

# Richard Hu

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## Education

### University of Toronto

Master of Applied Science, Mechanical Engineering

Toronto, Canada

Sept. 2019 - April Present

**Research** Deep reinforcement learning and virtual-to-real transfer of mobile robots. GPA (4.0/4.0)

### University of Toronto

Bachelor of Applied Science, Mechanical Engineering

Toronto, Canada

Sept. 2013 - April 2018

**Specialization** Mechatronics Stream and Bioengineering Stream, Robotics and Mechatronics Minor. GPA (3.81/4.00)

## Experience

### Autonomous System and Biomechatronics Lab

Researcher

Toronto, Ontario

Sept. 2018 - Present

- **Autonomy** Designed a mobile robot platform for urban search and rescue in ROS and C++
- **Machine Learning** Developed a deep reinforcement learning network and virtual-to-real transfer pipeline
- **Localization** Implemented lidar and vision based SLAM for real time pose estimation
- **Control** Optimized a robust motion controller for rough terrain navigation
- **Deployment** In house experimental testing with autonomous point to point navigation

### aUToronto - SAE AutoDrive Challenge (2018, 2019 Winner)

Planning and Control Team

Toronto, Ontario

Sept. 2018 - Present

- **Autonomy** Aim to develop a level 4 autonomous vehicle using ROS and C++ in a team of 30+ students
- **Localization** Implemented real-time kinematics GPS for precision localization
- **Planning** Optimize trajectory planner for real time performance
- **Simulation** Evaluation of planning and control system using kinematics and dynamics model

### Toward Smart Cities: Road Accident Prevention

Data Scientist

Toronto, Ontario

Sept. 2018 - Dec. 2018

- **Pipeline** Data-driven accident prediction pipeline using Python and SKlearn in a team of 5
- **Machine Learning** Researched and benchmarked supervised learning models: Random Forest, SVM, and Deep Neural Network
- **Data Engineering** Data collection, visualization, feature engineering, and negative sampling

### Autonomous Turtlebot Navigation

Developer

Toronto, Ontario

Jan. 2018 - Sept. 2018

- **Mapping** Developed coverage and exploration algorithm using ROS and C++
- **Computer Vision** Used OpenCV for object detection and identification
- **Social** Implemented person following and emotional model for human-robot interaction

### Autonomous Maze Navigation Rover Design

Developer

Toronto, Ontario

Sept. 2017 - Dec. 2017

- **Autonomy** Implemented localization, obstacle detection, and path planning in MATLAB and Arduino
- **System** Designed architecture for autonomous payload pick-up and delivery in a maze

### Conavi Medical

Mechanical Engineer - Novasight Hybrid System

Toronto, Ontario

May. 2016 - Aug. 2017

- **Management** Directed technical design reviews with senior leadership; accelerated the exit of the project phase
- **Operations** Established a inventory system with full traceability for FDA 510k submission validation
- **Research** Investigated potential design hazards and risks of catheter rotary assembly
- **Manufacturing** Streamlined and optimized assembly and calibration work instruction

## Honors & Awards

2018 **Best Undergraduate Poster Presentation**, CFD Society of Canada

Winnipeg, Manitoba

All Terms **Dean's Honour list**, University of Toronto

Toronto, Ontario

2015 **University of Toronto Excellence Award**, University of Toronto

Toronto, Ontario

2015 **Shell Canada Limited Engineering Scholarship**, University of Toronto

Toronto, Ontario

2015 **Best Innovation Award and Best Prototype Award**, U of T Engineering Competition Junior Design

Toronto, Ontario