Alex Allahar

202-644-3189 |alex.allahar@tamu.com

Education

Texas A&M University – B.S. in Electrical Engineering Expected May 2025

Experience

Smithsonian National Zoo – Washington, D.C. May 2018 – May 2019

Environmental Data Science Intern

- Cleaned and processed 3D GeoJSON bird tracking data, integrating it into a comprehensive bird database.
- Developed geospatial datasets in R for seamless integration into interactive visualizations.
- Built an interactive tracking table for filtering and analyzing bird migration data by species and location.
- Designed dynamic migration maps with Google Leaflet and JavaScript, enhancing user engagement.
- Integrated datasets and maps into the "Follow That Bird" website, improving accessibility with web technologies.
- Led educational demonstrations at the Smithsonian Zoo, applying data insights on bird migration and conservation.

Projects

SolarEye Security System Aug 2024 – Present

- Developed firmware for a security system on Raspberry Pi SC15184, enabling sensor acquisition, camera control, live streaming, and real-time database updates and storage of events via Firebase.
- Designed custom 4-layer PCB with a MOSFET relay for controlling an RTOS-based system.
- Engineered an embedded RTOS control system on Raspberry Pi for mobile app-based remote operations.
- Presented at IEEE TPEC 2025, showcasing embedded systems and smart security solutions.

TheHuzz Mutation Engine Optimization Aug 2024 – Dec 2024

- Enhanced TheHuzz with dynamic mutation and feedback-driven fuzzing to improve coverage and reduce runtime.
- Developed an effectiveness-checking algorithm to enhance mutation strategies and minimizing redundancy.
- Benchmarked the optimized mutation engine against other verification methods at RTL on open-source processors in a Linux environment, resulting in up to a 7.95% increase in coverage.

NLP Transformer Model for SMS Classification Aug 2024 – Dec 2024

- Developed a custom transformer-based SMS classification model using machine learning and NLP techniques.
- Implemented self-attention, multi-head attention, and pooling layers using matrix operations, without frameworks.
- Utilized GloVe embeddings and custom tokenization to capture semantic meaning and improve text representation.
- Optimized backpropagation and gradient descent with binary cross-entropy loss for model training.

Single-Cycle Processor March 2024 – May 2024

- Designed a single-cycle processor in Verilog, integrating ALU, control unit, register file, and memory modules.
- Verified, validated, and debugged processor components using VCS waveforms and testbenches.
- Implemented watchdog timer for cycle management and error handling in simulation.

Skills

Languages: C, C++, Verilog, MATLAB, Assembly (LEGv8, ARM), Python, Java, R, HTML, CSS, JavaScript, LaTeX

Design Tools & Software: Altium, KiCad, LTspice, Multisim, Xilinx Vivado, Git, GitHub, Linux

Instrumentation: Oscilloscope, Logic Analyzer, Spectrum Analyzer, Function Generator, FPGA Development Board

Hardware: STM32, ESP32, Arduino, Raspberry Pi, MOSFETs, BJTs, ICs

Data Analytics: Pandas, NumPy, Matplotlib, Seaborn, SQL

Machine Learning: TensorFlow, PyTorch, Scikit-learn