Luke Qi

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Education

Massachusetts Institute of Technology Sep. 2017 – Jun. 2021
Candidate for S.B. in Physics, S.B. in Electrical Engineering *Cambridge, MA*

- GPA: 5.0/5.0
- Coursework: Photonics, Experimental Physics, Analog Electronics Lab, Machine Learning, Quantum Mechanics I, II & III, Quantum Nonlocality, Signal Processing, Electromagnetics and Applications, Statistical Mechanics

Experience

Isaac Chuang's Quanta Lab Aug. 2019 – Present
Keel Foundation Undergraduate Research and Innovation Scholar *Cambridge, MA*

- Created an ion shuttling simulator with Python and SPICE. Finding globally optimal voltages for transporting and splitting ion chains with SciPy methods
- Launched a collaboration with Gonzalo Muga's group to develop robust Shortcuts-to-Adiabaticity protocols based off my simulation results. Aiming to achieve the first experimental results of these optimal ion shuttling protocols
- Developing a full end-to-end numerical simulation pipeline to be used in future ion shuttling experiments, contributing to the scalability of trapped-ion quantum computers

Trace Matters Scientific Feb. – Aug. 2019
Hardware Engineer *Somerville, MA*

- Built a customized quadrupole mass filter controller and oscilloscope with Xilinx's PYNQ System-on-a-Chip board, which was used directly by the company as the backend signal processor of a prototype mass spectrometer
- Implemented low-latency communication with the front-end DigitalOcean server to visualize sample data and calibrate system in real time

MIT Aerospace Controls Laboratory Sep. – Dec. 2018
Undergraduate Researcher *Cambridge, MA*

- Implemented state-of-the-art depth clustering and online learning algorithms for human detection and classification on a 3D Velodyne LIDAR. Improved performance compared to the previous dynamic means-clustering algorithm
- Fused LIDAR output with the Single Shot Multibox Detector algorithm to increase the robustness of the new data-processing pipeline. Wrote a Python script to parse and plot trajectories outputted by the new pipeline

The Aerospace Corporation Jun. – Aug. 2018
Innovation Lab Intern *Los Angeles, CA*

- Developed and integrated computer vision algorithms in ROS to autonomize rendezvous and proximity operations. Utilized Augmented Reality tags and Point Cloud Library for pose estimation
- Programmed two line-following Arduino robots with PID controls and infrared communication capabilities to demonstrate swarm robotics techniques

Published Work

Taghioskoui, M., Qi, L. *Low-Pressure ICP-MS for Planetary Trace Elemental Analysis.* Harsh-Environment Mass Spectrometry Workshop, 16-19 September 2019, Myrtle Beach, SC.

Qi, L., et al., 2016, *New Observations of Near-Earth Asteroid 138847 (2000 VE62),* M.P.S. 721480/M.P.C. 100734.

Projects

Sigma-Delta Analog-to-Digital Converter | *Analog Electronics Laboratory* May 2020

- Designed and simulated in LTSpice, PCB layout done with KiCAD

Leadership

MIT Ridonkulous Dance Team | *Captain, VP External* Fall 2018 – Present

- Elected captain in charge of creating and executing the team's competition set and leading tri-weekly practices

Technical Skills

Software: Python, SPICE, Xilinx Vivado, Verilog, C++, ROS, Linux
Hardware: Arduino, Oscilloscopes, VNA, PCB design, FPGA programming