

Junde Li

303 Electrical Engineering West, University Park, PA, 16802
Tel.: (814)-699-0752 | Email: jul1512@psu.edu | Homepage: jundeli.github.io

Education

Pennsylvania State University

Jan. 2019 – Present

PhD student in Computer Science and Engineering | GPA: 3.73/4.0

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

BMgt in Logistics Management | GPA: 82.69/100

Research Interests

Quantum Computing, Autonomous Systems. I am interested in machine learning, computer vision, robotics, and hybrid quantum-classical machine learning and optimization in applications of drug discovery and autonomous vehicles.

Publications

Synopsis: 5 Journals, 8 Conferences and 1 Book Chapter with 199 citations ([Google Scholar](#)).

J5. Y. Hou, **J. Li**, J. Yoon, A. Knoepfel, D. Yang, L. Zheng, T. Ye, K. Wang, S. Ghosh, and S. Priya. Retina-Inspired Narrowband Perovskite Sensor Array for Panchromatic Imaging. *Nature Electronics*, 2022. (Under Review)

J4. **J. Li**, M. Alam, and S. Ghosh. Large-scale Quantum Approximate Optimization via Divide-and-Conquer. *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, 2022. (Under Review)

J3. K. Nagarajan, **J. Li**, S. Ensan, N. Khan, S. Kannan, and S. Ghosh. Fault Injection Attacks in Spiking Neural Networks and Countermeasures. *Frontiers in Nanotechnology*, 2022.

J2. **J. Li**, R. Topaloglu, and S. Ghosh. Quantum Generative Models for Small Molecule Drug Discovery. *IEEE Transactions on Quantum Engineering (TQE)*, 2021.

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.

C8. **J. Li** and S. Ghosh. Scalable Variational Quantum Circuits for Autoencoder-based Drug Discovery. *Design Automation and Test in Europe Conference (DATE)*, 2022.

C7. K. Nagarajan, **J. Li**, S. Ensan, N. Khan, S. Kannan, and S. Ghosh. Analysis of Power-Oriented Fault Injection Attacks on Spiking Neural Networks. *Design Automation and Test in Europe Conference (DATE)*, 2022.

C6. A. Farris, A. Kim, **J. Li**, and S. Ghosh. Situating a Middle/High School Introduction to Quantum Computing in Advanced Quantum Drug Discovery Efforts. *Middle Atlantic American Society for Engineering Education (ASEE)*, 2021.

- C5. **J. Li**, M. Alam, C. Sha, J. Wang, N. Dokholyan, and S. Ghosh. Drug Discovery Approaches using Quantum Machine Learning. Design Automation Conference (**DAC**), 2021.
- 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.
- 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.

Invited Talks

1. Drug Discovery using Quantum Machine Learning, Generative Models Stage of Deep Learning 2.0 Virtual Summit, 2021. (details [here](#))

Research Experiences

Pennsylvania State University

Student Researcher

Advisor: Swaroop Ghosh

Quantum Computing and Quantum Machine Learning

- [C3, J3] 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.
- [C5, J2, C8] Quantum generative models: 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.
- [B1, C4] Qubit allocation and 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.

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

Human-computer Interaction and Human Factors

- [J1] Smart wearables and health technologies: took part in several research projects associated with

State College, PA

01/2019 – Present

Hong Kong

07/2016 – 12/2018

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

Bosch Center for Artificial Intelligence

(Remotely)

Deep Learning Research Intern

01/2022 – Present

Advisor: Chun-Hao Liu

1. Come up with advanced ideas regarding how to leverage sensor fusion to improve object detection performance in autonomous driving.
2. Specifically adopt self-supervised learning to overcome the lack of 3D point cloud labeling problem.
3. Implement the proposed algorithms with mainstream AI frameworks and verify it on both internal and external datasets.

ApexQubit

(Remotely)

P/T Quantum Machine Learning Engineer

02/2021 – 05/2021

Advisor: Zhiyong Zhang

1. Develop prototype of purely classical generative model for utilization of quantum computations.
2. Integrate quantum algorithms into the classical model on small scale and compose a proof-of-concept.
3. Scale the quantum-classical model to handle larger molecules usable in practical drug discovery applications.

Pennsylvania State University

State College, PA

(Head) Teaching Assistant, CMPSC 360 Discrete Mathematics

01/2019 – 05/2020

Held weekly recitation classes and office hours.

Matrix Auto Technology Ltd

Hong Kong

Artificial Intelligence Engineer

10/2018 – 12/2018

Advisor: Jean Lam

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.

ASM Pacific Technology Ltd

Hong Kong

Process Engineer (R&D)

07/2018 – 10/2018

Advisor: Pak Kin Leung

ASMP 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

Dr. Tse-Yun Feng Graduate Student Award, Penn State University	2021
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 Journals: Quantum Information Processing; IEEE Transactions on Mobile Computing;

Microprocessors and Microsystems; Applied Ergonomics; Internet of Things

Reviewer for Conferences: IEEE/ACM International Symposium on Microarchitecture (2021); Design Automation Conference (2021, 2020); International Conference on Hardware/Software Co-design and System Synthesis (2019); International Conference on Computer Design (2019); 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, Quantum Computation, Computer Vision

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 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.