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Zhentian Qian

Education

Aug 2019–Present **Ph.D. in Robotics Enginerring**, *Worcester Polytechnic Institute*, Worcester, USA, GPA: 4.0/4.0.
Advisor: Prof. Jing Xiao, Prof. Jie Fu
Research focus: computer vision, robotics, simultaneous localization and mapping (SLAM)
Course highlights: Foundations of Robotics, score 4.0/4.0; Robot Dynamics, score 4.0/4.0; Robot Control, score 4.0/4.0; Formal Methods, score 4.0/4.0; Discrete Mathematics, score 4.0/4.0; Probability And Mathematical Statistics, score 4.0/4.0.

Sep 2016–June 2019 **Master of Science in Electrical Engineering**, *Zhejiang University*, Hangzhou, China, GPA: 3.92/4.0.
Course highlights: Mobile Robot Control, score: 4.0/4.0; Machine Learning, score 4.0/4.0; Computer Vision, score: 4.0/4.0.

Sep 2012–June 2016 **Bachelor of Engineering in Electronic Information Engineering**, *Zhejiang University*, Hangzhou, China, GPA: 3.9/4.0.
Course highlights: Fundamentals of Computer Science and Technology, score 4.0/4.0; Lab.& Fundamentals of C Programming, score 4.0/4.0; Computer Architecture, score 4.0/4.0; Signal Analysis and Processing, score 4.0/4.0; Information Theory & Coding, score 4.0/4.0.

Research Experience

2019–Present **Semantic SLAM (simultaneous localization and mapping)**, *AIR lab and CIRL lab, Worcester Polytechnic Institute*, Worcester, USA.
Generate ellipsoid representation of semantic objects in the environment from multiple-view observations while doing simultaneous localization and mapping. Related Publication: [1].

2021–Present **Semantic Loop Closure**, *AIR lab and CIRL lab, Worcester Polytechnic Institute*, Worcester, USA.
Use semantic objects in the environment to perform robust loop closure. The semantic loop closure module can avoid false positives seen in loop closure methods based on geometric feature points while achieving the same level of drift reduction.

2019 **Network defense**, *CIRL lab, Worcester Polytechnic Institute*, Worcester, USA.
Assessing different proactive network defense strategies against a resourceful attacker. The network system is modeled as a probabilistic attack graph and a receding horizon planning algorithm is developed to model the action of the stealthy attacker. Related Publication: [2]

2018–2019 **Modeling and Control of Sensorless Brushless DC Motor Drives**, *State Key Laboratory of Power Electronics, Zhejiang University*, Hangzhou, China.
Identified and developed the state-of-the-art permanent magnet synchronous motor control algorithms without using speed sensor.

2016–2018 **Modeling, Control and Characterization of Film Capacitor Based Adjustable Speed Drives Technology**, *State Key Laboratory of Power Electronics, Zhejiang University*, Hangzhou, China.
Investigated and resolved instability, dc-link over-voltage and power interruption problems in the adjustable speed drive system. Related Publications: [3], [4], [5].

Teaching Experience

2020–2021 **Teaching Assistant**, *Worcester Polytechnic Institute*, Worcester, USA, TA for graduate-level courses including Robot Dynamics and Robot Control.
Major responsibilities:
Create and provide sample code for lectures and homework assignments.
Provide solutions for homework assignments.
Grade and pinpoint the errors in students' homework assignments and tests.
Provide feedback to professors regarding the common errors and confusions among students.
Host TA sessions to answer students' questions about homework assignments and lectures.
Host help sessions to go over picked example questions on homework assignments and lecture content.

Industry Experience

Aug 2015 **Assistant engineer**, *Guochen Robot Ltd*, Hangzhou, China, participate in the SCARA teaching robot program.

Project description: this project aims to build a 4 degree of freedom (4-DOF) selective compliance assembly robot arm (SCARA) as a teaching robot. The robot would have a transparent case, allowing students to view the mechanical structure of the robot. The host computer software should provide students with an easy-to-use development platform and cultivate students' programming capabilities.
Major responsibilities:
Design the circuits on the main controller board for the SCARA robot.
Program for the digital signal processor (DSP) on the main controller board.
Design the architecture and interactive interface of the host computer software.

Publications

[1] **Zhentian Qian**, Kartik Patath, Jie Fu, and Jing Xiao. Semantic slam with autonomous object-level data association. In *2021 IEEE International Conference on Robotics and Automation (ICRA)*, 2021.

[2] **Zhentian Qian**, Jie Fu, and Quanyan Zhu. A receding-horizon mdp approach for performance evaluation of moving target defense in networks. In *2020 IEEE Conference on Control Technology and Applications (CCTA)*, pages 1–7, 2020.

[3] **Zhentian Qian**, Wenxi Yao, and Kevin Lee. Voltage sag ride-through capabilities of electrolytic capacitor-less adjustable speed drive system during power interruptions. In *2018 IEEE Energy Conversion Congress and Exposition (ECCE)*, pages 763–768, Sep. 2018.

[4] **Zhentian Qian**, Wenxi Yao, and Kevin Lee. Dynamic dc-link over-voltage mitigation method in electrolytic capacitor-less adjustable speed drive systems. In *2018 IEEE Energy Conversion Congress and Exposition (ECCE)*, pages 4628–4632, Sep. 2018.

[5] **Zhentian Qian**, Wenxi Yao, and Kevin Lee. Stability analysis and improvement of v/hz controlled adjustable speed drives equipped with small dc-link thin film capacitors. In *2018 IEEE Applied Power Electronics Conference and Exposition (APEC)*, pages 861–866, March 2018.

Patents

[6] Kevin Lee, Wenxi Yao, and **Zhentian Qian**. System and method for stability control in adjustable speed drive with dc link thin film capacitor. Number US10333444B2, USA, 2017.

[7] Kun Luo, Shengtao Xu, Xingchen Zhou, **Zhentian Qian**, Rucheng Xiong, Kaiqi Dai, Yi Wang, and Yanzhao Duan. Two-chamber style diesel engine tail gas grain catcher based on microwave heating technique of regenerating. Number CN205064044U, China, 2016.

Computer Skills

Proficient in MATLAB, C, C++, Python and ROS. Experience with Verilog, CoppeliaSim and Unreal Engine.

Selected Honors and Awards

Ph.D., Worcester Polytechnic Institute

2021 Robotics Engineering Graduate Student Travel Award

Graduate, Zhejiang University

2016-2017 Award of Honor for Graduate, Graduate of Merit

Undergraduate, Zhejiang University

2014-2015 Honorable Mention of the Interdisciplinary Contest In Modeling

First Prize of the National University Student Social Practice and Science Contest On Energy Saving

Scholarship for Excellence in Research and Innovation

2013-2014 Third-Class Scholarship for Outstanding Students

Third Prize of the National Talents Training Base

2012-2013 Second-Class Scholarship for Outstanding Merits