John Graeme Dockrill   4th Year Mechatronics Engineering Student

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EDUCATION

University of British Columbia (UBC) – Vancouver   **September 2018 – May 2024**
B.ASc in Mechanical Engineering, Mechatronics

TECHNICAL SKILLS

Mechanical Design	Electrical/Hardware Design	Programming	Tools and Techniques
• SolidWorks, Fusion 360, Onshape, Ansys FEA, Rapid Prototyping	• Steppers, Servos, BLDC, Encoders, Sensors, VFDs	• MATLAB, Simulink, Arduino, C, C#, Python, Perl, HTML, CSS	• Oscilloscope, Function Generator, Microcontroller
• Additive Manufacturing (FDM)	• NI Multisim, VHDL	• Robot Operating System (ROS)	• Lathe, Mill, Waterjet cutter
• Machine Design, Drafting	• Circuit Analysis/Design	• 8051 Assembly	• Soldering
• Heat Transfer			

WORK EXPERIENCE

ENVO Drive Systems – *R&D Engineering Associate*, Burnaby, BC   **May 2022 – August 2022**
- Using SolidWorks, designed and conducted FEA on a welded aluminum frame for a small snowmobile to fix several key issues.
- Optimized performance and throttle response of motor controller, using Grin Technologies Phase Runner Suite, to reduce noise and vibrations at higher rpm.
- Sourced off-the-shelf components and fasteners. Maintained a BOM for the projects, to facilitate supply chain procurement.
- Kept a detailed log of my work including thought process and calculations for documentation purposes.
- Prepared several complete engineering drawing packages, employing GD&T, to be manufactured overseas.
- Participated in weekly R&D meetings to share project progress and ideas within the engineering team.

UBC Department of Mechanical Engineering – *OER Developer*, UBC   **May 2021 – August 2021**
- Authored and coded 100+ mechanics problems in Perl, with full solutions for use in an Open Education Resource first year engineering textbook.
- Automated file management using Python to modify 200+ existing files in our GitHub repo, improving workflow.

UBC ENGINEERING STUDENT TEAMS

UBC Rover – *Robotic Arm Team Member*, UBC   **September 2022 – Present**
- Set up hardware testing bench to conduct environmental testing on a TMC 2209 V1.2 stepper motor driver.
- Integrated sensor modules into test circuit for measuring temperature and stepper motor error using data sheets.
- Wrote code in C for a Teensy 4.1 microcontroller to read data from sensors and control stepper motor motion.
- Learned how to navigate Robot Operating System (ROS) and will be working on arm poses later this term.

UBC Solar – *Vehicle Mechanics Team Member*, UBC   **September 2021 – Present**
- Wrote a MATLAB program for force analysis on control arms to facilitate control arm design.
- Researched and designed a comprehensive plan for testing the use of staked bearings on our car's aluminum A-arms.
- Performed static structural FEA with Ansys to test strength of suspension ball joint pin and verify hand calculations.
- Properly torqued and safety wired bolts according to specifications.
- Manufactured suspension system spacers using a bench lathe to fix shock alignment.
- Manufactured an aeroshell lay-up jig assembly using waterjet cutting.

UBC Rapid 3D Printing – *Consulting Team Lead*, UBC   **January 2021 – September 2022**
- Consulted directly with clients to design and 3D print their requests whilst maintaining clear documentation.
- Developed and 3D printed initial prototypes for medical testing equipment, which were sent to Europe to be further developed.
- Organized a team of 12 members, by assigning them consulting projects, and guiding them through the consulting workflow.
- Lead a team of 4 students to design the z-axis scissor lift mechanism of a custom portable 3D printer, using Onshape CAD.

UBC Supermileage – *Powertrain Team Member*, UBC   **September 2018 – April 2020**
- Designed and conducted SolidWorks Finite Element Analysis on 3 critical drivetrain components which were implemented into a gas-powered vehicle.
- Designed a bearing housing to maintain a safety factor of 2 and reduce the mass of the part by a half to increase fuel efficiency.
- Created 2D engineering drawings in SolidWorks for the manufacturing of components.
- Collected data on the fuel consumption and efficiency of the powertrain system using a dynamometer.

TECHNICAL PROJECTS

3D Printed Robotic Arm, Personal Project   **June 2022**

- Using Onshape CAD, designed a fully 3D printed split-ring compound planet epicyclic gearbox with a 96:1 gear reduction to function as joints.
- Tested stepper motor, driver, and the gearbox prototype with an Arduino UNO microcontroller to identify issues.
- Manufactured using 3D printing and tested three motor axes as well as the arm structure.
- Selected and specified compatible stepper motors and stepper motor drivers to actuate the 3D printed gearbox.
- Used limit switch sensors to calibrate end of axis travel for robotic joints.

Portfolio Website, Personal Project   **December 2021**

- Designed and coded a portfolio website using HTML, CSS, and JavaScript, to showcase my projects to potential employers.
- Learned HTML and CSS, coded, and debugged the entire website in the span of 7 days.

LED Bicycle Lights, Personal Project   **September 2021**

- Using Onshape, designed and 3D printed a housing to mount electronics to the inner frame of my bicycle.
- Soldered wired connections between LED strips and waterproofed them appropriately.
- Programmed an Arduino microcontroller to loop several randomized functions to control the LEDS.

3D Printed RC Tank, Personal Project   **May 2021**

- Researched and procured compatible motors, speed controllers, and battery.
- Designed and programmed a radio control circuit with an Arduino microcontroller to wirelessly control the speed of two BLDC motors.
- Using Onshape, modelled and 3D printed a 40:1 compound reduction gear box to increase motor torque to the rear sprocket.
- Prototyped a sprocket and tread meshing concept for feasibility. Identified and implemented improvements from tests.

RESEARCH EXPERIENCE/PAPERS

Impact of Student Problem Creation on Self-Reported Confidence in Mechanics, J Dockrill   **September 2021 – May 2022**

- Wrote an academic paper as a continuation of my summer 2021 work term with one of my peers, under the supervision of our professor, in the topic of engineering education.
- Presented to a group of researchers in the ASEE Zone IV conference that took place on UBC campus in May 2022.