Ali Toyserkani

alitoyserkani.com • ali.toyserkani1998@gmail.com • linkedin.com/in/alitoyserkani • github.com/alitoyserkani

Experience

PathAI | *Mechatronics Engineering Intern* | Boston, MA — Jan '20 – Aug '20

- Designed and integrated **a sub-10µm two-axis precision linear actuator into AI imaging system** using SOLIDWORKS, KiCAD and loop-shaping
- Implemented a Sony IMX camera sensor driver (C, C++) on the NVIDIA Jetson Xavier platform for 20fps image acquisition speed
- **Improved computational reconstruction speed of whole-slide pathology images by 8x** through parallel GPU programming (CUDA)
- Prototyped and evaluated various imaging optics technologies through iterative mechatronics, **control theory** and firmware methodologies
- Created a barcode detection model in **OpenCV** to detect and decode 8 barcode formats on scanned pathology slides with **95% accuracy**

Lyft Level 5 | *Hardware Engineering Intern – Autonomous Driving* | Palo Alto, CA — May '19 – Aug '19

- Improved **compute efficiency (latency/power) by over 10x** through benchmarking and integration of neural network hardware accelerators
- Designed a **camera interface . board** in Altium which performs image compression, lens correction and filtering through an ISP
- Optimized compute performance using TensorFlow (**Python**) and vendor-specific tools to **re-format, prune, and re-train detection models**

Lyft Level 5 | *Software Engineering Intern – Autonomous Driving* | Palo Alto, CA — Aug '18 – Dec '18

- Implemented and deployed a **<1ms time-critical steering controller** on a new fleet of self-driving vehicles, used by motion planning team
- Integrated multiple RTOSs (ThreadX, FreeRTOS, Nucleus) onto MCUs (TI, STM) for the autonomous fleets embedded platforms
- Created a hardware-agnostic embedded software framework (**C++**) which performs critical drive-by-wire functions on the vehicle platform

WATonomous – SAE Autonomous Vehicle Challenge | *Technical Project Manager* | Waterloo, ON — Jan '18 – Apr '19

- Managed and **led a group of over 100 students** in building a self-driving car for the SAE AutoDrive Challenge
- Created an embedded controls interface to execute planned trajectories using **CAN communication** with **PID feedback control**
- Developed a data pipelining package in **ROS** and **PCL** to synchronously distribute ~100 MB/s of **camera and LiDAR** data

Multi-Scale Additive Manufacturing (3D Printing) Lab | *Research Assistant* | Waterloo, ON — May '17 – Aug '17

- Took initiative to re-design, build and assemble a **binder-jetting 3D printer**, allowing researchers to perform 15%+ more experiments
- Co-developed a **new hybrid additive manufacturing method** (paper) for making polymer parts without the need for support structures
- Created a real-time image processing model and an STL slicer using **OpenCV/Qt** to adjust process parameters when detecting part defects

Projects

Quadruped Robotic Dog

- Designed a self-balancing four-legged robot in Fusion360, and manufactured using harmonic gear trains, 3D printing, and machining tools
- Developed sensor input & control logic on Raspberry Pi (**ROS**) to plan motion, and a motor control layer to move legs simultaneously (**Arduino**)

4-Axis Robotic Arm

- Created a **multi-purpose robotic arm** with 4 degrees of freedom to repeat a user-recorded set of tasks

Awards & Competitions

- **3rd Place @ IEEE Hardware Hackathon 2017** for creating an electronic hand glove for smart home automation
- **Winner of CANSOFCOM Military Challenge @ Hack the North 2017** for creating a motion detection and data visualization tool
- **Top 15 Autonomous Mars Rover Robot @ International University Rover Competition 2017**
- **Best IoT Project @ Queens University Hackathon 2018** for prototyping a home facial recognition platform

Technical Skills & Tools

- **Languages:** C++, C, Python, Rust, MATLAB, Bash, JavaScript
- **Software Tools:** ROS, Linux, OpenCV, TensorFlow, Arduino, CUDA, OpenGL, Qt, Git, Jupyter, JIRA, Bazel, SCons
- **Design/Hardware:** SolidWorks, Fusion360, AutoCAD, Machining Tools, 3D Printing, KiCAD, Altium, Soldering, Oscilloscopes

Education

University of Waterloo, Mechatronics Engineering, Option in Artificial Intelligence (CGPA: 3.83/4) — Sep '16 – Apr '21

- **Relevant Coursework:** Autonomous Mobile Robots, Computational Vision, Real-Time OS, Microprocessor Systems, Data Structures
- **Online Coursework:** Robotics SW Engineering (ColumbiaX), AI for Robotics (Udacity), CS 231n - CNNs for Visual Recognition (Stanford)

Interests & Hobbies

- Long-Distance Running, Hiking, Drone Racing, Photography, Piano, Guitar, Longboarding, Robotics