
SUMMARY OF QUALIFICATIONS

- **Extensive coding experience:** 6+ years across C, C++, C#, Python, Java, TypeScript, MATLAB, Git, CMake.
- **Machine Learning & Computer Vision:** CNN projects in human pose estimation, semantic road segmentation, monocular depth estimation.
- **Embedded systems:** KiCad, VHDL, ARM Assembly, Altium. Designed efficient and fast low-level code.
- **Exceptional academics:** Recipient of 20+ prestigious academic & leadership awards valued at \$100,000+.
- **Proven leadership skills:** Lead organizer for 200+ conference. 6 years leading 180+ volunteers to reach 650+ seniors as Senior's Program Founder. Delivered workshops to 350+ engineering students as IEEE SB Chair.

EDUCATION

Bachelor of Electrical & Computer Engineering

Cumulative GPA: 97%

University of Victoria, Victoria, BC

Sept. 2016 – Apr. 2021

WORK EXPERIENCE

Software Engineer Intern – Azure Cognitive Search

Sept. 2020 – Dec. 2020

Microsoft, *Bellevue, WA (Remote)*

- Designed & completed 2nd most requested API & backend feature on Azure Cognitive Search team in **C#**.
- Currently released under [preview API](#).

**Software Engineer Intern – Azure Search, AI Platform**

Jun. 2019 – Aug. 2019

Microsoft, *Bellevue, WA*

- Developed a [dynamic search website generator](#) with **suggestions** and **filtering** options in **TypeScript**.
- Connected designers, engineers, and program managers to identify scope of work and feature set.
- **Improved user experience** on Azure Search portal by adding new JSON editor & search website customization.

**Software Developer Intern – Garage Program**

Jan. 2018 – Apr. 2018

Microsoft, *Vancouver, BC*

- Built [cross-platform mobile app](#) leveraging **offline machine learning** for chest x-ray classification in **C#**.
- Built **image processing** pipeline, DevOps Continuous Integration, **iOS share extension**, and integration of TensorFlow Android binding library. **Team expert on Git** version control.

**STEM Instructor**

Jan. 2017 – Aug. 2017

Science Venture, *Victoria, BC*

- Performed **risk & behaviour management**; developed and delivered engaging engineering curriculum to 170+ children; communicated with 125 parents to improve camper experience.

**Research Fellow**

Jul. 2016 – Aug. 2016

TRIUMF, *Vancouver, BC*

- Constructed experimental apparatus; conducted **computer simulations** to measure sensitivity of neutron radiation detector for nuclear fusion commercialization at Canada's particle & nuclear physics laboratory.



LEADERSHIP EXPERIENCE

Founder & Program Leader, Senior's Program

July 2015 – present

- Founded a series of workshops on technology and computers for seniors in the community.
- Supervised a team of **180 volunteers** to reach **650+ attendees** over 30 workshops; raised \$700.

Chair & Vice-Chair, IEEE Student Branch

Sept. 2019 – present

- Co-delivered **14** skill development workshops focusing on Git, machine learning, integrated circuits, breadboards, soldering, & circuit design, reaching **350+** engineering students; successfully secured \$1000 in funding.

Conference Organizer Lead

Aug. 2019 – Nov. 2019

- **Assembled** and orchestrated organizing committee; established conference vision.
- Spearheaded logistics planning for **200+ attendee conference** on "fusion of technology and business strategy".

PROJECTS

Human Pose Estimation using Deep Neural Networksgithub.com/robertklee/COCO-Human-Pose

- **Team Lead** to design a deep neural network for human pose estimation (HPE) on COCO-2017 dataset.
- Architected cloud training pipeline, model architecture, data augmentation, model visualization, and deployment.
- Our model achieves **very good performance** on most images. It struggles in some difficult images, typically with highly overlapped people or heavily occluded joints.

Computer Vision Project on Semantic Road Segmentationgithub.com/robertklee/KITTI-RoadSeg

- Successfully trained **U-Net CNN** on KITTI Road dataset with worst case of 91% F1 score using **Keras & Python**.

- Designed network architecture by analyzing numerous computer vision research articles.
- Designed data generator, train and test scripts, loss functions; configured cloud training; tuned hyperparameters.

