Han Ruihua

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Southern University of Science and Technology, Shen Zhen, China
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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

Range-Only Collision Avoidance approach for Low-cost Multi-Robot Systems

- This research aims to develop a range only collision avoidance approach for multi-robot systems using the low-cost sensors like the UWB modules.
- *Responsibilities*: Developing the particle filter based approach to estimate the relative coordinates from the range-only measurements. Utilizing these relative coordinates, the NH-ORCA is extended to calculate a safety velocity for each robot.

Multi-Robot Navigation with Deep Reinforcement Learning

- 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

- 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.

PUBLICATIONS

- **Ruihua Han**, Shengduo Chen, and Qi Hao, "A Distributed Range-Only Collision Avoidance Approach for Low-cost Large-scale Multi-Robot Systems" IROS2020. *Submitted*

- **Ruihua Han**, Shengduo Chen, and Qi Hao, "Cooperative Multi-Robot Navigation in Dynamic Environment with Deep Reinforcement Learning" ICRA 2020. *Accepted.*

- 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.

WORK EXPERIENCE

Research Assistant

Southern University of Science and Technology

- Participated in *Self-driving Campus Bus* and *Multi-Robot navigation* 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)*.

GRADES AND SKILLS

- 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