Ojas Kulkarni

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LinkedIn ● Portfolio

EXPERIENCE

Research Assistant Dec. 2023 – Present
University of Utah | Salt Lake City, UT

- Current research focuses in optical machine learning and silicon photonic implementations of optical machine learning architectures.

Lead Game Developer Dec. 2020 – Sep. 2023
University of Utah | Salt Lake City, UT

- Led game development for ASPIRE, the outreach program of the Telescope Array Project, with a focus on enhancing physics education through interactive simulations.
- Developed **25+** game simulations covering topics such as kinetic energy, simple and complex machines, and angular mechanics. Utilized modern web and game development principles to create engaging educational content.
- Implemented custom resources to optimize user experience, resulting in the generation of **500,000+** visits per year.
- Delivered weekly project updates, modernized existing games to enhance user experience, and consistently proposed innovative ideas for new games.
- Extensive software engineering through custom algorithms and data structures with emphasis on efficiency

Embedded Hardware Research Intern May 2023 – Sep. 2023
University of Cincinnati | Cincinnati, OH

- Implemented a reconfigurable matrix multiplier using Verilog HDL achieving a **20%** improvement in execution time compared to software-based approaches
- Aged the board using heat treatment and performed side-channel analysis using simple/differential EM techniques
- Characterized a **10%** variation in nominal operation of matrix multiplier from transiently aged circuit
- Presented cumulative research at the 2023 research symposium resulting in the *Best Research Presentation Award*

Nanotechnology Research Intern May 2022 - Sep. 2022
University of Louisville | Louisville, KY

- Designed and realized a ray-traced 3D simulation of a nanostructure growth, resulting in a **200-fold** execution speedup over previous research efforts
- Utilized Scanning Electron Microscopy (SEM) to verify simulation results via fabrication techniques, leading to **94%** more accurate result predictions
- Presented cumulative research at the NNCI A+M summit to a **50+** audience size

EDUCATION

University of Utah | B.S in Computer Engineering (ABET), B.S Applied Mathematics May 2024

- Relevant Coursework: Digital Signal Processing, Optoelectronics, Optical Communication Systems, Antenna Theory & Design, Computer Architecture, Embedded Systems Design, Data Structures and Algorithms, Digital Systems Design

PROJECTS

Retrofit Smart Home Jan. 2023 – Dec. 2023

- Designed and developed a retrofit smart home system transforming a traditional space into an automated space, reducing end-user costs by more than **62%**
- Designed PCBs integrating ESP microcontrollers, electric motors, drivers, battery management system, encoders yielding a **35%** reduction in fabrication costs compared to commercially available units.
- Implemented advanced sensor integration, including ambient light, barometric pressure, gas and CO2 sensors etc. to generate localized data with **98.5%** accuracy to power custom IoT devices
- Developed associated firmware including supporting I2C, USB, and Wi-Fi drivers to filter and utilize data

SKILLS

Electrical Engineering Toolset: UART, I2C, SPI, USB, Oscilloscopes, Digital Multimeters, Logic Analyzers, VNAs, FPGAs, LTSpice, MATLAB, Class 100/1000 Cleanroom
Software Engineering Toolset: Python, C, C++, C#, Java, Verilog HDL, JavaScript, HTML, CSS, TCP/IP, ARM, Linux, Git
Software: Altium, EagleCAD, KiCAD, Fusion 360, Intel Quartus, Xilinx Vivado, Keil IDE