
Education

Graduated June 2019 **Bachelor of Applied Sciences, University of Toronto**
Major in Mechanical Engineering, Minor in Robotics and Mechatronics

Mar 2016 *George Brown College*
& Nov 2018 Machining Courses: Machining I, Machining III, Welding

Technical Skills

Modeling: Solidworks and Inventor; AutoCAD; ANSYS; PSpice; MATLAB & Simulink; Simio

Programming: C, C++, Python, ROS, Git Bash

Microsoft: Word, Excel, PowerPoint

Machining: Lathe, Mill, Drill Press, Welding (Stick, Oxyacetylene), Circle Grinder

Manufacturing: Ability to read and manufacture according to engineering drawings

Relevant Engineering Experiences

Sept. 2017 – **Mechanical Engineering Intern, Isowater Corporation**

- Aug. 2018
- Collaborated with chemical and electrical interns to interpret PIDs, procure parts, and build prototype piping sub-assemblies and frames of chemical process systems.
 - Assisted electrical intern to install and monitor pressure transmitters, thermocouples, heat controller units, data logger and solenoid valves of chemical process systems.
 - Converted PIDs into engineering drawings with enough detail that allowed coworkers and contractors to manufacture with minimal confusion or delay.
 - Using Inventor and AutoCAD, created 3D models and 2D engineering drawings of chemical process systems and workspace so coworkers visually understood space constraints and layout.
 - Acted as key point of contact with operator from partner university, troubleshooting issues with the provided prototype and receiving weekly updates.
 - Consulted with vendors to procure parts with required traits and that were within budget.
 - Designed frames to support chemical process prototypes from PIDs.
 - Used Inventor and AutoCAD to create 3D models of chemical process systems, their structural frames, and respective 2D engineering drawings.
 - Completed documenting past projects by updating the BOMs and part drawings, finishing incomplete/missing files, and registering all changes into the company database.
 - Performed pressure leak tests of various prototype chemical process systems to ensure both safety during use and prevent loss of product.
 - Validated the structural strength of heavy equipment skid, shipping container supports and customized parts with stress calculations with variables done on Excel and FEA on ANSYS

Nov. 2016 – **Chassis Fabrication Team Member, U of T Solar Car Design Team**

- Aug. 2017
- Cooperated with supervisors and fabrication members to construct the hybrid monocoque chassis, including its plug, mould and modifying the main composite body.
 - Fabricated custom carbon fiber and fiberglass composites, from cutting carbon fiber/fiberglass sheets, foam board and honeycomb sheets, applying the epoxy and preparing the curing.
 - Vacuum bag moulded the composite-mould assemblies to be cured in an industrial oven.
 - Interpreted rough drawings and instructions to mill and lathe custom metal moulds, slots, inserts, laminate sheets. Consulted supervisor for more details to machine the suspension system's beams.
 - Enhanced the chassis' aerodynamic properties, smoothing plugs, moulds and chassis, by sanding and applying filler.

Sept. 2014 – **Machinist, U of T Formula 1 SAE Design Team**

- May. 2016 • Machined various steel and aluminum parts using the grinder and drill press.
- Cooperated with others to assemble chassis and structural beams, with rivets and welding.

Relevant Engineering Projects

Jan. 2019 – **Programming Turtlebot2, University of Toronto (MIE443)**

- May 2019 • Worked on a team of four to consolidate independently written functions and states, ensuring each would trigger and transition appropriately.
- Determined a brute force algorithm for the travelling salesman problem was the optimal solution for a path planning challenge and coded it for the Turtlebot2.
- Impressed judges on programming Turtlebot2 to recognizably emote rage with programmed movements and sounds after sensing a hit.
- Tested Turtlebot2 code to find acceptable physical parameters and ensure it would succeed even in edge cases and worst-case scenarios.
- On bi-weekly basis, met with team to brainstorm, address issues, and extensively tested code on Turtlebot2 to ensure current progress was on track.

Jan. 2019 – **Lac-Mégantic Derailment Accident Analysis, University of Toronto (APS440)**

- May 2019 • Collaborated on a team of four to apply Causal Analysis through System Theory (CAST) to the accident, ensuring understanding of the entire accident and its systemic factors.
- Consolidated information from reports from government boards, organization, and journalists to create encompassing systems engineering models of the accident (i.e. Safety Control Structure and System Dynamic Model diagrams).
- After analysis of the diagrams, identified the missing control loops and information pathways in the system that allowed the accident to propagate.

