

# Clark Zhang

## Profile

An avid roboticist performing research at the intersection of planning and machine learning.

## Education

- 2016–Present **Ph.D. Electrical Engineering**, *University of Pennsylvania, GRASP Lab*, Philadelphia, PA.  
Estimated Graduation Date: May 2021
- 2019 **M.S. Robotics**, *University of Pennsylvania, GRASP Lab*, Philadelphia, PA.
- 2012–2016 **B.S.E. Computer Engineering, Mathematics Minor**, *University of Michigan*, Ann Arbor, Summa Cum Laude, GPA: 3.97/4.0.

## Experience

- 2016–Present **Research Assistant**, *University of Pennsylvania, GRASP Lab*, Philadelphia, PA.
- Research in motion planning aided by machine learning techniques.
  - Research in dynamics model learning for control and planning.
  - Developed motion planning software for a UR10 robot arm.
  - Developed low level control software for small wheeled robots.
- 2019 Sept – **Software Engineer (Part-time)**, *Nuro*, Mountain View, CA.
- Present
  - Behavior prediction for autonomous vehicles.
- 2019 June – **Software Engineering Intern**, *Nuro*, Mountain View, CA.
- Aug
  - Behavior prediction for autonomous vehicles.
- 2018 May – **Advanced Robotics Intern**, *Amazon Robotics*, North Reading, MA.
- Aug
  - Applied machine learning techniques to improve execution of robot motion plans.
  - Worked on robotic system to automatically detect, pick, and stack boxes from moving robots.
- 2016 June – **Robotics Intern**, *Jet Propulsion Laboratory*, Pasadena, CA.
- Aug
  - Research in terrain estimation using Gaussian Process Regression.
  - Helped develop framework for layer-based modular robotic software in Python.
- 2015 Sept – **Lead Computer Vision Engineer and Controls Engineer**, *Vayu, Inc.*, Ypsilanti, MI.
- 2016 Jan
  - Led design and implementation of the embedded software architecture in C++ for a VTOL aircraft.
  - Lead engineer on vision based autonomous landing system.
  - Modeling of dynamics for a VTOL airplane.
  - Field testing and tuning of control systems.
- 2015 May – **Undergraduate Technical Intern**, *Intel Corporation*, Hillsboro, OR.
- Aug
  - Microarchitecture verification for Xeon Phi chips.
  - Updated old tests and wrote new tests in the e verification language.
  - Designed and implemented new components of the test environment.
- 2014 May – **Software Engineering Intern**, *Thomson Reuters*, Dexter, MI.
- Aug
  - Designed and implemented full software features in C# for a Tax and Accounting application.
  - Optimized SQL queries.
  - Created design specifications and documentation.
- 2013 May – **Independent Developer**.
- Aug
  - Developed and sold Music Organizer for Windows Phone called “Overture Music Player.”
  - Developed fast string filter based on prime factorization.

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## Teaching Experience

- 2020 Spring **Guest Lecture: Introduction to Reinforcement Learning.**  
Introduction to Reinforcement Learning lecture for a graduate Natural Language Processing class.
- 2019 Fall **University of Pennsylvania ESE 650: Reinforcement Learning.**  
Created homeworks and led office hours for graduate level course.
- 2018 Fall **University of Pennsylvania ESE 530: Elements of Probability Theory.**  
Led recitation lectures, held office hours, and graded homeworks for graduate level course.
- 2018 Spring **University of Pennsylvania ESE 680: Learning in Robotics.**  
Designed projects and led office hours for graduate level course.

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## Awards

- 2018 **Robocup Best Paper Finalist**, *International Conference on Intelligent Robots and Systems.*
- 2016 **NSF Graduate Research Fellowship**, *University Of Pennsylvania.*
- 2016 **EECS Outstanding Student Award**, *University Of Michigan.*
- 2012-2015 **University Honors**, *University Of Michigan.*
- 2014-2015 **James B Angell Scholar**, *University Of Michigan.*
- 2014 **EECS Scholar Award**, *University Of Michigan.*
- 2013 **William J Branstrom Freshman Prize**, *University Of Michigan.*

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## Patents

Shi, J., **Zhang, C.** (2021). Optimizing storage space utilizing artificial intelligence (US10926952B1). U.S. Patent and Trademark Office.

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## Publications

- C. Zhang**, S. Paternain & A. Ribeiro. "Sufficiently Accurate Model Learning for Planning and Control." Submitted to International Conference on Intelligent Robots and Systems (IROS), 2021.
- C. Zhang**, A. Khan, S. Paternain, & A. Ribeiro. "Sufficiently Accurate Model Learning." In the proceedings of the International Conference on Robotics and Automation (ICRA), 2020.
- C. Zhang**, J. Huh, D. Lee. "Learning Implicit Sampling Distributions For Motion Planning." In the proceedings of the International Conference on Intelligent Robots and Systems (IROS), 2018. **Finalist for Robocup Best Paper.**
- C. Zhang**, M. Ono, R. Lanka. "Multiresolution Partitioned Gaussian Process Regression for Terrain Estimation." In the proceedings of the IEEE Aerospace Conference, 2018.
- M. Eisen, **C. Zhang**, L. Chamon, D. Lee, A. Ribeiro. "Learning Optimal Resource Allocations in Wireless Systems." IEEE Transactions on Signal Processing 67.10, 2019.
- B. Lee, **C. Zhang**, Z. Huang, & D. Lee. "Online Continuous Mapping using Gaussian Process Implicit Surfaces." In the proceedings of the International Conference on Robotics and Automation (ICRA), 2019.
- H. Jeong, **C. Zhang**, G. Pappas, D. Lee. "Assumed Density Filtering Q-learning." In the proceedings of the International Joint Conferences on Artificial Intelligence (IJCAI), 2019.
- A. Khan, **C. Zhang**, N. Atanasov, K. Karydis, V. Kumar, & D. Lee. "Memory Augmented Control Networks," ICLR 2018.
- A. Khan, **C. Zhang**, D. Lee, V. Kumar, & A. Ribeiro. "Scalable centralized deep multi-agent reinforcement learning via policy gradients." Arxiv Preprint, 2018.

M. Eisen, **C. Zhang**, L. Chamon, D. Lee, A. Ribeiro. "Dual Domain Learning of Optimal Resource Allocations in Wireless Systems." In the proceedings of the International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2019.

J. Foy, A. Hassani, J. C. Lagarias, & **C. Zhang**. "Sums Of Two k-th Roots." American Mathematical Monthly: Problems and Solutions, April 2017.

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## Activities

2020 **AI Health Hackathon Finalist**, Weill Cornell Medicine.

- Developed object/text recognition program with haptic feedback to navigate subways for the blind.

2014-2015 **Java Workshop Chair**, *IEEE HKN Honor Society*.

- Organized workshops to teach middle school and high school students basic Java. programming
- Created lesson plans and a website with resources and taught the workshop.

2013–2016 **Michigan Autonomous Aerial Vehicles Team**, Ann Arbor, MI.

- Led a team to research and develop an Extended Kalman Filter for quadcopter state estimation.
- Led a team to write and optimize a path planning algorithm.
- Created low level scheduler to run on ARM microcontroller.

2014–2015 **Stryker Sponsored Student Project**, *Stryker Orthopedics*, Ann Arbor, MI.

- Produced wearable device with three students to monitor the knee after total knee replacement surgery.
- Designed and populated printed circuit boards and wrote firmware for onboard microcontroller.

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## Skills

Languages C++(11), Python, C, Matlab

Tools Git, Makefiles/CMake, ROS, LaTeX

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## Hobbies

Piano, Running