

# Jiahe Chen

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## RESEARCH PROFILE

I am a recent graduate of Cornell University with a PhD in Robotics. My research focuses on leveraging swarms of robots with minimal onboard capabilities combined with advanced mathematical models to develop scalable error-tolerant multi-robot systems capable of building large-scale complex structures.

**Research Interest:** Multi-Agent Systems, Optimal Transport Theory, Machine Learning

**Tools:** Robot Operating System (ROS), Linux, AutoCAD, Altium, Cadence, LabVIEW

**Programming Languages:** Python, C, Verilog, MATLAB, Mathematica

## EDUCATION

**Ph.D. in Robotics**, Cornell University, GPA 3.82/4.0 2019 - 2024

**M.S. in Electrical Engineering**, University of Pennsylvania, GPA 3.97/4.0 2017 - 2019

**B.S. in Engineering Physics**, Queen's University (Canada), First Class Honours 2013 - 2017

## AWARDS

Jacobs Fellowship at Cornell (Aug 2020 & Aug 2021), Merit-Based Fellowship at Cornell (Aug 2019), Outstanding Academic Award Honorable Mention at UPenn (May 2019), Dean's Scholar at Queen's (May 2015 & May 2017), Excellence Scholarship at Queen's (Sep 2013)

## PROJECTS

**Collective Robotic Terrain Transformation** Mar 2022 - Dec 2024

*Advised by Prof. Kirstin Petersen, Cornell University*

- Developed a distributed multi-robot system to form large-scale continuous terrains with complex geometries.
- **Tools:** Python, Numpy, Scipy, OpenCV, MATLAB

**Physics Simulation of Robotic Construction** Mar 2023 - Dec 2023

*Advised by Prof. Kirstin Petersen, Cornell University*

- Developed a physics simulator for multi-robot construction with granular material.
- Built a reinforcement learning test environment and discovered optimal policies for diverse construction tasks.
- **Tools:** Python, OpenAI Gymnasium, Stable Baselines3, Pymunk, Pygame, Pandas, PyTorch, Google Cloud

**Collective Robotic Construction** Apr 2020 - Mar 2022

*Advised by Prof. Kirstin Petersen, Prof. Nils Napp, and Prof. Hadas Kress-Gazit, Cornell University*

- Developed a distributed multi-robot system that can reliably build large-scale user-defined 3D structures.
- **Tools:** Python, NetworkX, Numpy, Scipy, OpenCV, statsmodels

**Price Prediction of Used Cars** Sep 2021 - Dec 2021

*ORIE 5741 Learning with Big Messy Data, Cornell University*

- Discovered the best machine learning models for predicting used car pricing based on the market dataset.
- **Tools:** Python, Pandas, scikit-learn, statsmodels, Numpy, Scipy

**Multi-Robot Wireless Charging System** Sep 2019 - Jul 2020

*Advised by Prof. Kirstin Petersen, Cornell University*

- Designed a low-cost programmable wireless power transfer system that can quickly charge multiple robots.
- **Tools:** COMSOL Multiphysics, AutoCAD, 3D Printing, EAGLE, Arduino, MATLAB

**Implantable Chips for Brain-Machine Interface Applications** Jan 2018 - Jun 2019

*Advised by Prof. Firooz Aflatouni and Prof. Jan Van der Spiegel, University of Pennsylvania*

- Designed ultra-low-power analog and mixed-signal chips for neurostimulation and neural signal processing.
- **Tools:** Cadence, MATLAB, Mathematica,

**Instrumentation System for a Proton Accelerator** May 2016 - Jun 2017

*Advised by Prof. Mark Daymond, Reactor Materials Testing Laboratory, Queen's University*

- Designed an instrumentation system to measure the amount of protons delivered from the accelerator accurately.
- **Tools:** LabVIEW, MATLAB, Altium, Arduino