Zhikai Zhang

MSME-R student at Carnegie Mellon University

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Projects/Research

CMU Biorobotics Lab Graduate research | Neural distributed control, CPG, RL
- Neural inspired controller:emergent gait generation and terrain adaptation without complex computation like MPC and RL
- Firmware and software implementation for modular legged robot (EigenBot)
- Research work and literature review on neural control for EigenBot, eg. CPG, neuron structures, neuron modelling etc.

Planning over skills for quadruped robot | RL, Motion planning, Issac Gym
- Motion planning with RRT & options framework symbolic planning over trained skills, eg, climb, jump
- training skill policies in Issac Gym

6 DOF Robot arm control/trajectory planning | Robot dynamics, STM32, Prototyping
- 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, used Kalman filter to predict ball's motion
- Wrote MATLAB trajectory planning script and wrote 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 for a journal paper
- Set up pipeline to automate communication between Hololens, ROS and learning algorithm
- Improving TPGMM learning performance by >200% with BIC and trajectory smoothing

Bike danger warning system | 77GHZ mmwave radar, Kalman filter
- Used Kalman filter and data screening for car motion detection and prediction

UBCThunderbots Electrical team lead (Autonomous soccer-playing robots for Robocup)
- Wifi modules firmware to communicate with server and SPI implementation with VHDL for FPGA
- Modified and debugged SDK source code for automation and improved connection speed
- PCB/schematic design using Altium and KICAD for wifi module integration

Professional experience

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.
- Investigating BLE mesh firmware for better performance (# of data relays, mesh network settings etc.)
- Developed Firmware for wireless sensors and test automation for power consumption analysis

Education

Carnegie Mellon University	**Pittsburgh, PA**
Master in mechanical engineering	**2022-2024**
- GPA: 4.0	
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, 8051 & ARM Assembly, matlab, Lua

Methods: MPC, Reinforcement learning, Motion planning, Neural control

Frameworks/tools: ROS, Unity, Xilinx ISE/Quartus/ModelSim, Altium/KiCAD/Circuit maker, OpenCV