 4.00; CGPA: 3.86
Thesis Supervisor: Professor Angela P. Schoellig

Technical Skills

Programming	Python | C/C++ | ROS2 | MATLAB | Java | Verilog/FPGA | XML
Systems	Linux | Android | ARM Assembly | Universal Windows Platform | Embedded Systems
Research Focus	State Estimation | Radar Localization | Offroad Robot Autonomy | Indoor UWB

Academic Experience

Autonomous Space Robotics Lab — *September 2023 - Present*
Master of Applied Science Candidate — *University of Toronto Institute for Aerospace Studies*

- Investigating using radar as an alternative to LiDAR in **Teach & Repeat** for long-term robot autonomy
- Developed a Radar Teach & Repeat (RT&R) pipeline that uses radar as the only exteroceptive sensor
- Demonstrated sub-10 cm RMSE radar-based path-tracking accuracy in 20+ km of UGV field tests
- Published RT&R to **ICRA 2025**: **"Radar Teach and Repeat: Architecture and Initial Field Testing"**
- Co-authored in the collection of a **Multi-season Dataset** for robot navigation in the Forêt Montmorency

Dynamic Systems Lab — *July 2021 - June 2023*
Undergraduate Research Student — *University of Toronto*

- Collected ultra-wide band (UWB) TDOA data: **UTIL Dataset** for indoor localization co-authored in **IJRR**
- Learned to make customized Bolt quadrotors based on the **Bitcraze Crazyflie** hardware platform
- Reproduced UWB relative localization in simulation and experiments using **Extended Kalman Filter**
- **Thesis** on Multi-Quadrotor Cooperative Flight with UWB-aided Relative State Estimation and Control

Vector Institute for Artificial Intelligence — *May 2022 - August 2022*
Summer Research Intern — *MaRS Discovery District*

- Modelled UWB sensor noise as **Gaussian Mixture Model** (GMM) in dynamic cluttered environments
- Employed only IMU and UWB measurements to estimate the GMM noise parameters and the states
- Incorporated bi-level optimization in a slide window filter estimation framework with robust cost functions
- Contributed in the **GMM** results and methodology and published to **IROS 2023**

Industry Experience

Huawei Technologies Canada Inc. — *May 2021 - August 2022*
Human-Computer Interaction Application Assistant Engineer — *Professional Experience Year*

- Mastered Android **mobile application development** in Java
- Designed animated User Feedback Interface in XML for Android apps (using Android Studio)
- Set up a **Universal Windows Platform** for Tobii Eyetracker achieving **multi-modal** interactions on Android
- Prototyped a Python pipeline to evaluate users' real-time yoga poses, then converted it to an Android app
- Built custom Google **Mediapipe** Android library packages on Linux to deploy on Android phones
- Trained an online **Transfer Learning** pipeline for eye-tracking on Android using Tensorflow Lite models
- Delivered complete project demonstrations to the design executive teams in the Huawei headquarters