Amaar Quadri
3A WATERLOO MECHANICAL ENGINEERING

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Skills

- **Certified SolidWorks Professional** with experience in sheet metal, weldments, drawings and in-context tools
- Experienced in designing parts and creating detailed drawings for a variety of **manufacturing processes** including laser cutting, sheet metal bending, welding, machining, 3D printing and injection molding
- 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 and materials science
- Programmed solutions for a wide range of complex mechanical and software problems in **Python, C++ and Java**

Work Experience

MECHANICAL DESIGN ENGINEER – SUNNYBROOK RESEARCH INSTITUTE   SEPT – DEC 2019

- Prototyped a catheter with a steerable tip for use in a wide variety of cardiovascular intervention surgeries
- Designed an innovative, intuitive and ergonomic fully mechanical mechanism for tensioning and actuation
- Writing a **patent** and an **academic paper** on the mechanism's usage as a cable driven parallel mechanism
- Devised a statistical algorithm in Python that improved the catheter tip's **tracking precision to 0.1 millimeters**
- Iteratively modified Nitinol anchors at the catheter tip to prevent deformation using **nonlinear simulation**

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 **high precision** fixture for calibrating a camera box using cheap sheet metal components which reduced calibration time from **3 hours to under 10 minutes** and significantly improved accuracy
- Designed a moving linkage in a hydraulic arm, capable of withstanding over **36,000 pounds** of force
- Collaborated with machinists throughout to ensure parts can be manufactured efficiently and inexpensively

SOFTWARE ENGINEERING CONSULTANT – CAPCO   MAY – AUG 2018

- Programmed a Java application for parsing logs at a high throughput from a Bank of Montreal database

Projects

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

- Led a student team to design, build and test an **autonomous submarine** for the 2020 RoboSub Competition
- Fabricated a robust frame with a waterproof enclosure, custom water-cooling and a modular 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 electrical, vision and path planning systems

MECHANICAL ENGINEER (BRAKING TEAM) – WATERLOOP   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

- **Certified SolidWorks Professional**, and Advanced in Sheet Metal, Drawing Tools, and Weldments
- Ranked one of the top students, with a **4.0 GPA**, in mechanical engineering at the University of Waterloo
- Completed the Udacity Robotics Software Engineer Nanodegree showing knowledge in controls and automation

Hobbies/Interests

- Designing and launching **rockets** in Kerbal Space Program
- Published an **artificial intelligence** powered Checkers app
- Speed-solving Rubik's cubes in 20 seconds
- Playing acoustic guitar

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 to actuation of the pull-wires. I devised a set of requirements, led brainstorming sessions and performed engineering calculations and wrote Python code to evaluate potential designs.

I am currently writing a patent, of which I will be 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.
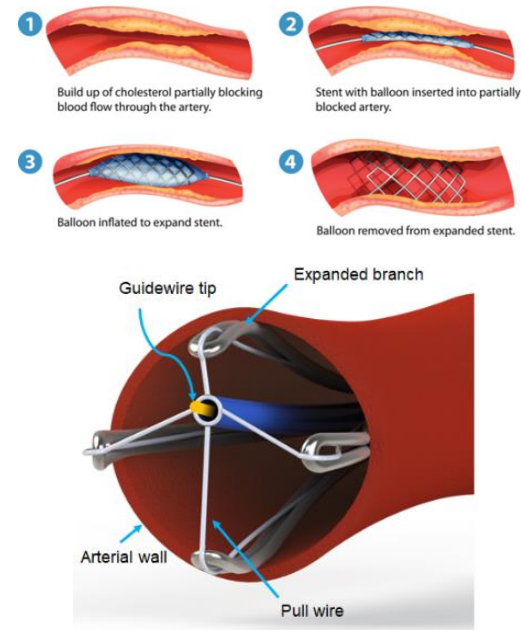
Mulcher Tilt Adapter

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.
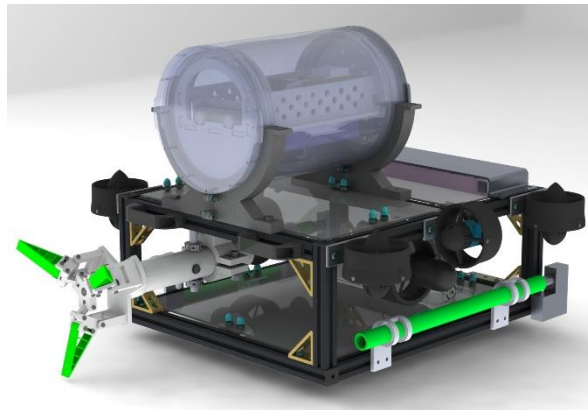
WATERLOO AQUADRONE
Created and Grew the Team

TIGERCAT
Submarine CAD Model

Camera Calibrating Assembly