

Redmond, WA, USA hello@robertkl.com

SUMMARY OF QUALIFICATIONS

- Extensive coding experience: 7+ 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

University of Victoria, Victoria, BC

Sept. 2016 - Apr. 2021

Cumulative GPA: 97% **WORK EXPERIENCE**

Software Engineer II - Azure Cognitive Search

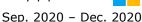
Jun. 2022 - present

Software Engineer - Azure Cognitive Search

Jul. 2021 - May 2022

Microsoft, Redmond, WA (Remote)

Drove development work for a highly requested feature; revamped key component of telemetry pipeline.



Software Engineer Intern - Azure Cognitive Search

Software Engineer Intern - Azure Search, AI Platform

Microsoft, Redmond, WA (Remote)

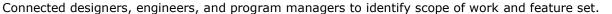
Designed & completed 2nd most requested API & backend feature on Azure Cognitive Search team in C#.

Currently released under preview API.

Jun. 2019 - Aug. 2019

Microsoft, Bellevue, WA

Developed a <u>dynamic search website generator</u> with suggestions and filtering options in TypeScript.



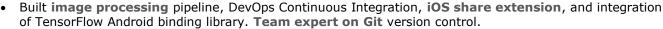
Improved user experience on Azure Search portal by adding new JSON editor & search website customization.

Software Developer Intern - Garage Program

Jan. 2018 - Apr. 2018

Microsoft, Vancouver, BC

Built <u>cross-platform mobile app</u> leveraging offline machine learning for chest x-ray classification in C#.



LEADERSHIP EXPERIENCE

Founder & Program Leader, Senior's Program

Jul. 2015 - Oct. 2021

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

Sep. 2019 - Jan. 2021

• 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 Networks

github.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 Segmentation

github.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
- Configured CMake for platform agnostic compilation; profiled code using Valgrind; created custom asm operator.

Achieved a 10x speedup compared to naïve implementation by using C and assembly-level optimizations.

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)

<u>bit.ly/RLAudioFX</u>

- 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 material.
- 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

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