

Junde Li

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Education

Pennsylvania State University

Jan. 2019 – Present

PhD student in Computer Science and Engineering

Advisor: Swaroop Ghosh

City University of Hong Kong

Oct. 2016

MSc in Engineering Management, GPA: 4.02/4.3, ranked 1/88

Advisor: Alan Chan

Qingdao University

Jun. 2015

BSc in Logistics Management, GPA: 82.69/100

Research Interests

Quantum Computing, Autonomous Systems. I am interested in quantum machine learning and hybrid quantum-classical optimizations in applications of generative adversarial learning for drug discovery and robust perception for autonomous vehicles.

Publications

Synopsis: 1 Book Chapter (B), 5 Conferences (C), and 1 Journal (J) with 57 citations ([Google Scholar](#)).

B1. A. Ash-Saki, M. Alam, **J. Li**, and S. Ghosh. Error-Tolerant Mapping for Quantum Computing. In Emerging Computing: From Devices to Systems, Springer, 2020. (In Press).

C5. **J. Li**, M. Alam, and S. Ghosh. Large-scale MaxCut Optimization on Noisy Superconducting Qubits via Divide-and-Conquer. ACM International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), 2021. (Under Review)

C4. M. Alam, A. Ash-Saki, **J. Li**, A. Chattopadhyay, and S. Ghosh. Noise Resilient Compilation Policies for Quantum Approximate Optimization Algorithm. IEEE International Conference on Computer-Aided Design (**ICCAD**), 2020.

C3. **J. Li**, and S. Ghosh. Quantum-soft QUBO Suppression for Accurate Object Detection. European Conference on Computer Vision (**ECCV**), 2020.

C2. **J. Li**, N. Gattu, and S. Ghosh. FAuto: An Efficient GMM-HMM FPGA Implementation for Behavior Estimation in Autonomous Systems. IEEE International Joint Conference on Neural Networks (**IJCNN**), 2020.

C1. **J. Li**, M. Alam, A. Ash-Saki, and S. Ghosh. Hierarchical Improvement of Quantum Approximate Optimization Algorithm for Object Detection. IEEE International Symposium on Quality Electronic Design (**ISQED**), 2020.

J1. **J. Li**, Q. Ma, A. Chan, and S. Man. Health Monitoring through Wearable Technologies for Older Adults: Smart Wearables Acceptance Model. Applied Ergonomics. (2019) 162-169.

Workshops

W1. **J. Li**, M. Alam, and S. Ghosh. Large-scale Quantum Approximate Optimization via Divide-and-Conquer. IBM IEEE AI Compute Symposium, 2020.

Research Experiences

Pennsylvania State University

Research Assistant

Advisor: Swaroop Ghosh

05/2020 - Present

State College, PA

Quantum Computing and Quantum Machine Learning

- [C3] [C5] [W1] Hybrid quantum-classical optimization: designed an efficient hybrid algorithm for solving large-scale maximum cut-like NP-hard problems with near-optimal solutions and exponential speedup.
- Quantum generative neural networks: working on quantum generative networks for creating a large amount of drug candidates that are potentially effective for ongoing global pandemic by exploiting quantum computing advantage.
- [C4] Noisy resilient quantum program compilation: presented two policies, variation-aware qubit placement and variation-aware iterative mapping that can improve the circuit success probability by 8.408X on average.
- [B1] Error tolerant qubit mapping and allocation: reviewed state-of-the-art qubit mapping techniques for error tolerance in applications of maxcut, object detection and factorization, and illustrated various quantum optimization opportunities in these fields and beyond.

Machine Learning for Autonomous Systems

- [C1] [C3] Object detection (perception) for autonomous vehicles: proposed a novel hybrid algorithm for filtering out false positives in object detections with state-of-the-art accuracy for both generic and pedestrian detections.
- [C2] Driving behavior estimation for autonomous vehicles: designed a power-efficient FPGA embedded systems of machine learning model GMM-HMM for predicting driving behaviors of surrounding vehicles.

City University of Hong Kong

P/T Research Assistant

Advisor: Alan Chan

07/2016 – 12/2018

Hong Kong

Human-computer Interaction and Human Factors

- [J1] Smart wearables and health technologies: took part in several research projects associated with Human Factors, Data Analytics, and Machine Learning in smart wearables and health technologies, and submitted proposal on these areas for applying research grant as co-PI.

Work Experiences

Pennsylvania State University

(Head) Teaching Assistant, CMPSC 360 Discrete Mathematics

Held weekly recitation classes and office hours.

01/2019 – 05/2020

State College, PA

Matrix Auto Technology Ltd

A.I. Software Engineer (Autonomous Driving)

Advisor: Jean Lam

10/2018 – 12/2018

Hong Kong

MAT is a startup company providing self-driving car solutions and services.

1. Participated in developing vehicle localization using particle filter, based on initial location from sensors.
2. Designed self-driving car workflow prototype based on paper review on environmental perception, localization, path planning, prediction, and control.

Advisor: Damon Deng, Pak Kin Leung

ASMPT is a leading integrated solution provider in semiconductor and electronics industries.

1. Pre-processed images taken from silicone pads for recognizing wafer ID by Photo OCR pipelines.
2. Coordinated with control, mechanical, software and vision teams for making machine improvements.
3. Conducted research and development in computer vision and applications for visual inspection.

Honors and Awards

Self-driving Car Engineer Nanodegree, Udacity	2020
Distinction, City University of Hong Kong	2016
Outstanding Student Thesis Award, Qingdao University	2015
Excellent Student Award, Qingdao University	2013
Merit Scholarships, Qingdao University	2011 - 2013

Professional Services

Reviewer for IEEE Transactions on Mobile Computing

Sub-reviewer for Design Automation Conference, 2020

Sub-reviewer for International Conference on Hardware/Software Co-design and System Synthesis, 2019

Sub-reviewer for International Conference on Computer Design, 2019

Sub-reviewer for ACM/International Symposium on Low Power Electronics and Design, 2019

Technical Skills

Programming Languages: Python, C/C++, MATLAB, Java, R
Deep Learning / Robotics: PyTorch, TensorFlow, Caffe, OpenCV, ROS
Quantum Computing Tools: Qiskit, PennyLane, Cirq, PyQuil
Hardware: Verilog, High-level Synthesis

Selected Courses and Course Projects

Courses: Wireless and Mobile Sensing in the age of IOT, Field Programmable Gate Array, Computer Architecture, Operating Systems, Algorithm Design and Analysis, Natural Language Processing, Large-scale Machine Learning

Project – Acoustic beamforming for vehicle localization: our course project aims to locate moving cars through an array of audio sensors mounted at wayside. Sound signals emitted from moving vehicles were collected using Arduino system and processed on Python for pinpointing the direction-of-arrival and distance of multiple surrounding vehicles relative to ego vehicle (sensor array). Our DAS beamformer was able to locate vehicles within error of 4.46% compared to ground truth position.

Project – Natural language generation: this course project trains a natural language generation model on E2E NLG Challenge dataset and generates human-readable sentences for given meaning representations. Our seq2seq model was improved using data augmentation and error analysis techniques, and achieved the highest testing accuracy, 69.58% for BLEU benchmark metric, in the class.