# Maiko Lum

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## EDUCATION

**Boston University, College of Engineering**                                                                                    **May 2025**
Bachelor of Science in Biomedical Engineering | Minor in Computer Engineering                                        GPA: 3.43

**Coursework:** Circuits, Logic Design, Signals and Controls, Computer Organization, Algorithms, Biological Transport, BME Data Analysis, Molecular Cell Biology, Thermodynamics, Systems Physiology, Mechanics, Statistics

## SKILLS

**Laboratory:** DNA Sequencing, qPCR, ECG, Gel Electrophoresis, EOG, Oscilloscope
**Programming Languages:** C++, C#, C, Verilog, MATLAB, Python, MIPS Assembly
**Mechanical Design:** Autodesk Inventor, OnShape, CAD, Cura, Reconstruct
**Language:** English (Fluent), Japanese (Fluent)

## WORK EXPERIENCE

**Boston University Dept. of Electrical & Computer Engineering**                                          **Aug 2024 – May 2025**
*Undergraduate Teaching Fellow – Logic Design*                                                                                Boston, MA
- Reinforced student understanding of logic design concepts by working with a professor to design and lead labs, demonstrating technologies such as Xilinx Vivado, FPGA boards, and Verilog HDL
- Instructed 80+ students by constructing homework problems, providing support with assignments, debug and host office hours for one-on-one and group help sessions
- Managed workflow of student graders by ensuring grades are logged before deadlines

**Boston University School of Medicine Gong Lab**                                                                 **Jun 2022 – May 2025**
*Undergraduate Research Assistant*                                                                                            Boston, MA
- Experimented with different flow rates and effects on drainage of a human eye giant vacuole (GV) through 3D reconstruction (Reconstruct software) of over 200 GVs to better understand anatomy for micro-invasive surgical treatment of glaucoma
- Evaluated findings against published literature using serial block-face scanning electron microscopy (SBF-SEM)
- Maintained functionality of perfusion experimentation by troubleshooting SCB-68 circuitry and pressure transducer hardware
- Presented work titled *Comparison of Giant Vacuoles to the Inner Wall Endothelium of Schlemm's Canal between Normal and Glaucomatous Human Donor Eye* at Boston University Undergraduate Research symposium
- Summer 2024 Undergraduate Research Opportunities Program funding recipient

**Japonaise Bakery & Cafe**                                                                                          **May 2024 – Aug 2024**
*Cashier*                                                                                                                      Brookline, MA
- Facilitated a positive customer experience by promptly addressing questions and resolving concerns
- Collaborated with team members to optimize checkout speed and improve overall operational efficieny

**Boston University Dept. of Organic Chemistry**                                                                **May 2022 – Aug 2022**
*Laboratory Assistant*                                                                                                          Boston, MA
- Synthesized chemical stockrooms for Organic Chemistry labs and facilitated laboratory room setup
- Analyzed different compound and its usage in experiment to further knowledge on organic chemistry

**Boston University Finzi Lab**                                                                                        **Jan 2022 – May 2022**
*Laboratory Assistant*                                                                                                          Boston, MA
- Conducted precise weighing of root samples in Harvard Forest, investigating nitrogen and carbon content levels to monitor its emission status

## PROJECTS

**Whisper to Words: AI-Powered Speech Therapy Application**                                              **Sep 2024 – May 2025**
- Designed a real-time, Unity-based speech therapy app for children with autism by integrating OpenAI's Whisper and Undertone transcription models
- Developed a custom 370 x 13,000 phonetic similarity matrix using generative AI to quantify pronunciation accuracy beyond amplitude metrics, significantly improving feedback precision for early speech patterns

**3D Successive Over-Relaxation (C, Pthreads)**                                                              **Apr 2025 – May 2025**
- Developed and parallelized a 3D SOR algorithm using threads with domain decomposition across x, y, and z axes
- Engineered thread-safe synchronization and dynamic convergence tracking, achieving optimal performance through z-axis partitioning and memory-aware design

- Benchmarked serial vs. multithreaded performance, demonstrating up to 4x speedup and identifying cache locality as critical factor in scalability through testing runtime improvement on large grid simulations

**FPGA Board Game: LED Catcher**         **Apr 2024 – May 2024**
- Designed and implemented a real-time LED-catching game on FPGA using Verilog and Vivado, featuring responsive user input and dynamic LED movement
- Built a functional testbench to simulate gameplay logic and validated system performance through hardware testing
- Contributed to game design and display logic, optimizing visual feedback and timing performance

**Quantitative PCR (qPCR) Analysis**         **Apr 2024 – May 2024**
- Engineered a quantitative PCR experiment using SYBR Green to analyze DNA amplification across serial dilutions, resulting in a detailed assessment of cycle threshold (Ct) values and fold change quantification
- Diagnosed procedural issues in real-time PCR data by identifying the absence of primers and proposing methodological improvements, including the incorporation of hydrolysis probes for enhanced assay specificity
- Synthesized and interpreted complex fluorescence data via QuantStudio5 software to evaluate experimental accuracy, generate amplification plots and calculate $\Delta$Ct and fold-change metric for gene expression analysis

**Android Application Game**         **Apr 2023 – May 2023**
- Coordinated with a team of four engineers to draft an Android application, enabling users to swipe incoming opponents through C++ back-end and Java front-end design
- Programmed front-end enhancement, integrating interactive elements and applying collision detection techniques
- Collaborated with back-end developers to establish user manuals, settings, difficulty levels, and character selection

**Desk Lamp for Neurodiverse Learning Needs**         **May 2022 – Jun 2022**
- Designed and coded a working prototype of a desk lamp accommodating users with ADHD and learning disabilities, considering given specifications in a group project leveraging a budget of $400
- Managed creation of prototype enclosure utilizing CAD and operated metal sawing, milling, laser cutting, drilling, and tapping machines and assisted with programming Arduino Nano microcontroller using C

## LEADERSHIP

**Biomedical Engineering Society** *President*         **2024 – 2025**
**Biomedical Engineering Society** *Vice President*         **2023 – 2024**
**Biomedical Engineering Society** *Secretary*         **2022 – 2023**
**Theta Tau Psi Delta Chapter** *Treasurer*         **2022 – 2023**