Joel Mendez

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WORK EXPERIENCE

PepsiCo: *Software Engineer Intern* Valhalla, NY | 05/2023 - 08/2023

- Developed a computer vision-based machine learning model to detect PPE in lab settings, achieving 95% detection accuracy.
- Integrated facial recognition for notifications on violators with 90% accuracy.
- Deployed system with RTSP cameras and local web application for real-time monitoring and implemented a database for logging detections.

PROJECTS

Solar Tracker: C, Python, HTML, CSS, JavaScript, C++, Arduino, FreeRTOS, SPI, I2C, UART, ADC, Git

- Led the development of an embedded dual-axis solar tracking system, enabling real-time image processing with computer vision algorithms to optimize solar panel positioning, resulting in an 18% increase in energy efficiency.
- Developed a web-based monitoring and control interface hosted on the ESP32, providing remote access to real-time data on energy production, battery status, and weather conditions, improving user engagement and system management.

Bit-Banging Driver Library for ESP32: C, SPI, I2C, UART, Saleae Logic Analyzer, JTAG Debugger, GDB, OpenOCD

- Developed a comprehensive bit-banging driver library enabling custom UART, I2C, and SPI communication protocols on ESP32, with support for configurable baud rates, data frames, and bit-level control using GPIOs and hardware timers.
- Utilized a Saleae logic analyzer and JTAG debugger to validate protocol timing accuracy, ensuring reliable data transfer, error-checking mechanisms, and seamless communication.

STM32 Peripheral Integration: Timers, Interrupts, PWM, ADC, SPI, I2C, GPIO, UART, DMA, FreeRTOS

- Implemented a robust system managing servo motors, ultrasonic sensors, motion sensors, and a 16x2 LCD display on an STM32 microcontroller, leveraging FreeRTOS for efficient task management and concurrent processing of peripheral data using multiple threads.
- Utilized PWM for servo control, ADC for motion sensing, ultrasonic measurement for distance calculation, and real-time data updates on the LCD, demonstrating precise integration of multiple peripherals with timer-driven and interrupt-based mechanisms.

Classic Space Invaders on ESP32: C, FreeRTOS, ESP-IDF, SPI, GPIO, DMA, Timers, Interrupts, Git

- Created a Space Invaders clone on the ESP32 using C and the ESP-IDF framework, utilizing FreeRTOS to manage tasks for game logic, rendering, and input handling.
- Achieved smooth 24 FPS gameplay with efficient SPI rendering and responsive controls, implementing dynamic enemy patterns, collision detection, and varied spacecraft.

SKILLS

Programming Languages: C, C++, Python, Java, Arduino, MATLAB, Verilog, HTML, CSS, JavaScript, SQL

Embedded Systems: ESP32. STM32. Tiva C Series (ARM Cortex), Arduino Uno, PIC MCU, Altera DE2 FPGA

Protocols: RTSP, GPIO, I2C, SPI, UART, Wi-Fi, Bluetooth, HTTP, ESP Now, ADC, DMA

Tools: Git, Bash, Keil IDE, Wireshark, Visual Studio, Jira, Google Cloud, Linux, Platform IO, Oscilloscope, Saleae Logic Analyzer, JTAG Debugger, GDB, OpenOCD, PSpice, Nessus, Microsoft Office, Code Composer Studio, MPLAB

Frameworks: ESP-IDF, OpenCV, Flask, TensorFlow, Keras, NumPy, Optuna, HAL, JUnit, Swing, OpenGL

EDUCATION

Manhattan University | Bachelor of Science in Computer Engineering | GPA: 3.84/4.00 | Graduation: May 2024

Relevant Coursework: Machine Learning, Computer Vision and Imaging, Neural Networks, Data Structures and Algorithms, Software Engineering, Embedded Systems Design, Network Security Systems, Operating Systems, Computer Network Architecture