SHIH-CHUAN WANG

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EDUCATION

Carnegie Mellon University, School of Computer Science — Pittsburgh, PA
M.S. in Robotic Systems Development — GPA: 4.0/4.0 — May 2021
Selected Coursework: Planning and Decision-making in Robotics, Underactuated robotics, Optimal Control

National Taiwan University (NTU) — Taipei, Taiwan
B.S. in Biomechatronics Engineering — Jun. 2018

SKILLS

Programming	C/C++, Python, Julia, MATLAB
Robotics	Motion planning, Trajectory optimization, Optimal control, Navigation
Software/Tools	ROS, OMPL, Gazebo, Docker, Git, SBPL, Simulink, GDB, etc

EXPERIENCE

Biorobotics Lab, Robotics Institute, CMU — Pittsburgh, PA
Research Assistant — Feb. 2021 - May 2021

- Working on planning and control of off-road autonomous RC car for fast navigation and exploration
- Improving local planner and reference tracking controller to satisfied stakeholder requirements using model predictive stochastic optimal control algorithm (MPPI), EKF sensor fusion, and point cloud processing
- Maintained software infrastructure for efficient system field test and deployment using Docker and customized deployer

Search-based Planning Lab, Robotics Institute, CMU — Pittsburgh, PA
Research Intern — Jun. 2020 - Aug. 2020

- Conducted research on multi-UAV path planning with global deconfliction for persistent coverage and surveillance
- Adapted frontier-based exploration for goal assigner utilizing multi-objective utility function and multi-goal A*
- Designed motion primitives for kinodynamic motion planning using graph search(MHA*) and lattice-based planner
- Developed novel goal assigner and debugged existing software pipeline to improve coverage performance by 80%

Robots and Medical Mechatronics Lab, NTU — Taipei, Taiwan
Research Assistant — Jul. 2018 - Jan. 2019

- Mobile Robot for Field Robot Competitions
  - Programmed a low-level speed controller and data transmission interface on ARM Cortex-M3 based microcontroller using C/C++ for mobile robot navigation
- Handheld Surgical Robot for Orthopedic Surgery
  - Performed system identification and designed DOB controller on a surgical robot prototype to improve tracking accuracy
  - Derived inverse dynamic model and analyzed controller performance of a handheld surgical robot, suppressed error of tip motion to within 2mm

PROJECTS

Apartment Package Delivery System with UAV — Pittsburgh, PA
MRSD Capstone Project — CMU

- Developed an unmanned aerial vehicle system to deliver packages from building entrance to apartment balconies
- Built and integrated a software stack(ROS/C++/Python) comprising of planning, navigation, perception & simulation modules with ability to conduct full pipeline experiments
- Implemented sampling-based global planner and receding-horizon local planner by leveraging OMPL and OctoMap representation to generate smooth and collision-free trajectory
- Devised visual servo algorithm and recovery strategy to pickup package while having limited localization accuracy(GPS)
- Analyzed risks by detailing project management and technical uncertainties and executed systematic approaches that avoided or mitigated risks; worked through CPU frying, drone crash, and COVID

Model Learning and Trajectory Optimization for Power Drifting Vehicle — Pittsburgh, PA
Underactuated robotics — CMU

- Utilized trajectory optimization framework (iLQR) to stabilize vehicle to a specific power drifting condition
- Learned the vehicle dynamic model using Sparse Spectrum Gaussian Process to achieve efficient approximate inference

Robot Manipulation with Self-supervising Reinforcement Learning — Pittsburgh, PA
Robot Autonomy — CMU

- Developed a robotic groceries handling operation with automatic reset on the Franka Panda Robot in simulation
- Implemented Constrained-RRT and collision checking algorithm to generate feasible path for Franka robot arm