# 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 machine learning, computer vision, robotics, and quantum machine learning in applications of generative adversarial learning for drug discovery and robust perception for autonomous vehicles.

## Publications

**Synopsis**: 6 Conferences (C), 1 Book Chapter (B), and 1 Journal (J) with 72 citations ([Google Scholar](#)).

C6.   **J. Li**, R. Topaloglu, and S. Ghosh. Quantum Generative Models for Small Molecule Drug Discovery. Design Automation Conference (**DAC**), 2021. (Under Review)

C5.   **J. Li**, M. Alam, and S. Ghosh. Large-scale Quantum Approximate Optimization via Divide-and-Conquer. Design Automation Conference (**DAC**), 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.

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).

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.

## Research Experiences

**Pennsylvania State University**                                                    05/2020 - Present
*Research Assistant*                                                                  *State College, PA*
Advisor: Swaroop Ghosh
Machine Learning for Autonomous Systems
- o   [C1] [C3] <u>Object detection (perception) for autonomous vehicles</u>: 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.
- o   [C2] <u>Driving behavior estimation for autonomous vehicles</u>: designed a power-efficient FPGA embedded systems of machine learning model GMM-HMM for predicting driving behaviors of surrounding vehicles.

Quantum Computing and Quantum Machine Learning
- o   [C3] [C5] <u>Hybrid quantum-classical optimization</u>: designed an efficient hybrid algorithm for solving large-scale maximum cut-like NP-hard problems with near-optimal solutions and exponential speedup.
- o   [C6] <u>Quantum generative adversarial networks</u>: 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.
- o   [B1] [C4] <u>Qubit allocation and quantum program compilation</u>: presented two policies, variation-aware qubit placement and variation-aware iterative mapping that can improve the circuit success probability by 8.408X on average.

**City University of Hong Kong**                                                      07/2016 – 12/2018
*P/T Research Assistant*                                                              *Hong Kong*
Advisor: Alan Chan
Human-computer Interaction and Human Factors
- o   [J1] <u>Smart wearables and health technologies</u>: 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**                                                     01/2019 – 05/2020
*(Head) Teaching Assistant,* CMPSC 360 Discrete Mathematics                           *State College, PA*
Held weekly recitation classes and office hours.

**Matrix Auto Technology Ltd**                                                        10/2018 – 12/2018
*A.I. Software Engineer (Autonomous Driving)*                                         *Hong Kong*
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**                                                        07/2018 – 10/2018
*Process Engineer (R&D)*                                                              *Hong Kong*
Advisor: 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
Reviewer for Applied Ergonomics
Sub-reviewer for Design Automation Conference, 2021, 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.