Robert Lee

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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
Cumulative GPA: 97% Sept. 2016 – Apr. 2021

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 Sep. 2020 – Dec. 2020
Microsoft, *Redmond, 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.

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
- 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 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