Seiya Kozakai

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ACADEMICS

University of Michigan — Ann Arbor, MI
M.S.E. Electrical & Computer Engineering in Signal & Image Processing and Machine Learning — Expected May 2025
B.S.E. Computer Engineering — May 2, 2024

EXPERIENCE

Johns Hopkins Applied Physics Laboratory (APL) — **May 2023 - Aug 2023, May 2024 - Aug 2024**

Algorithm Development Engineer Intern Summer 2024 (Secret Clearance) — Laurel, MD

- Worked on ML for a multi-spectral shallow water target detection system mounted to a Coastal Reconnaissance UAV.
- Researched effects such as ghosting, stray light, and light absorption to improve training data viability by ˜62%, exploring various techniques such as thresholding and localized image mean values.
- Successfully built a pipeline to estimate data using Principle Component Analysis (PCA) and Bayesian MAP estimation.
- Developed algorithms to remove unwanted light streaks that covered over 66% of the image, with 90% overall reduction.
- Integrated a MLFLOW server with a MINIO bucket (AWS S3) and a PostgreSQL database for streamlined training.

Acoustic Algorithms Engineer Intern Summer 2023 (Secret Clearance) — Laurel, MD

- Worked on a vertical-line array to detect ships and submarines using a Least-Squares based Target Motion Analysis.
- Developed a novel custom API in C, binding our C++ Libraries and algorithms with Python data readers.
- Created unit tests for various software projects using Pytest and GoogleTest, speeding development 1 month ahead.

NCKU Intelligent Information Retrieval Laboratory — **June 2022 - September 2022**

Deep Learning AI Intern — Tainan, Taiwan

- Analyzed recent developments in AI and deep learning research, such as the rise of transformers, with professor Chiang Jung-Hsien in National Cheng Kung University (NCKU).
- Implemented machine learning models such as CNN (Resnet) and GAN for image enhancement with 43% less parameters.

PROJECTS

New Leaf — *React, Python 3.12, Flask, SQLite, AWS EC2* — **January 2024 - April 2024**

- Built a full-stack web application for new parents to promote community building and a hub for expert parental advice.
- Created a recommendation algorithm based on user actions for advanced search capabilities and personalized results.

LazyTune — *C/C++, Python3.11, DSP, RTOS, Tkinter* — **September 2023 – December 2023**

- Designed and built a Digital Synthesizer from the ground up using a Raspberry Pi 4 and a Teensy 4.1 (Arduino).
- Developed an audio system using the PJRC Audio Library tool, creating a signal chain with a 12-band Vocoder and selectable effects (reverb, bit crush, etc) controlled using a mixture of physical knobs, buttons, and graphical interface.
- Custom built a Pitch Shift tool, which paired with the PJRC Library Note Frequency tool allows us to produce Autotune. Implemented via a Phase Vocoder approach, adjusting small segments and recombining via Overlap and Add.
- Achieved high functionality with low-latency audio processing of less than 11ms, while using less than 8MB RAM.

Spatial Audio Reconstruction — *Jupyter, Statistics* — **September 2022 - December 2022**

- Explored DSP techniques to create immersive spatial sound from 2-channels using Interaural Time/Level Difference with cross-correlation, pinna effect, and Head Related Transfer Functions (both a computational model using raytracing and an empirical model from microphone measurements).

LEADERSHIP

FIRST Robotics Team NRG 948 — Programming Lead — **September 2018 - June 2021**

- Designed lessons and taught Java, computer vision, and software development skills to a team of 32+ programmers.
- Utilized Agile Project Management and Azure DevOps to streamline internal communication.
- Performed repairs in the Pit Crew at competitions. Finalist in FIRST Championship 2019 in Houston, Texas.

SKILLS

Languages	English (native), Japanese (native, JLPT N1 Certificate), Chinese - Mandarin (Proficient)
Technical Languages	C++ (C++ 17), C, Python (3.11), Julia, MATLAB, Rust, Java, JavaScript, Verilog HDL
Tools & Frameworks	Linux, Git, Docker, ARMv8 & x86_64 ASM, Jupyter, Pytorch, Probability & Matrix Algebra
Hobbies	Piano (2010), Calligraphy (2010), Violin (2013), Guitar (2022)