





Amaar Quadri

3B WATERLOO MECHANICAL ENGINEERING

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Summary of Qualifications

- **Certified SolidWorks Expert** experienced in designing parts and detailed drawings for **manufacturing processes** including laser cutting, sheet metal bending, welding, machining, injection molding, and 3D printing
- Accurately modelled, analyzed and acted on a variety of multipart **static simulations** in SolidWorks and Ansys
- Excelled in courses on structural analysis, thermodynamics, fluid mechanics, controls, and materials science
- Programmed solutions for a wide range of complex mechanical, software, and robotics problems in **Python**

Work Experience

MECHANICAL DESIGNER – SUNNYBROOK RESEARCH INSTITUTE SEPT 2019 – PRESENT

- Prototyped a catheter with a steerable tip for use in a wide variety of cardiovascular intervention surgeries
- Designed an innovative, ergonomic, and fully mechanical mechanism for tensioning and actuation
- Authored a **patent** and an **academic paper** on the mechanism's usage as a cable driven parallel mechanism
- Iteratively modified Nitinol anchors at the catheter tip to prevent deformation using **nonlinear simulation**
- Continuing to work part time during school terms to create a **sub-millimeter precision** tracking system

MECHANICAL EQUIPMENT DESIGN ENGINEER – TIGERCAT INDUSTRIES JAN – APR 2019

- Worked on a special projects team to design custom parts for **heavy duty forestry** and silviculture machinery
- Designed a cost-effective **high precision** fixture for calibrating a camera box which reduced calibration time from **3 hours to under 10 minutes** and significantly improved accuracy
- Designed and simulated a moving linkage in a hydraulic arm, capable of withstanding **36,000 pounds** of force

MECHANICAL RESEARCHER – METER MAY – AUG 2020

- Worked on unsolved research problems relating to the design of an x-ray CT scanner for dimensional metrology
- Designed a mechanized x-ray filter assembly with 2 wheels of selectable filters controlled with a single motor
- Compared cooling solutions for an electronics enclosure by analyzing thermal effects with differential equations
- Identified the impact of rotational inaccuracies of the part by analyzing x-ray simulation results

Projects

MECHANICAL DESIGN LEAD – UW AQUADRONE DESIGN TEAM MAR 2019 – PRESENT

- Led a student team to design, build, and test an **autonomous submarine** for the 2021 RoboSub Competition
- Fabricated a robust frame with a waterproof enclosure, and a ballast-based buoyancy system
- Designed a fully custom **robotic arm** and **torpedo launcher** with a common underlying **pneumatic system**
- Determined the optimal materials and manufacturing processes to ensure functionality and **waterproofing**
- Collaborated with other sub-teams to incorporate dependable vision, controls, and path planning systems
- Justified the value of the team and presented to the university to secure over \$30,000 in funding

MECHANICAL ENGINEER (BRAKING TEAM) – WATERLOO SEP 2018 – APR 2019

- Collaborated with a team to design a **high-speed transportation pod** for the SpaceX Hyperloop Challenge
- Designed a clamp-based friction braking system and validated its structural integrity via **static simulations**

Education and Achievements

- Ranked one of the top students, with a **3.9 GPA**, in mechanical engineering at the University of Waterloo
- Completed the Udacity Robotics Software Engineer Nanodegree showing knowledge in controls and automation
- Trained a neural network to play Connect 4 at a superhuman level using self-play reinforcement learning

Amaar Quadri – Work Sample

Steerable Catheter Control Mechanism

SUNNYBROOK RESEARCH INSTITUTE

My team is working on an experimental catheter device intended for use in cardiovascular procedures. It has 4 expanding branches to anchor itself in place in the artery. The 4 pull-wires are then manipulated by the surgeon to deflect the guidewire tip to help steer it through blockages in the artery.

During my coop, I was tasked with designing the mechanical mechanism that would convert the surgeon's input into actuation of the pull-wires. I devised a set of requirements, led brainstorming sessions, performed engineering calculations, and wrote Python code to evaluate potential designs.

I also wrote a patent, of which I am the primary author, based on the final design. The final design was ergonomic, intuitive and had an elegant simplicity. By the end of the coop, I also had a working 3D printed prototype. My employer was so impressed that I am still working part time during school.

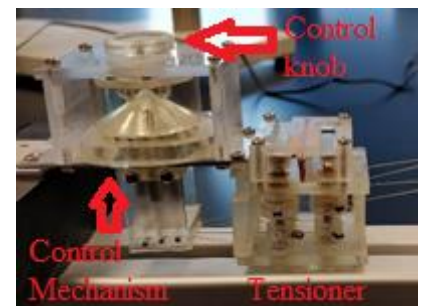
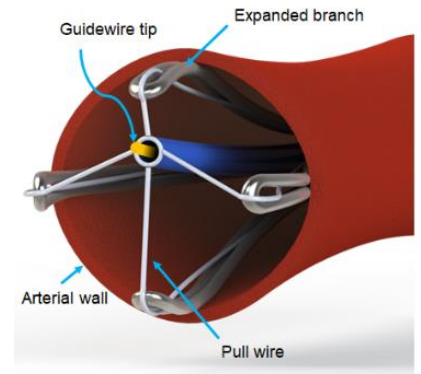
Mulcher Tilt Adapter

TIGERCAT INDUSTRIES

A mulcher is a heavy-duty forestry machine that has a high-speed rotating drum on a hydraulic arm. The drum has teeth on it that are used to grind up tree stumps and other debris after a set of trees have been harvested.

As part of my coop, I was tasked with designing an adapter that would fit between the hydraulic arm and the drum. The adapter would have a slot instead of a fixed joint which would allow the drum to tilt to better match the contours of the ground, yielding a more comprehensive mulching.

The part was designed to be made from thick laser cut structural steel welded together. I ran simulations and iterated on the design to ensure it could withstand the 10,000lb weight of the drum and the 36,000lb force from the hydraulic cylinders.



WATERLOO AQUADROME

Created and Grew the Team

Submarine CAD Model

TIGERCAT

Camera Calibrating Assembly

