Zhikai Zhang

CMU MSME-R | UBC ECE | Garmin Ltd. | Biorobotics Lab

Pittsburgh, Pennsylvania | zhikaiz@andrew.cmu.edu | website | +1 412-215-4666 | Github

Work Experience

CMU Biorobotics Lab: Research Engineer   **Oct 2024 - Present**
- Boosted pipe inspection robot stability by integrating vision-IMU sensor fusion with Kalman filtering, enabling reliable autonomous navigation in unstructured environments
- Improve hexapod locomotion RL by 150% with bio-inspired rewards across 5+ terrains in Isaacgym/sim

Garmin: Software Engineering Intern   **Jan 2019 – Aug 30th 2019**
- Reduced BLE mesh network latency by 87% via parameter optimization (relay depth, mesh config), improving communication speed for large-scale sensor systems
- Automated power testing and factory QA workflows for wireless sensor firmware

Research/Projects

CMU Biorobotics Lab Graduate research (ICRA Publication) | Distributed control, CPG, Firmware
- Improving distributed locomotion control performance by 31.3% with $P \ll 0.05$
- Led research on decentralized control algorithms enabling emergent gait behaviors and terrain adaptation using lightweight neuron-inspired CPGs.
- Reduce latencies and packet drops by 120% by efficient design of firmware and real-time control architecture across joint-level modules

Quadruped Planning and RL (CMU research) | RL, Motion planning, IssacGym, Deep Learning
- Increased motion success rate by 68% through goal-conditioned RL policies guiding agile maneuvers like jumping and climbing
- Integrated PRM & A* motion planning over RL skills; developed CNN-based cost prediction

Undergraduate Research Assistant:Human-Robot Learning (ACM THRI Publication)
- Developed a user teaching pipeline with ROS + Hololens + Unity, enabling intuitive demonstrations and unsupervised learning
- Achieved 210% improvement in trajectory generalization using BIC and trajectory smoothing

6 DOF Robot arm prototyping, control & trajectory planning | Robot dynamics/control, STM32
- Designed and built a 6DOF robotic arm (mechanical, electrical, control stack) using 3D printed parts and STM32H7 microcontroller
- Implemented PD+gravity compensation and MATLAB trajectory planning for real-time control

UBCThunderbots Electrical team lead (2019 Champion for Robocup SSL League Division B)
- Boosted comms throughput via FPGA-based SPI and WiFi firmware/hardware integration
- Developed low-level robot firmware and motion primitives, reducing software latencies

Publications

- Zhang, Z., Guo, S., Kou, H., Shikhare, I., Choset, H., & Li, L. ***Bio-inspired Distributed Neural Locomotion Controller (D-NLC) for Robust Locomotion and Emergent Behaviors.*** *In press., expected 2025*
- Sakr, M., Zhang, Z., Li, B., Zhang, H., Van der Loos, H.F.M., Kulic, D., & Croft, E. ***How Can Everyday Users Efficiently Teach Robots by Demonstrations?*** arXiv preprint arXiv:2310.13083.

Education

Carnegie Mellon University	**Pittsburgh, PA**
Master in mechanical engineering → GPA: 3.96	**2022-2024**
University of British columbia	**Vancouver, BC**
Bachelor of applied science → GPA: 3.5	**2016-2022**

Skills

Languages: C/C++, Embedded C, C#, Python, Verilog/VHDL/SystemVerilog, Assembly, matlab, Lua
Methods/Tools: MPC, Reinforcement/Deep learning, Motion planning, IsaacLab/Gym, ROS