

# Chuyi Hou

University of Toronto

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[houchuyi.github.io](https://github.com/houchuyi)

## Research Interests

Risk-analysis and stochastic optimal control. Algorithms that enable control systems to make smarter decisions efficiently where safety cost is maximized. Machine Learning for Robotics and Control. Machine learning models that enable robots to operate at higher accuracy. Human Computer Interaction. Algorithms/Tools/Models that enable a seamless interaction between human and computers.

## Education

University of Toronto

Toronto 2017-2022

BASc in Engineering Science

Major in Robotics

Undergraduate thesis supervisor: Margaret P. Chapman. Fourth-year GPA:4.0/4.0.

Thesis title: "Towards a Scalable Approach for Risk-Averse Safety Analysis."

## Research Experience

Research Associate

2021 - Present

Dynamic Graphics Project Lab of the University of Toronto Canada

Tested and validated various machine learning models to determine which ones are suitable for the task at hand and document the trade-offs. Interfaced with hardware prototypes and develop pipelines to efficiently transfer data to the computing units. Quantified the performance of the system. Built demos to showcase the abilities of the system.

NSERC Summer Research Assistant

2019

Intelligent Transportation System Lab of the University of Toronto Canada

Performed literature review on topics such as "How Ontology is used in Smart City Projects and OpenTripPlanner", and "How to conduct inferencing based on Transportation Ontology Mappings", and successfully identified opportunities. Developed a gtfs auto-updater. Worked with JSON, and urllib.request in Python. Integrated loop detector Ontology map with the OpenTripPlanner using AlleogroGraph API.

## Working Experience

UASK Education

2018 - Present

Academic Part-time Online Tutor

Performed online one-to-one tutoring through ZOOM (a video conferencing application).

Tutored students who are from high schools and first year of universities.

Developed a great communication skills by having over 300 hours of online tutoring experience.

## Projects

### Producing 360-Degree Panoramas Using the CPET Dataset

2020

Role: **Developer** Supervisor: **Prof. Jonathon Kelly**

Identified project thesis, dataset, general approaches, and evaluation metrics in the project proposal. Implemented two panorama stitching algorithms using Python and libraries such as OpenCv, Scipy, and numpy. Utilized the dataset collected by the Clearpath Husky rover to produce high quality panoramas with reduced vignetting effect. Wrote project report that summarizes the process and the outcome.

Project Report can be accessed via: <https://github.com/houchuyi/Producing-360-Degree-Panoramas-Using-the-CPET-Dataset>

### YouTube Trending Video Database Analysis

2020

Role: **Developer** Supervisor: **Prof. Diane Horton**

Identified project domain, dataset, investigative questions, and schema. Implemented schema using SQL. Cleaned the dataset using Python. Wrote queries to find the results that solve the investigative questions.

Project Report can be accessed via: [https://houchuyi.github.io/projects/4\\_project/assets/pdf/YouTube\\_Trending\\_Video\\_Database\\_Analysis.pdf](https://houchuyi.github.io/projects/4_project/assets/pdf/YouTube_Trending_Video_Database_Analysis.pdf)

### The Galbraith Memorial Mail Robot

2019

Role: **Developer** Supervisor: **Prof. G.M.T.D'Eleuterio**

Gained expertise in controlling Tuttlebot3 Waffle Pi. Gained experience working with ROS and coding in python. Implemented PID control for line following purpose, and Kalman Filter and Bayesian Localization on the robot.

Public repository can be accessed via: <https://github.com/houchuyi/Robotic-Control-ROB301.git>

### Deep Learning Food Recognition Model

2019

Role: **Developer** Supervisor: **Prof. Lisa Zhang**

Gained expertise in implementing and training deep learning neural networks from very basic models, fully connected layers and convolutional networks, to Faster R-CNN, an object detection neural network. Trained, tuned, and tested a PyTorch standard Faster-RCNN. Created a Python graphic user interface (GUI), using tkinter library, for presentation demonstration purposes. Collaborated smoothly with my teammates offline.

Public repository can be accessed via: <https://github.com/nbjameslee/Deep-Learning-Food-Detection-Model>

### Fully Autonomous Ball Dispensing Mobile Machine

2019

Role: **Circuitry and sensor member / Developer** Supervisor: **Prof. M.R.Emami**

Designed and tested a fully automatic ball dispensing mobile machine with PID control. Specialized in the design and construction of circuitry and sensor subsystems as well as integration with electromechanical and micro-controller. Developed communication between PIC board and Arduino through  $I^2C$ . Excellent teamwork throughout the project. "Almost professional", said by the supervisor. Won 2<sup>nd</sup> place out of over 20 teams for performance efficiency and overall features in a public demonstration showcase.

## School Experience

<b>Technical Design Team Lead</b>	– University of Toronto Scarborough Robotics Club	2021-2022
<b>Event Director</b>	– University of Toronto Association of Chinese Engineers (UTACE)	2018-2022
<b>Circuit Team Member</b>	University of Toronto Robotics Association (UTRA)	2019-2022

## Awards

Dean's Honour List	2020 Fall
Dean's Honour List	2020 Winter
NSERC Undergraduate Student Research Award	2019
Dean's Honour List	2019 Fall
Dean's Honour List	2017 Fall

## Professional Skill

Proficient in	MATLAB, Python, Pytorch, OpenCV
Experienced in	SQL
Familiar with	C, Java
Use	ROS

## Personal Information

### Languages

Chinese/Mandarin (native), English (fluent)

### Sport

Tennis, table tennis, ski

**Canadian permanent resident**

## Publications

- [1] P. V. Chadalavada, C. Hou, H. Satgunarajah, N. Pol, Y. Liu, and D. Wigdor, “Pressar : Vision-based freehand touch and force sensing,” ACM Conference on Human Factors in Computing Systems (CHI), 2022 under review.