Sheng Qu

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SUMMARY

M.S. student at Carnegie Mellon University working on robot perception of humans and socially compliant navigation. I build LiDAR-based systems that measure real-world human behavior and learning-based controllers grounded in optimal control, probabilistic modeling, and physics-informed ML. Seeking robotics Ph.D. positions for Fall 2027.

EDUCATION

Carnegie Mellon University Pittsburgh, PA
M.S., Civil and Environmental Engineering • GPA 3.91/4.00 *Expected Dec 2026*

- Coursework: Computer Vision, Optimal Control & Reinforcement Learning, Physics-Informed Machine Learning, Machine Learning, Digital Twins & AI Predictive Analytics, Data Management
- Fall 2026: Deep Reinforcement Learning & Control (10-703), Introduction to Robot Learning (16-831), Visual Learning & Recognition (16-824), Robot Software Introduction (16-709)

Hohai University Nanjing, China
B.S., Environmental Science and Engineering • GPA 4.14/5.00 *2025* **University of British Columbia** Vancouver, Canada
Summer exchange, Jiangsu Provincial Scholarship • GPA 93/100

RESEARCH EXPERIENCE

Overhead LiDAR Sensing of Human Social Behavior CMU • NSF SAI #2425121
Advisors: Prof. Mario Bergés, Prof. Katherine Flanigan • hardware bring-up & algorithm design *2026–Present*

- Co-developed a ceiling-mounted dual-LiDAR pipeline for privacy-preserving, occlusion-robust measurement of pedestrian behavior in public space: Livox MID-360 sensors on Jetson edge nodes, ICP extrinsic calibration into a common frame, statistical background removal, clustering-based person detection, AB3DMOT-style multi-object tracking, and encounter detection between tracked individuals.
- Led hardware and deployment engineering: edge-node recording, campus networking, clock synchronization, and NAS archival; fused two-node system verified end to end, with deployment in CMU's Hunt Library underway (July 2026).
- Designed detection specifically for the overhead geometry, where pretrained autonomous-driving detectors transfer poorly to top-down point-cloud distributions — an underexplored sensing configuration.

Socially Compliant Robot Navigation in Simulation CMU
Team project • pedestrian behavior modeling & simulation realism *2026–Present*

- Design the pedestrian side of a Unity + ROS navigation simulator — personality variation, social group formations, and belief-state reasoning — so that navigation policies train against crowds that behave like real ones, narrowing the sim-to-real gap for socially compliant navigation.

PINN-Augmented MPPI Control for Quadrotors under Wind Independent project
Sole developer: dynamics model, controller, simulation, evaluation *2026*

- Built a quadrotor control stack in MuJoCo combining a residual physics-informed neural network that predicts aerodynamic disturbances with GPU-parallelized MPPI; achieved precise trajectory tracking under wind fields up to 8 m/s against a nominal-MPPI baseline.
- Modeled motor dynamics and aerodynamic drag; open-sourced with rollout, wind-field, and tracking-error visualization.

EARLIER RESEARCH

Undergraduate Thesis: Risk Assessment of Trace Antibiotics in Urban Lakes Hohai University
Multi-year field and laboratory campaign *2022–2025*

- Quantified 9 sulfonamide antibiotics across 7 urban lakes via UPLC-MS/MS and performed uncertainty-aware ecological risk assessment — early training in probabilistic inference from sparse, noisy real-world sensor measurements.

SKILLS

Programming: Python, C, MATLAB
Frameworks & tools: PyTorch, ROS 2, MuJoCo, OpenCV, NumPy/SciPy, Unity, Git, SQL, Jupyter
Methods: LiDAR perception (point-cloud detection & tracking), optimal control (MPPI), reinforcement learning, physics-informed neural networks, probabilistic modeling & Bayesian inference
Languages: English (proficient), Chinese (native)