Katie Allison

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Education

Sept 2021 to Mar 2025 **M.A.Sc. in Mechanical Engineering** University of Toronto

Co-supervised by Professor Benjamin Hatton (Bio-Inspired Materials and Design Lab) and Professor Jonathan Kelly (Space & Terrestrial Autonomous Robotic Systems Lab).

- Explored applications of surfaces with adaptive contact properties to robotic gripping.
- Prototyped and characterized active surfaces with tunable frictional properties (using pneumatic control).
- Designed and characterized custom active surface fingerpads for an underactuated industrial robotic gripper.
- Relevant systems design work included:
  - Designed, constructed, and programmed linear force test apparatus using a microcontroller board, stepper motor, lead screw, limit switches, and a force gauge.
  - Modified circuitry for and reprogrammed existing custom eight-channel pneumatic control apparatus.

Sept 2016 to June 2021 **B.A.Sc. in Engineering Science** University of Toronto

- Specialized in the Robotics option (selected from eight EngSci Majors).
- Wrote undergraduate thesis (supervised by Prof. Mireille Broucke in the Systems Controls Group) focused on adaptive internal modelling of the human cerebellar nodulus-uvula as a control system.

Work Experience

May 2021 to Present **Design Engineer (Contract)** Legere Reeds Ltd.

- Designed and fabricated a 3D profile scanning apparatus using a confocal light sensor.
- Wrote control software on a Raspberry Pi to actuate a 2-axis linear stage while taking in displacement data.
- Programmed data transformation and correction functions to interpret surface scan data.
- Wrote extensive user documentation including assembly, usage, and troubleshooting instructions.

May 2019 to Aug 2020 **Design Engineer Intern** Legere Reeds Ltd.

- Independently redesigned production software in consultation with company founders and production staff.
- Restructured and rewrote CAD-CAM process code (in VBA) to control custom manufacturing of reeds.
- Calculated reed surface profile curves using Python curve fitting and image analysis.
- Developed user interface and documentation for machine operators based on code flow and work protocol.
- Built virtual simulator of reed cutting process and created programs to test and compare data files.
- Created and tested design files and machining sequences for new reed designs.

May 2017 to Sept 2017 **Undergraduate Researcher** York University

Supervised by Prof. Gerd Grau in the Electronics Additive Manufacturing Lab.

- Explored novel methods of digitally fabricating microfluidic devices to hydrodynamically focus fluids.
- Designed, prototyped, & tested a 3D printed hydrodynamically focusing nozzle for use in printing electronics.
- Presented poster at Undergraduate Summer Student Research Conference.

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Teaching and Leadership Experience

Sep 2024 to Dec 2024 **Engineering Computation Instructor** Division of Engineering Science

- Created in-class labs and assessments focusing on numerical computation in MATLAB.
- Delivered lectures on engineering mathematics and computation to class of 150 students.

Jan 2022 to May 2024 **Systems Prototyping Instructor** Division of Engineering Science

- Created in-class labs, assessments, and lectures on design & prototyping of mechatronic systems.
- Wrote course handbook with over 200 pages of content, including both theory and practical exercises.
- Delivered lectures on technical design, modelling, prototyping, and debugging to classes of 240-300 students.
- Designed, tested, and facilitated lab assignments to teach CAD-CAM, breadboard circuitry, and microcontroller programming skills.

Oct 2022 to Present **Ontario Chapter Organizer** Women in Robotics

- Organized professional development and community-building events for local roboticists.
- Collaborated with other local groups for diversity in tech to host panel events and workshops.

April 2019 to May 2020 **Design Team Association Director** University of Toronto Eng. Society

- Organized acquisition of and move to several new workspaces on and off campus.
- Consolidated tool/equipment needs and working protocols of the University of Toronto Engineering Society's two dozen design teams to develop proposals for a shared workshop.
- Set up centralized safety training in collaboration with the Myhal Light Fabrication Facility staff.

Publications and Proceedings

- **K. Allison**, J. Kelly, and B. Hatton. "Structured Pneumatic Fingerpads for Actively Tunable Grip Friction,", to be presented at *2025 IEEE Intl. Conf. on Soft Robotics*, Lausanne, Apr. 2025. arxiv.org/abs/2502.00926
- R. Codd-Downey, M. Jenkin and **K. Allison**, "Milton: An open hardware underwater autonomous vehicle," *2017 IEEE Intl. Conf. on Information and Automation*, Macau, 2017, pp. 30-34, DOI:10.1109/ICInfA.2017.8078878.

Awards

2024 **Teaching Assistant Award** Faculty of Applied Science & Engineering

Awarded for excellence in teaching and course development as a Teaching Assistant at the University of Toronto.

2021 **Student Leadership Award** University of Toronto

Awarded for outstanding student leadership, service, and commitment to the University of Toronto.

2020 **Director of the Year** University of Toronto Eng. Society

Awarded annually to Engineering Society Project Directors deemed to have done the best job with their positions.