WENKAI REN

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EDUCATION

Johns Hopkins University, Baltimore, MD — Aug.2018 - May.2020
M.S. in Robotics Engineering (Laboratory Computational Sensing and Robotics)

Columbia University, Graduate school of Engineering and Applied Science, New York, NY — Aug.2016 - Feb.2018
M.S. in Mechanical Engineering (robotic and control)
GPA: 3.6/4.0

Northern Arizona University, Flagstaff, AZ — Aug.2013 - May.2016
B.S. in Mechanical Engineering
Minor in Electrical Engineering and Mathematics
GPA: 3.75/4.0 (cum laude)

EXPERIENCE

Course Assistant, Algorithms for sensor based robotics**,** Johns Hopkins University, MD — Feb.2019 - now

UGV Navigation , Johns Hopkins University, MD — Oct.2018 - now
Research Assistant**,** Supervisor: Marin Kobilarov
- Modified the car model with real-time 2D Lidar detection on UGV platform
- Processed Lidar data with K-means clustering to identify obstacles

Udacity Self-driving nano-degree Program (Python, C++) — Jun.2017 - Feb.2018
- System Integration Project (Team Leader)
  Implemented core autonomous vehicle system based on the Udacity self-driving car "Carla" architecture with three module includes perception , control, and path planning
  perception: based on camera image to perceive traffic light
  planning: based on the next waypoint and the decision of the traffic light waypoint to generate future waypoint
  control: based on the planning data of the trajectory, by sending control commends to steering, throttle and brake values
- Implement PID control and Model predictive control method in the vehicle simulator
- Implement path planning in high way environment with decision making planner to switch lane
- Implemented extended and unscented Kalman Filter to track surrounding pedestrians and cars in vehicle simulator

3D Food Printing, Columbia University, NY — May.2017 - Oct.2017
Research Assistant**,** Supervisor: Hod Lipson
- Programmed for food print process including switching materials, controlling layer height and visualizing the process
- Implemented the food printer with laser sensor for error analysis

Association Unmanned Vehicle System International Competition(Team) — Aug.2015 - May.2016
- Designed an autonomous underwater robot can perform color identification, dropping markers
- My work includes motor brackets and water sealing end caps design, front camera vision detection based on color marker

PROJECT

Feedback Linearization Trajectory tracking , ROS, C++ — Mar.2019
- Used car bicycle and 2d robot manipular model generate trajectory based on differential flatness
- Implemented Trajectory tracking based on generated trajectory and referenced control law

Multi-agent motion planner , ROS, C++ — Feb.2019
- Designed basic discrete motion planner framework with map, agent and motion planner.
- Implemented multi-agent planning collision free problem based on the designed planner with rviz visualization.

Differential Dynamic Programming(DDP) Trajectory Tracking , ROS — Dec.2018
- Generated collision-free path planning(Hybrid A star) trajectory
- Implemented DDP tracking based on generated path and transfer the optimal control sequence back to the Gazebo environment

Rapid Random Search tree planners(RRT, BiRRT,PRM), ROS,C++ — Nov.2018
- Generated collision-free variations of RRT algorithms with ur5 6 degree manipulator and robot car bicycle model

Search and Sample Return Project(modified after NASA sample return challenge), ROS — May.2018
- Implemented the "rover" car in simulator to autonomously map a simulated environment and search for samples of interest
- Use "hug wall" method in decision making and imaged based on control guidance to map the whole environment

Raspberry Pi Programming for GoPiGo Robot , python — Dec.2016
- Implemented "Bug2" algorithm on Go robot along with the ultrasound sensor data

LANGUAGES & SKILLS

- *C++/C, Python, Java*
- *ROS, MATLAB, OpenCv, Tensorflow, Keras, Linux, git, Solidworks*