Richard Hu

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Experience

Autonomous System and Biomechatronics Lab *Toronto, Ontario*

Research *Sept. 2018 - Present*

- **Robot Development** Developped a robot with SLAM, position controller, and velocity controller capabilities using stereo camera, and Lidar using ROS and C++.
- **Sim-to-Real** Transferred rough terrain navigation model learn using A3C to physical environment by improving simulation fidelity, controller robustness, and applying domain randomization techniques

MIE443 Mechatronics Systems: Design & Integration *Toronto, Ontario*

Teaching Assistent *Jan. 2018 - Apr. 2018*

- **Tutorial** Prepared and gave lecture for students on robot navigation and SLAM methods
- **Laboratory** Mentored students during their robot development process

Conavi Medical *Toronto, Ontario*

Mechanical Design Intern - Novasight Hybrid System *May. 2016 - Aug. 2017*

- **Technical Design Review** Led 3 major technical design reviews of the intravascular cathether, NOVASight Hybrid, with senior leadership in its R&D phase. Led to accelerated project progress and successful exist of development phase
- **Mechanical Design & Testing** Designed and tested cather imaging assembly rotary fluid seal component that is critical to patient safety using MATLAB and SolidWorks
- **R&D Inventory Management** Built a R&D phase inventory management system with full traceability, gaureeted validity of the product's 510k submission to US Food and Drug Agency

Projects

aUToronto - Autodrive challenge *Toronto, Ontario*

Mapping and Localization Team *Sept. 2018 - July. 2019*

- Developped code for processing and parsing semantic map using python, QGIS and Open Street Map
- Implemented real-time kinematics GPS system on the autonomous vehicle for localzation

Toward Smart Cities:Data-driven Road Accident Prevention *Toronto, Ontario*

Data Analysist *Sept. 2018 - Dec. 2018*

- Binary prediction of road accidents using weather, census, traffic, geography data, feature-engineering, and negative sampling
- Implemented SVM, Random Forest, and Deep Neural Network model, achieving 90% cross validated accuracy and 67% recall for collision

Pico-Scale Hydro Turbine Design *Toronto, Ontario*

Mechanical Design *Jan. 2018 - Sept. 2018*

- Designed a variable guide vane mechanism for pico-scale hydro turbine using Solidworks and ANSYS CFX
- Built the pico-scale turbine and pressurized pipeline test rig to mimic operating conditions

Autonomous Maze Navigation Rover Design *Toronto, Ontario*

Software Development & System Design *Sept. 2017 - Dec. 2017*

- Implemented 2D histogram localization, ultrasound obstacle detection, A* path planning algorithm in MATLAB and Arduino
- Architecture to govern autonomous navigation through a maze, localization, path-finding, payload pick-up and delivery

Honors & Awards

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

Education

University of Toronto *Toronto, Canada*

Bachelor of Applied Science, Mechanical Engineering, With Distinction - Dean's Honours List *Sept. 2013 - April 2018*

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

University of Toronto *Toronto, Canada*

Master of Applied Science, Mechanical Engineering *Sept. 2019 - April Present*

Research Learning based rough terrain navigation for mobile robots research at Autonomous Systems and Biomechatronics Lab