Sept. 2018 – **Passive Airship Pressure Regulator, SolarShip & University of Toronto (MIE491)**

- May 2019 • With a four-student team, designed a custom valve to regulate an airship's ballonnet system.
- Determined the dimensions of the chosen valve design using force analysis, ensuring it met the design objectives.
- Assembled, rendered and animated the 3D model to visually explain how the valve worked.
- Adhering to a predetermined schedule, provided client with presentations and reports to guarantee client's on-going satisfaction with the developing design.

Sept. 2018 – **PID-Controlled Pendulum, University of Toronto (MIE404)**

- Dec. 2018 • On a team of four, accomplished in programming a pendulum with a motor-powered propeller so that it would immediately return to its set angle, static or dynamic, after forced displacement.
- Determined the K coefficients of the PID using both the Ziegler–Nichols tuning method and manual tuning to achieve the desired step response, verifying with physical testing.
- Consulted with TA, professor and other groups on troubleshoot problems and what mistakes to avoid, in order to reduce wasted time and confusion.

Sept. 2018 – **Programming a Robot Manipulator, University of Toronto (AER525)**

- Dec. 2018 • Programmed a SCORBOT-ER 4u to quickly move blocks to defined positions while avoiding collisions.
- Collaborated with 2 others to verify the maximum velocity and range of the SCORBOT-ER 4u after calculating the theoretical values with forward kinematics and velocity kinematics.

- Jan. 2017 – **Design for Environment Report**, *University of Toronto (MIE315)*
 May 2017
- Determined plasma-arc gasification (PAG) as the best waste-to-energy replacement for Toronto's Greenhill Landfill, after analysing economic, environmental and societal factors.
 - Performed an environmental analysis, with both a hybrid economic input-output and a process-based lifecycle analysis on both incineration and PAG.
 - Collaborated on a team of four to consolidate scope, background information, analyses and recommendations in a concise and comprehensive report.
- Jan. 2017 – **Lap Joint Design**, *University of Toronto (MIE320)*
 May 2017
- Cooperated with a partner to improve a lap joint for the greatest ultimate stress per weight.
 - Using Solidworks and ANSYS, analyzed the original design to remove mass and reduce stress concentrations by simulated iterations of improved designs.
 - After physical testing failure, re-engineered design with a flexible bonding tape to address newly found flaws in the bonding agent, correcting old errors in the FEA simulations.
- Jan. 2017 – **Heat and Mass Circuit**, *University of Toronto (MIE313)*
 May 2017
- On a team of four, established the heat and mass properties of a circuit board through several laboratory tests in order to create accurate models.
 - Modified 2D numerical energy balance equations to model in 3D without increasing the number of nodes, reducing both model and code complexity.
 - Determined the best arrangement of heat sinks for a circuit board by coding MATLAB scripts that predicted the temperature gradient.
 - Verified the accuracy of the simulation model by testing all possible heat sink arrangement and comparing the data.
- Sept. 2016 – **Automaton Nutcracker Design**, *University of Toronto (MIE491)*
 Dec. 2016
- Work with three teammates to redesign a nutcracker toy to emulate human-like movements of swinging a hammer down while applying enough force to crack a walnut.
 - Overcame issues on creating achievable design goals by going back to the conceptual stage, reassessing current skillsets and consulting with supervisors.
 - Created the kinematic stick model of the toy with a kinematic modeling program to verify the movements realistically emulated a human swinging a hammer down.
 - Analysed kinematic models to discover which dimensions would apply the force required to crack a walnut, and confirmed conclusions with static force analysis.
- Jan. 2016 – **Airplane Stringer Stress Analysis**, *University of Toronto (MIE301)*
 May 2016
- Validated stress analysis results by using different methods, consolidating the data from finite element analysis, photoelasticity analysis, strain gauge analysis, and tensile strength analysis.
 - Collaborated with 5 students to write a report summarizing the airplane stringer's stress properties, assessing the compatibility and reliability of each analysis method.
 - Using Excel, calculated the stress for all data points and created graphs to visual represent the resultant stress over time, from each method where applicable.
- Sept. 2015 – **3D Printer Design Concept**, *University of Toronto (MIE243)*
 Dec. 2015
- Led a conceptual design project with 3 other students to design the modify of a 3D printer by:
 - Ensuring everyone had tasks that suited their skills and interests.
 - Adhere to a given schedule by scheduling meetings and enforcing project milestones.
 - Selected electric motors, and calculated dimension of gears and the frame to ensure they fulfilled the design goals.
 - Collaborated with team to assessed conceptual designs' weaknesses and strengths to refine the final design and meet design objectives.
 - With Solidworks, modeled the base, Z-arm and extruders and assembled all parts.