Zephaniah Ko | zephaniahko@gmail.com | 778-828-2345
Personal Portfolio: https://zephko.github.io/

Education

University of British Columbia, Sept 2018 - Present
Bachelor of Applied Science: 3rd Year Engineering Physics
Cumulative Average: 86.3%
Expected Graduation: May 2023

Technical Skills

Electrical:

- Experienced with component selection, schematic capture and PCB Layout using Altium Designer
- Construction of analog circuits (LCR, Op-Amps, FETs, BJTs) and digital circuits (Logic Gates, Flip-flops, Counters)
- Electronics debugging skills with multimeter, oscilloscope, function generator
- Soldering: surface mount, through hole, general wire connections
- Experience with communication protocols: SPI, I2C, Ethernet, CAN, PWM, RS422

Software:

- Languages: C++, Python, C, Java, BASH, MATLAB
- Robotics: ROS, Gazebo, Rviz, OMPL
- Experience with OpenCV, Keras
- UNIX/Linux shell proficiency
- Git and Continuous Integration
- Markup: HTML, CSS

Work Experience

UBC Collaborative Robotics Laboratory
Robotics Research Intern **Jan 2020 – May 2020**

Developed robotics software for a CS/robotics research team, creating a control system and interface for cognitively impaired adults to learn to drive powered wheelchairs while sharing control with a trainer

- Wrote clean, well-documented Python code to develop ROS wheelchair control system capable of interfacing with control from analog electronics, Bluetooth, USB, ethernet, and wi-fi on an embedded ARM-Linux board.
- Debugged and tested electrical hardware and SPI for digital-to-analog conversions on a custom PCB BeagleBone shield.
- Automated network configuration and robot startup processes using Bash and Python scripting, reducing total start time by over 50%.
- Integration of LiDAR data to perform SLAM and navigation in both physical environments and Gazebo simulations.
- Developed Gazebo simulation for trainers to practice remote control over a shared control wheelchair.

Technical Project Experience

UBC Rocket – Avionics Electrical Hardware Member http://www.ubcrocket.com/ **Sep 2020 – Present**

Designing electrical hardware with power regulation, sensor data collection, telemetry, and track position over time for UBC Rocket's Whistler-Blackcomb rocket to launch to the Karman Line in the Base 11 Space Challenge.

- Designed layout of the rocket's main "flight computer" 4-layer PCB with a NXP MK66, which regulates a Li-ion battery power source into 5V and 3V3, collects data from sensors via I2C, SPI, RS422, Ethernet, and CAN to communicate flight critical data and detect apogee.
- Impedance matched CAN, ethernet, and RS422 transmission lines for signal to minimize signal reflections
- Contributed to component selection, schematic capture, and PCB layout of the CAN module which is used for acquisition of pressure and temperature data from the rocket's fuel tanks.
- Fully responsible for design of a Reaction Control System PCB including component selection, schematic and layout design.

Zephaniah Ko | zephaniahko@gmail.com | 778-828-2345

Engineering Physics Autonomous Robot Competition Finalists: 4th out of 16 teams **May 5 – August 6, 2020**
Website: https://zephko.github.io/enph-253-robot/
Built a fully autonomous robot capable of tape following, picking up cans, and depositing them in an 8'' tall bin. Visit the site for a video and full circuit schematics and CAD models.

- Oversaw and managed strategy for all the electrical systems and presented them in a design proposal.
- Designed power regulation, control circuitry for sensors, and IR frequency sensor with an amplifier and band pass filter to detect an 1kHz IR Beacon from 4 feet away.
- Designed and soldered optocoupled H-bridge circuit to process microcontroller signals and control DC motors with PWM.
- Developed C++ embedded software for a STM32F3 MCU including signal processing, PID control loops, motor actuation.
- Troubleshooting of crucial sensor and motor problems with both software and hardware tools.

UBC Sailbot – Motion Planning Software Team Member https://www.ubcsailbot.org/ **Jan 2020 – Present**
Developing path planning software for a fully autonomous sailboat to compete in the Vic-Maui International Yacht Race

- Developed path-finding modules using OMPL, including RRT* and A*, to generate paths for obstacle avoidance, adapt to changing wind conditions, and perform tacking maneuvers
- Integrated sensor data and OMPL path-finding into a ROS control system
- Designed and implemented mathematical algorithms for state validity checking, obstacle avoidance, and evaluating paths
- Created local pathfinding visualization tool in Python to display optimized boat path on a map with dynamic obstacles and wind sensor data
- Wrote unit tests for using Python unittest framework and created ROS nodes for testing special pathfinding cases

---

Relevant Coursework

ELEC 204 (A+, 100%) – Linear Circuits. Basic concepts and analysis techniques in the context of electric and electronic circuits including Bode plots and the Laplace transform. Treatment of RLC circuits, phasors, op-amps. Introduction to nonlinear circuit elements, diodes, BJT, FET circuits.
ENPH 253 (A+, 95%) – Introduction to Instrument Design. Practice in engineering design and instrument development including mechanical and electrical design, and communications with sensors, actuators. Micro-controller implementation and system integration.