Ruihua Han

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EDUCATION

Master's Degree of Engineering   09/2014-06/2017
Xiamen University
   Major: Microelectronics and Solid State Electronics

Bachelor's Degree of Engineering   09/2010-06/2014
Wuhan University of Technology
   Major: Industrial Equipment and Control Engineering

RESEARCH EXPERIENCE

Multi-Robot Collision Avoidance Platform based on UWB   10/2019- present
- This research aims to build a UWB assisted multi-robot platform to perform localization, mapping and navigation.
- *Responsibilities*: Configure the function including communication, code updates, sensor driver for platform based on ROS. Developing the collision avoidance algorithm based on velocity obstacle (VO) with the uncertainty and noise in the UWB measurement.

Multi-Robot Navigation with Deep Reinforcement Learning   04/2019-10/2019
- This research aims to find the optimal path for multiple robots navigating in the 2d environment with time efficient and collision avoidance via deep reinforcement learning
- *Responsibilities*: Utilizing the Proximal Policy Optimization (PPO) algorithm to learn the navigation policy for each robot to find the optimal path. Besides, the policy gap between simulation and real world is alleviated by applying the noise during the learning process.

Multi-Robot Localization in Featureless Environment   04/2018-04/2019
- This research aims to localize a group of robots by the relative observation between two robots in a featureless environment where has no fixed landmark.
- *Responsibilities*: Developing the decentralized algorithm based on EKF which fuses the odometry and relative observation derived from the camera to perform the cooperative localization.

Design of Micro Piezoelectric Accelerator   09/2015-09/2017
- This research aims to design an accelerator which can detect the charge generated from the piezoelectric material by the vibration of the mass to calculate the corresponding acceleration.
- *Responsibilities*: Designed and optimized the detailed size of the accelerator model to obtain a higher performance by kinetic analysis and simulation with ANSYS.

PUBLICATIONS

- **Ruihua Han**, Shengduo Chen, and Qi Hao, "Cooperative Multi-Robot Navigation in Dynamic Environment with Deep Reinforcement Learning" ICRA 2020. *Submitted.*
- Shuai Zhang, **Ruihua Han**, Wankuan Huang, Shuaijun Wang, and Qi Hao. "Linear Bayesian Filter Based Low-Cost UWB Systems for Indoor Mobile Robot Localization." In 2018 IEEE SENSORS, pp. 1-4. IEEE, 2018.
- **Ruihua Han**, Jianyan Wang, Mahui Xu, and Hang Guo. "Design of a tri-axial micro piezoelectric accelerometer" Symposium on Piezoelectricity, Acoustic Waves, and Device Applications (SPAWDA),

2016. pp. 66-70. IEEE, 2016.

- Hui Zhou, **Ruihua Han**, Mahui Xu, and Hang Guo. "Study of a piezoelectric accelerometer based on d33 mode" Symposium on Piezoelectricity, Acoustic Waves, and Device Applications (SPAWDA), 2016. pp. 61-65. IEEE, 2016

- Mahui Xu, Jianyan Wang, **Ruihua Han**, Hui Zhou, and Hang Guo. "Analytical and finite element analysis of a new tri-axial piezoelectric accelerometer." Symposium on Piezoelectricity, Acoustic Waves, and Device Applications (SPAWDA), 2016. pp. 71-75. IEEE, 2016.

WORK EXPERIENCE

Research Assistant   **08/2017-present**

Southern University of Science and Technology
- Participated in *Self-driving Campus Bus* and *Multi-Robot Localization* projects.
- Served as the *Teaching Assistant* to teach the course *Intelligent Robot* about the *ROS navigation*.
- Wrote proposals to apply projects including *Self-driving Campus Bus ($1500000), Open Datasets for Autonomous Transportation ($600000)*.

Algorithm Engineer Intern   **07/2016-09/2016**

DJI-Innovations
- Developed the flight control algorithm based on ROS to control the aerial vehicle (M100) move to the assigned place and perform the task of fetching target automatically.

CONTEST EXPERIENCE

2015 ABU Robocon China   *national first prize*
- This competition requires students to build a badminton robot which can compete with other robots built by other universities.
- *Responsibilities*: Designed and built the mechanical structure of the robot; programmed the code to control the brushless motor.

2016 National Robot Creative Design Contest   *national first prize*
- This competition requires students to design a robot with the theme of *Intelligent Robot.*
- *Responsibilities*: Designed and simulated a dental robot based on virtual force feedback technology using SolidWorks.

2016 RoboMaster Robotics Competition   *national second prize*
- This competition requires students to form a robotics team, and independently develop and produce a variety of robots to participate in a large-scale competition
- *Responsibilities*: Programmed the code on the STM32 platform to address the problems including CAN/serial port communication and control (PID) of robots.

2017 RoboMaster Robotics Competition   *national third prize*
- This competition requires students to form a robotics team, and independently develop and produce a variety of robots to participate in a large-scale competition
- *Responsibilities*: Developed the flight control algorithm based on ROS and DJI Onboard SDK to perform the task of grabbing ball.

GRADES AND SKILLS
- Master's GPA: 3.1
- Language: IELTS 6.5 (L6.0, R9, W6.0, S5.5)
- Programming Language: C/C++, Python
- Software: Matlab, latex, ANSYS, SolidWorks
- Development Platform: Linux, ROS, STM32