Chuyi Hou

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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   2017-2021

BASc in Engineering Science   Major in Robotics

Undergraduate thesis supervisor: Margaret P. Chapman. GPA:4.0/4.0. Thesis title: "Towards a Scalable Approach for Risk-Averse Safety Analysis."

Research Experience

Research Associate   2021

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.

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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.

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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

The Galbraith Memorial Mail Robot 2019

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

Gained expertise in controlling Tutlebot3 Waffle Pi. Gained experience working with ROS and coding in python. Implemented PID control fro 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 2nd place out of over 20 teams for performance efficiency and overall features in a public demonstration showcase.

School Experience

University of Toronto Scarborough Campus Robotics Club	2021-2022
University of Toronto Association of Chinese Engineers (UTACE)	2018-2022
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	Python, Pytorch, OpenCV
Experienced in	C, MATLAB
Familiar with	ROS
Use	

Publications