Richard **Hu**

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Education

University of Toronto *Toronto, Canada*

Master of Applied Science, Mechanical Engineering *Sep. 2018 - Expected Sep. 2020*

Specialization Deep Reinforcement Learning, Machine Learning, Mobile Robotics

University of Toronto *Toronto, Canada*

Bachelor of Applied Science, Mechanical Engineering *Sep. 2013 - Apr. 2018*

Specialization Robotics and Mechatronics Minor; GPA (3.81/4.00); Dean's Honor List for all terms

Experience

Autonomous System and Biomechatronics Lab *Toronto, Ontario*

Researcher, Master Thesis *Sep. 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 in Pytorch
- **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 system level testing with autonomous point to point navigation

aUToronto - SAE AutoDrive Challenge (2018 and 2019 Winner) *Toronto, Ontario*

Planning and Control Team *Sep. 2018 - Oct. 2019*

- **Autonomy** Developping a level 4 autonomous vehicle using ROS and C++; within a team of 30+ students
- **Localization** Implemented real-time kinematic 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 *Toronto, Ontario*

Developer, Course Project *Sep. 2018 - Dec. 2018*

- **Smart City** Data-driven accident prediction using Scikit-learn in Python; within a team of 5 students
- **Data Engineering** Data collection, visualization, feature engineering, and negative sampling
- **Machine Learning** Trained and benchmarked 3 supervised learning models: Random Forest, SVM, and Deep Neural Network

Autonomous Turtlebot *Toronto, Ontario*

Developer, Course Project *Jan. 2018 - Sep. 2018*

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

Autonomous Maze Navigation Rover Design *Toronto, Ontario*

Developer, Course Project *Sep. 2017 - Dec. 2017*

- **Autonomy** Implemented localization, collision avoidance, and path planning algorithm in MATLAB and Arduino
- **Control** Designed architecture for autonomous payload pick-up and delivery in a maze

Conavi Medical - Novasight Hybrid System *Toronto, Ontario*

Mechanical Engineer Intern *May. 2016 - Aug. 2017*

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

Publication

Optimization and System Identification of a Variable Pico-Scale Hydro Turbine for Pressure Regulation

Yu. SM, Ko. Y, **Hu. H**, Seo. J, and Bilton. AM

ASME 2020 Power Conference. Virtual, Online. August 4–5, 2020. V001T08A020. ASME. https://doi.org/10.1115/POWER2020-16902

Honors & Awards

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

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*