Cheng Zhiqin

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Biography

My research interests encompass a broad range of areas in robotics, including machine learning, multi-agent systems, and dynamical systems. Presently, my focus lies in the domains of object trajectory prediction and manipulation, along with motion planning and control in unstructured environments. Besides, I am familiar with C++ and Python.

Education

Wuhan University — Wuhan, China
M.Sc. degree in Electronic and Communication Engineering, GPA:3.58/4, Exam-Free Postgraduate — 2019.9–2021.6

Wuhan University — Wuhan, China
B.E. degree in Mechanical Engineering and Automation, GPA: 85.7/100 — 2015.9–2019.6

Professional Experience

The Hong Kong Polytechnic University — Hong Kong SAR, China
Research Assistant at Department of Computing, Supervised by Prof. Jiannong Cao — 2021.10-2023.05

Projects

1. **Edge AI empowered robot for autonomous in-pipe inspection**
   - Mechanical design and locomotion analysis of in-pipe robot.
   - In-pipe defect inspection algorithm.
   - Closed circuit television for inspection result.
2. **Modular Soft robot for in-pipe crawling**
   - Mechanical design and locomotion analysis of soft robot.
   - Circuit board and actuator system.
3. **the Germany/Hong Kong joint research scheme**
   - Multi-robot middleware development.
   - Distributed multi-robot system testbed construction.
4. **Obstacle avoidance of UAV in the forest**
   - CNN algorithm for tree detection deployed on UAV.
   - Acceleration of algorithm through NPU on edge device.
5. **Robot obstacle avoidance based on reinforcement learning**
   - Point Cloud processing and control command generation through Neural Network and PPO.
   - Gazebo for training algorithm.
   - Jackal and VLP-16 for real-world experiments.
6. **Mechanical design and control of climbing robot**
   - Mechanical design of dual-arm pole climbing robot.
   - Motion control through hierarchical reinforcement learning (DQN in high-level and DDPG in low level).

Publications

†Co-primary author, *Co-corresponding author

Conference Articles

1. Huafeng Xu, Jiannong Cao, **Zhiqin Cheng**†, Zhixuan Liang, Jinlin Chen
   Design and Development of a Deformable In-pipe Inspection Robot for Various Diameter Pipes
   in **IEEE International Conference on Intelligent Robots and Systems**, 2023.

2. Jinlin Chen, Jiannong Cao, **Zhiqin Cheng***, Wei li
   Mitigating Imminent Collision for Multi-robot Navigation: A TTC-force Reward Shaping Apporach
   in **International Conference on Autonomous Agents and Multi-agent Systems**, 2023.

3. **Zhiqin Cheng**, Jiannong Cao, Jinlin Chen
   ManiWare: An Easy-to-Use Middleware for Cooperative Manipulator Teams
   in **IEEE International Conference on Smart Computing**, 2022.

Journal Articles

1. Jinlin Chen, Jiannong Cao, **Zhiqin Cheng***, Yuvraj Sahni
   ManiWare: An Easy-to-Use Middleware for Cooperative Manipulator Teams
   in **Internet of Things Journal**, 2023.

2. Jinlin Chen, Jiannong Cao, **Zhiqin Cheng**†, Shan Jiang
   Towards Efficient Distributed Collision Avoidance for Heterogeneous Mobile Robots
   in **Transactions on Mobile Computing**, 2023.

3. Jinlin Chen, Jiannong Cao, Zhixuan Liang, **Zhiqin Cheng**, Jia Wang
   GraphWare: A graph-based middleware enabling multi-robot cooperation
   in **Concurrency and Computation: Practice and Experience**, 2022.

Patents

1. Huafeng Xu, Jiannong Cao, Zhixuan Liang, **Zhiqin Cheng**
   An Adaptive and Deformable Pipeline Robot
   CN202310158958.2 China, 2023

2. Huafeng Xu, Jiannong Cao, Wentao Sun, Zhixuan Liang, Jinlin Chen, **Zhiqin Cheng**
   A Modular Pipeline Defect Detection Soft Robot
   CN202210253052.4 China, 2022

3. Junfeng Lei, **Zhiqin Cheng**, Haigang Sui
   UAV Obstacle Avoidance Method Based on Digital Space Slice
   CN202010680174.2 China, 2020

Books

1. Humanoid Robot Training Course, ISBN: 9787121415791

Awards and Honours

- Silver Medal, 48th International Exhibition of Inventions Geneva 2023
- First Prize, **Leader**, Chinese Robocup Standard Platform League 2018
- Scholarships and outstanding student 2016, 2017, 2018, 2020