UNMESH PHATERPEKAR

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EDUCATION

University of Colorado, Boulder, USA **August 2023 – June 2025**

Professional MS in Electrical and Computer Engineering, Embedded Systems **(GPA 3.61/4)**

Subjects: Embedded Systems Design, Principles of Embedded Software, Practical Printed Circuit Board Design, IoT Embedded Firmware, Low Power Embedded Design Techniques, Introduction to Power Electronics, High Speed Digital Design

TECHNICAL SKILLS

Programming Languages	C, C++, Python
Operating Systems	Linux and Microsoft Windows
Microcontrollers	8051, NXP FRDM-KL25Z, Arduino, Jetson Nano, Blue Gecko, Raspberry Pi
Software	Simplicity Studio, STM32CubeIDE, MCUXpresso, Altium, KiCad, Keil µ Vision, LTSpice, AutoCAD, SolidWorks, ADS, Hyperlynx, MATLAB and Simulink, Gazebo, Cheddar, Ansys HFFSS

EXPERIENCES

University of Colorado Boulder, Boulder, CO **January 2025 - Present**

Graduate Teaching Assistant | Internet of Things – Embedded Firmware

- Guided students in troubleshooting and debugging IoT projects using the BLE stack on EFR32BG13 Blue Gecko Series from Silicon Labs and contributed to the course by resolving issues and enhancing project development
- Reviewed and optimized students' code by providing best practices for embedded firmware development, error handling, and efficient peripheral communication and collaborated with the instructor to redesign and enhance the course content

Dwarkadas J. Sanghvi College of Engineering **March 2020 - May 2021**

Electronics and Simulations Department Member | ABU Robocon 2021

- Aided in designing circuits with microcontrollers such as Arduino DUE, Arduino UNO and selected as the Main Controller of Robot, securing an All-India Rank of #9 in DD National Robocon (2021), organized by ABU Robocon
- Liaised with the Mechanical department to analyze parameters for real-time simulations on ROS and Gazebo under the Simulations Department, securing 5th place in the DJSCE Robocon MATLAB competition (2021)

EcoSys Efficiencies Private Limited, Mumbai, India **May 2020 - July 2020**

IOT System Development Intern | Google Firebase, Altium, Sublime Text

- Gathered live warehouse data and logged to Google Firebase via the Console for inventory tracking and established a web page using HTML, CSS, and JavaScript to display information while converting project data specifications into structured data formats
- Initiated hardware-based solutions to detect discrepancies within the warehouse by integrating motion sensors while designing an automated anti-theft system to enhance security and prevent unauthorized access or inventory loss

ACADEMIC PROJECTS

Pocket Ranger | Simplicity Studio, Altium, LTSpice

- Designed and programmed a low-power gaming system using two Blue Gecko MCUs, enabling Bluetooth Low Energy (BLE) communication between a sensor-equipped controller (Stick Gecko) and a display unit (Screen Gecko)
- Integrated a joystick, MPU-6500 gyroscope, ambient light sensor, and SH1107 OLED display into a custom PCB, optimizing firmware for efficient power management using the BQ25570 PMIC, with charging support via battery and solar cell

Pi Parking System | Raspberry Pi OS, OpenCV, Visio, Cheddar

- Programmed a real-time parking system prototype with GPIO for gear simulation, integrating OpenCV to display a 15FPS reverse camera feed, an ultrasonic sensor with motor control to apply brakes within 300ms of obstacle detection
- Implemented POSIX APIs to develop camera, sensor, motor, and scheduling services, ensuring efficient real-time operation and process synchronization through semaphores for optimized resource management and system performance

Eco Sensor System | Simplicity Studio, Visio, Arduino

- Devised 90% of a product detecting flammable gas (300-10000ppm) and measuring ambient light using MQ-2 and TEMT6000 sensors, converting data via ADC, and displaying real-time data on a WS2B18 RGB board using WS2812 protocol
- Created GATT services for sensor data and integrated encrypted wireless communication and alarm systems to signal hazardous conditions in a client-server configuration

Smart Security System | MCUXpresso IDE, State Diagram, LogicPort

- Designed and implemented a security mechanism using a PIR sensor, achieving 95% accuracy in detecting unauthorized access and reducing false alarms by 30% through an innovative hand gesture authorization system
- Employed a security system using a GPIO-based interface for the PIR Obstacle Sensor and I2C protocol for the ZX Gesture and Motion Sensor, triggering an alarm upon detecting unauthorized entry to alert the user

Agriculture Automated Irrigation System | STM32 Cube MX, PuTTy, KiCad

- Developed an advanced UART-based Modbus irrigation system, optimizing dispensing accuracy, nutrient efficiency, and crop yields while reducing fertilizer and water usage by up to 30% for sustainable farming

EXTRA CURRICULAR ACTIVITIES

- Built projects like the Water Reservoir Management System and Module-Based Indoor Air Quality Monitoring System, utilizing water level sensors, NodeMCU ESP8266, DHT11 temperature sensor, and SIM900A GSM module for real-time data monitoring and communication and co-authored research papers on those projects