Zhikai Zhang

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

CMU Biorobotics Lab: Research Engineer **Oct 2024 - Present**

- State estimation and control of pipe inspection robot with CV + IMU + Kalman Filter
- RL and Sim2Real distillation for legged modular robot locomotion with depth Camera (IsaacLab/Gym)

Garmin: Software Engineering Intern (Embedded) **Jan 2019 – Aug 30th 2019**

- Test app for large scale ble mesh network, improving test automation, ease of use and performance of BLE mesh network under test.
- BLE mesh firmware performance tuning (# of data relays, mesh network settings etc.)
- Wireless sensors and test automation for power consumption analysis

Projects/Research

CMU Biorobotics Lab Graduate research (ICRA Publication) | Distributed control, CPG, Firmware

- Spearheaded Neural inspired distributed control research: emergent gait generation and terrain adaptation with lightweight control algorithm distributed to each joint module
- Firmware and software implementation for modular legged robot (EigenBot)
- Research work on insect control, eg. CPG, neuron structures, neuron modelling etc.

Quadruped Planning over skills (CMU project) | RL, Motion planning, IssacGym, Deep Learning

- Worked under Prof. Likechev: Motion planning with PRM & A* over RL trained skills
- Goal conditioned RL policy for waypoint guided agile behaviours, eg. climb, jump
- Cost predictor implementation with CNN and data collection of robot skills performance

6 DOF Robot arm prototyping, control & trajectory planning | Robot dynamics/control, STM32

- Mechanical, electrical design and Built a robot arm with 3D printed parts & off the shelf motors
- 6DOF robot dynamics analysis and PD + gravity control, implementation on the physical robot
- Used OpenCV to detect and track a throwing ball, Kalman filter for ball's position estimation
- Wrote MATLAB trajectory planning script and control firmware for stm32h7 MCU

Undergraduate Research Assistant | Unity, Hololens, ROS simulation, Unsupervised learning

- Used ROS to interface with Unity path planning for the KUKA IIWA robot arm
- Set up pipeline to automate communication between Hololens, ROS and learning algorithm
- Improving TPGMM learning performance by >200% with BIC and trajectory smoothing
- ACM Transaction on Human-Robot Interaction publication

UBCThunderbots Electrical team lead (Autonomous soccer-playing robots for Robocup)

- Wifi module firmware and FPGA SPI implementation with (VHDL) + SDK debugging
- Robot firmware to work with high level motion planning
- PCB/schematic design using Altium and KICAD for wifi module integration

Bike danger warning system Startup Project | 77GHZ mmwave radar, Kalman filter

- Used Kalman filter and data screening for car motion detection and prediction
- Market and customer research, financial projection and value proposition

Education

Carnegie Mellon University **Pittsburgh, PA**
Master in mechanical engineering **2022-2024**
- GPA: 3.96

University of British columbia **Vancouver, BC**
Bachelor of applied science **2016-2022**
- GPA: 3.5

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