C Optimization Project on Discrete Cosine Transform github.com/robertklee/C-Optimization-DCT

- Achieved a **10x speedup** compared to naïve implementation by using **C** and **assembly-level** optimizations.
- Configured **CMake** for platform agnostic compilation; profiled code using Valgrind; created custom asm operator.

Computer Vision Project on Monocular Depth Estimation github.com/DeclanMcIntosh/monodepthV2tf

- Successfully trained **U-Net CNN** for depth estimation on DrivingStereo dataset using **Keras & Python**.
- Constructed training loss (photometric reprojection and edge-aware smoothness) in Keras backend, which are designed to counter object occlusion and camera egomotion.

Networked Web Game Application github.com/robertklee/RoyalGameOfUr

- Implemented **multi-user two-player online game** using **Python**, Bottle, React, and SQLite & server-side logic.

Battlesnake Reinforcement Learning-based AI Controller

- Challenge: Design algorithm to control snake in real-time game combat environment. Goal: Survive the longest.
- Trained keras-rl reinforcement learning model with a combination of self-play and publicly available snakes.

Pulse-Width-Modulated Signal Generation & Monitoring Embedded Systems (STM32F0) bit.ly/GitHubPWM

- Goal: Using the STM32F0 microcontroller, change the frequency of a PWM signal generated by a 555 timer, measure the frequency using interrupts, and interface with an LCD to display the results.
- Restriction: Must access relevant I/O registers directly. Must consult reference manual and data sheets.
- Configured the Analog-to-Digital Converter to read a potentiometer input, Digital-to-Analog Converter to drive an optocoupler to adjust 555 timer frequency, and Serial Peripheral Interface (SPI) to communicate to LCD.

Audio Effects Circuit Design & Embedded Systems (STM32F407) bit.ly/RLAudioFX

- Goal: with an analog audio input, pitch shift or add echo effect and output to a speaker.
- Circuit: designed AC level shifting circuit, active bandpass filter, LED matrix display and DAC quantization error smoothing in KiCad; manufactured as a printed circuit board; soldered components and tested PCB.
- Embedded Systems: FFT to extract frequency domain; NVIC with timer-raised interrupts to service analog sampling, button debouncing, and image display on LED matrix; memory and clock cycle optimizations.

AWARDS AND ACHIEVEMENTS

Schulich Leader Scholarship 2016 – 2020

- **\$80,000 full-ride scholarship**; 50 awarded nationally among 1512 nominees; selected for academic excellence in science, technology, engineering, and mathematics, and outstanding community or entrepreneurial leadership.

1st Place, Western Engineering Competition - Senior Design Jan. 2020

- Built a robot to collect Martian artifacts in a timed environment with limited budget and weight.
- Qualified for **national Canadian Engineering Competition**.

Jamie Cassels Undergraduate Research Award for 2019-2020 Sept. 2019

- Under the mentorship of faculty supervisor, research **hardware acceleration** for ML neural networks.

1st Place 3-Time Winner, UVEC Engineering Competition - Senior Design Oct. 2017, 2018, & 2019

- Developed the **best robotic solution** with limited materials in a timed environment.
- Served as **delegate** at **regional Western Engineering Competition**.

3rd Place, Google Games Competition Oct. 2017

- Competed in team challenges focusing on problem solving and algorithm design.

3rd Place, Engineering Design Autonomous Cable-Carrying Robot Project Mar. 2017

- Architected the robot's control program using Finite State Machine with basic control theory & signal processing.
- Challenge: The robot must find a target object within constrained search area and run a simulated cable from source to target while minimizing excess cable and object collisions.

2nd Place, Engineering Design Presentation to Saanich Parks and Recreation Dec. 2016

- Presented conceptual designs on infrastructure that fosters a positive attitude towards sustainable energy.

1st Place, UVEC Engineering Competition - Junior Design Oct. 2016

- Identified the client's objectives, constraints; constructed the prototype; pitched the final product to judges.
- Served as delegate at regional **Western Engineering Competition** in Banff, Alberta.

Governor General's Academic Medal, Bronze 2016

National Champion, Michael Smith Science Challenge 2014

- Set **national record** score of 97.5% among 1,700+ candidates.

POSTER PUBLICATIONS

Neural Network Hardware Acceleration: Leveraging parallelism in FPGAs to improve CNN performance