

LUKE LIU

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Education

University of Rochester

Master of Science - Computer Science

Rochester, NY

Aug. 2025 – Present

University of Washington

Bachelor of Science - Electrical and Computer Engineering

Seattle, WA

Sept. 2021 – Mar. 2025

Publications

- **Luke Liu**, Yinglun Zhang, Hande Küçük McGinty, Muhammad Amith, “A GUI for OBO Foundry’s ROBOT Library to Encourage Usability and Adoption”, IEEE International Conference on Healthcare Informatics, 2024

Research Experience

Information Processing Lab - University of Washington

Synthetic Data Generation for Vision Model Training

Jan. 2025 – Present

Advisor: Dr. Jenq-Neng Hwang

Seattle, WA

- Designed a simulation pipeline using Vega Prime to synthesize RGB and infrared video data for training computer vision models
- Automated bounding box label generation using the stencil buffer to isolate and extract object silhouettes frame-by-frame
- Trained a YOLOv8 model on the generated dataset for multi-class object detection from aerial and oblique perspectives

Electronic Monitoring of Alaskan Fish Species

May 2024 – Dec. 2024

Advisor: Dr. Jenq-Neng Hwang

Seattle, WA

- Developed a computer vision pipeline for automating fish measurements from video footage
- Created a midline estimation algorithm for length measurement using principal component analysis (PCA), contour detection, and image erosion
- Developed a custom PCA function to partition fish into head and tail regions, recalculating orientation along localized principal axes to address irregular contours and midline estimations
- Implemented a loss function with proximal gradient descent and L2 regularization to penalize midline deviations

University of Texas Medical Branch

GUI Development for Ontology Tool Usability

June 2023 – Oct. 2023

Advisor: Dr. Muhammad Amith

Galveston, TX

- Developed GOBOT, a cross-platform graphical user interface designed to improve the accessibility of ROBOT, a command-line tool for ontology file manipulation
- Created 22 functions by interfacing with ROBOT commands through API abstraction layers and system calls
- Conducted usability testing with research professors by implementing iterative design changes for widget placement and user-input optimization based on feedback

miRcore

Predictive Modeling of tRF-mRNA Interactions

Oct. 2024 – Present

Advisor: Dr. Inhan Lee

Seattle, WA

- Analyzed tRNA-derived fragments (tRFs) in Alzheimer’s microglia to identify regulatory relationships between tRF and mRNA expression
- Integrated RNA-seq and proteomic data to examine tRF5 upregulation and its negative correlation with immune-related genes such as *HLA-DRA* and *WDR1*
- Developed computational pipelines using Bowtie2, DESeq2, and RNAhybrid to map reads, quantify differential expression, and predict tRF-mRNA binding interactions

Gene Expression Profiling for Opioid Addiction Biomarkers

Aug. 2019 – Apr. 2020

Advisor: Dr. Inhan Lee

Ann Arbor, MI

- Analyzed NCBI microarray datasets to identify down-regulated genes in the nucleus accumbens of opioid-addicted patients to uncover biological markers of addiction
- Applied t-tests, analysis of variance (ANOVA), linear models, and empirical Bayes methods to compare gene expression between control and opioid-addicted subjects
- Classified gene expression profiles using support vector machines and random forests
- Identified FBL and NHP2L1 as key down-regulated genes with implications for schizophrenia in opioid-addicted individuals

Teaching & Leadership Experience

Paul G. Allen School of Computer Science & Engineering

Aug. 2023 – Present

Lead Teaching Assistant

Seattle, WA

- Developed a pipeline to convert Markdown cheat sheets to HTML, making them compatible with screen readers
- Led weekly meetings with a group of over 20 Teaching Assistants to discuss grading logistics
- Developed programming assignments, technical specifications, and practice problems for a class of 400 students
- Debugged individual student code in office hours to resolve structural, semantic, and conceptual coding issues

miRcore

June 2019 – Aug. 2019

Lead Teaching Assistant

Ann Arbor, MI

- Taught high school students introductory R programming and microbiology, guiding them in using NCBI and STRING databases to analyze large mRNA datasets for bioinformatics research
- Served on the online relations committee, responsible for organizing and coordinating online meetings

Work Experience

Cloud Clusters Inc.

June 2024 – Aug. 2024

Software Engineer Intern

Kansas City, MO

- Performed feature engineering to enhance deep learning models for detecting fraudulent purchases and suspicious customer behavior
- Tested models, progressing from probabilistic models (Naive-Bayes) to language models (BERT)
- Integrated the fraud detection model into the company's website using Django

Extracurriculars & Projects

Cornbear

Jan. 2024 – June 2024

Backend Developer

Seattle, WA

- Worked with a team of Teaching Assistants to develop an auto-grading tool for the introductory programming classes to reduce grading time by 50%
- Developed style and concept checkers using static analysis tools to manage and lint through student submissions

UW Human Powered Submarine

June 2022 – Sept. 2023

Electrical Engineer

Seattle, WA

- Developed a codebase using the I2C protocol to interpret sensor data for diver feedback on submarine alignment
- Provided depth data to the diver using liquid crystal displays (LCDs) and light-emitting diodes (LEDs) through an integrated depth sensor
- Developed a driveshaft clamp that stores and utilizes magnets to provide real-time RPM data through the integration of hall-effect sensors

HuskyADAPT

Oct. 2021 – June 2022

Electrical Engineer

Seattle, WA

- Prototyped a drumset with sound-activated LED lights catered to those with hearing impairments and those who prefer multisensory experiences
- Showcased our prototype, receiving positive reception and interest from an audience representing diverse backgrounds and disabilities

Technical Skills

Languages: C++, C, Java, JavaScript, Python, HTML/CSS, SQL

Frameworks/Libraries: PyTorch, TensorFlow, Scikit-learn, OpenCV, NumPy, SciPy, Pandas, Matplotlib, Django, React, JavaParser, CheckStyle

Developer Tools: Arduino, Git/GitHub, QT, Linux, SolidWorks, KiCAD, Hugo