Ali Toyserkani

2A Mechatronics Engineering Student, University of Waterloo, Class of 2021 (GPA: 3.82)

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Experience

Multi-Scale Additive Manufacturing (3D Printing) Lab | *Research Assistant & Software Developer*
Waterloo, ON | May 2017 – Aug 2017

- Built a cross-platform **Qt-based application** using **OpenGL** and **boost** to create machine-dependent toolpaths from imported CAD files. Code on **Github**.
- Co-developed a **new hybrid additive manufacturing method** for polymeric parts without the need for support structures.
- Co-created a **real-time image processing model** using **OpenCV** to adjust process parameters when detecting part defects.
- Conducted several phases of research experiments for multiple projects and plotted data using **MATLAB**.

UW Robotics Team | *Electrical Team Member*
Waterloo, ON | Jan 2017 – May 2017

- Worked on designing and building a rover than can **traverse tough terrain autonomously**, move/analyze objects, detect its surroundings and communicate with a base station via radio.
- Constructed the power distribution mechanism, fixtures for the camera hardware, and assembly parts for the rover's chassis.
- Earned **15th place** at the 2017 International University Rover Challenge in Hanksville, Utah.

Fluid Mechanics Research Laboratory | *Hardware Developer*
Waterloo, ON | Jun 2016 – Dec 2016

- Created mechanical models of the human vocal tract using **SolidWorks** to educate youth on phonetics and linguistics.
- Emulated a changing human voice using **Arduino** UNO, 555-timers, amplifiers, and **IoT** for an immersive teaching experience.
- Manufactured and machined over 75 metal, plastic and wooden parts for the assemblies of multiple trachea models.

Projects & Competitions

TrackyfAI – A Military Video Processing Tool **|** *2nd place, CANSOFCOM Military Challenge, Hack the North 2017*

- Developed a **data visualization tool** for the government using **Python** to efficiently notice and log patterns in surveillance footage.
- Programmed **image processing algorithms** using **OpenCV** to track real-time object trajectories and create contour graphs.
- Integrated pre-trained **TensorFlow** models (Inception V3, darknet) to classify all objects within a detected contour.

HomeSleeves – Finger Sleeves for Home Automation **|** *3rd place, Toronto IEEE Hardware Hackathon 2017*

- Built a wearable hand accessory using an **Arduino** Nano to control lighting and music volume with ease.
- Identified user commands by combining data using **sensor fusion** from capacitive force sensors and a 3-axis gyro/accelerometer.
- Controlled **IoT** devices by sending command signals with a TCP local WiFi socket using **Node.js** and **Arduino**.

ExtensaArm – A Modular 4-Axis Robotic Arm **|** *Term Project, Robotics Engineering Design, Fall 2016*

- Created a **multi-purpose robotic arm** with 4 degrees of freedom to repeat sets of user-taught tasks.
- Wrote **embedded C software** to wirelessly control the robotic arm's axes with a console joystick.
- Developed efficient algorithms to convert manually controlled robot movements to an executable machine file for task repetition.

Technical Skills & Tools

Languages: C++, C, Python, Bash, C#, JavaScript, Java
Software: Qt, OpenCV, Arduino, Node.js, OpenGL, TensorFlow, Unity, Unix/Linux, MATLAB
Hardware: Machining Tools, PCB Design, Soldering, Oscilloscopes, Sensors
Design: SolidWorks, AutoCAD, Fusion360, DipTrace, Altium

Interests

- Running – Trying to run at least 20 km a week. Ontario 2014 Track and Field Finalist.
- Leadership – Always organizing meaningful events. Served as an executive on high school leadership council.
- Chess – Slowly working my way towards grandmaster on chess.com.