Kai Asaoka

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SKILLS

- **Software:** Python, VHDL, Assembly, Java, C, Git, Linux, MATLAB.
- **Hardware:** KLayout, FPGA, Arduino/STM32, Digital Logic, Circuit Analysis, Soldering, Oscilloscopes.
- **Robotics:** Computer Vision (OpenCV, SIFT, Masking), Machine Learning (PyTorch, Keras, TensorFlow), Robotics Control (ROS), Simulation and Reinforcement Learning (Q-Learning, Gazebo), Controls (PID), PLC.
- **Optics**: Ansys Lumerical, Waveguides, Amplifiers, Attenuators, Filters, Time Interval Analyzers, Signal Processing.

EDUCATION

University of British Columbia   **Sep. 2021 – May 2026**

BASc, Engineering Physics   *Trek Excellence Scholarship for Top 5% GPA in Faculty*

- Engineering Physics is UBC's most competitive engineering specialization, combining aspects of mechatronics and honours physics.

EXPERIENCE

Quantum Experimentation Co-op Researcher   **May 2024 – Dec. 2024**

Nippon Telegraph and Telephone Corporation (NTT)   *Atsugi, Kanagawa, Japan*

- Led optical fiber-based multi-party quantum communication experiments by generating time-bin entangled GHZ state.
- Reduced experiment run time by up to 80% by designing automated experimental procedures with custom Python libraries using PyVISA and PySerial and NI LabVIEW to remotely control equipment with RS232 protocol.
- Developed algorithms for sorting time-to-event datasets to identify and filter for three-photon coincidences with scripts using NumPy, SciPy, and Matplotlib, and optimized system parameters through analysis of results.
- Implemented novel simulation model based on previous literature to realistically simulate affects of altering filtration parameters of light on interference results based on spectral relationship.
- Improved quantum interference between heralded single photon and weak coherent pulse, fulfilling all objectives; paper in progress.

Systems Engineer Co-op – Project Management   **Jan. 2023 – Apr. 2023**

VIA Rail Canada Inc.   *Vancouver, BC*

- Implemented 7 projects and increased workplace task completion rate by 10% using Kaizen, 5S, Six Sigma, and Lean Manufacturing.
- Managed operations using Azure DevOps and presented productivity data using Power BI for visualization during weekly meetings.
- Provided stakeholder consultation and technical documentation to directors, communicated with equipment suppliers, proposed projects and implemented training initiatives modelling the Toyota Production System to maximize efficiency in the workplace.
- Analyzed and developed floor plan incorporating Visual Management to relocate critical infrastructure and equipment, implemented centralized metal recycling depot based on stakeholder consultation and usage data collected through surveying.

PROJECTS

Self-balancing 2 DOF Inverted Pendulum   **Sep. 2024 – Present**

- Designing self-balancing 2 DOF inverted pendulum as controls system design lead from scratch incorporating CoreXY gantry system.
- Developing cascaded PID control algorithm in MATLAB Simulink to achieve simultaneous pendulum balancing and acceleration.

Self-Driving Car Simulation with Image Recognition   **Sep. 2023 – Dec. 2023**

- Implemented self-driving in Gazebo Linux car simulation using OpenCV, PyTorch, Keras, TensorFlow, and ROS in Python to incorporate sign and license plate reading, pedestrian detection and offroad navigation using image recognition and machine learning.
- Developed a contour-based road boundary smoothing algorithm using weighted averaging of detected lane lines to incorporate autonomous navigation in a simulated autonomous driving environment.
- Integrated a convolutional neural network for optical character recognition, leveraging contour-based training instead of raw images to enhance processing speed and accuracy.

All-Terrain Self-Driving Racing Robot   **Apr. 2023 – Aug. 2023**

- Designed autonomous racing robot, designed to sustain impact from a 1-foot drop and to navigate by following tape and beacon-emitted IR light, as lead mechanical designer to compete in Mario Kart-themed robotics competition.
- Developed steering and chassis architecture in CAD using Onshape, fabricated using 3D printers and laser/waterjet cutters.
- Fabricated prototype H-Bridge motor driver circuit on breadboard and soldered high-performance infrared detector circuit.

UBC Supermileage Powertrain Division Member   **Sep. 2023 – May 2024**

- Developed portable ECU tuning system incorporating Volumetric Efficiency and Alpha-N tuning for gasoline-powered prototype vehicle as a member of UBC Supermileage engineering design team.
- Installed ultra-wideband O2 sensor, implementing diagnostic board for USB interface for seamless integration with tuning software.