

# Montserrat Alvarez

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## EDUCATION

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### University of California Davis

Bachelor of Science in Computer Engineering

Davis, CA

June 2024

## PROJECTS

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### VIDEO GAME CONTROLLED LEDS

November 2024

- Created a Python program to read a player's health and turn on LEDs using OpenCV and Pytesseract
- Programmed a PSoC 6 microcontroller to process data received via UART from the python program to turn on different LEDs to reflect the player's health
- Implemented a custom BLE service to allow the user to also control the LEDs via the AIROC application
- Developed a FreeRTOS scheduling system to manage different tasks, including a BLE task that uses PWM to blink an LED when BLE is disconnected

### OBJECT DETECTION SYSTEM (CAPSTONE)

January - June 2023

- Partnered with a team to design a prototype to detect objects for an autonomous vehicle for the UC Davis EcoCAR team
- Contributed to the programming of the Jetson Nano and PSoC to process data from ultrasonic and LiDAR sensors, displaying object distances on a terminal, and turning an LED on when the distance is deemed unsafe
- Wrote a report and presentation detailing the hardware used, production cost, software flowchart, and other details

### STEP COUNTER

November 2022

- Worked with a team to design a wearable step counter that displays the user's step count on an android application
- Designed a charge manager board on Altium to charge the battery and connect to a buck boost converter to power the device
- Programmed a PSoC microcontroller to use I2C, UART, and BLE to allow communication between the accelerometer, and phone application

### PACMAN GAME

June 2022

- Created a pacman game using C and a TI CC3200 launchpad, with a teammate
- Displayed the game on an OLED display by using SPI communication and designed the sprites with an Adafruit library in Code Composer Studio
- Implemented HTTP and Amazon Web Services to automatically send the player's final score to their email

### SOUND FOLLOWING ROBOT

June 2021

- Programmed a robot to move towards sound using the TI MSP432 microcontroller and TI-RSLK Max robotics kit
- Built a microphone amplifier circuit to detect sound, and programmed digital filters to reduce noise, improving the robot's sound detection accuracy
- Measured and processed the audio signals in digital domain using an oscilloscope and Code Composer Studio

### FPGA BOARD DICE GAME

June 2021

- Designed a counting dice game using schematic capture, digital logic, and Quartus on the DE10-Lite board
- Created truth tables, K-maps, and finite state machines to design all of the game logic and to display the score on a 7 segment hex display

## WORK EXPERIENCE

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### UC DAVIS COFFEE HOUSE

September 2022 - June 2024

- Maintained a high standard of food safety and cleanliness by regularly checking the temperature of the food to ensure compliance with health regulations
- Worked in a fast paced environment and served customers efficiently and courteously in order to uphold customer satisfaction resulting in a base of regular customers
- Expedited service and created a positive work environment by collaborating efficiently with coworkers

## SKILLS

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**Technologies:** Quartus, ModelSim, LTSpice, Altium, OrCAD Capture CIS, GCC, FreeRTOS

**Languages:** C, C++, Python, Verilog, VHDL, RISC-V assembly, MATLAB

**Interfaces:** I2C, UART, SPI, PWM

**Lab Equipment:** Oscilloscope, Function Generator, Multimeter