# Unmesh Phaterpekar

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## Education

**University of Colorado, Boulder** **August 2023 - July 2025**
***MS in Electrical and Computer Engineering, Focus in Embedded Systems*** **(GPA: 3.63/4.0)**
**Courses:** Embedded Systems Design, Practical PCB Design, Low Power Embedded Design Techniques, High-Speed Digital Design, Introduction to Power Electronics, IoT Embedded Firmware,

**Dwarkadas J. Sanghvi College of Engineering** **August 2018 - May 2022**
***Bachelors in Electronics and Telecommunications Engineering*** **(GPA: 3.83/4.0)**
**Courses:** Electronic Devices and Circuits, Digital System Design, Microcontrollers and Applications

## Skills

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| Microcontrollers/Microprocessors | 8051, STM32, EFR32, MKL series, ATmega series, NVIDIA Tegra, Broadcom BCM |
| Programming Languages | C/C++, Python, HTML, CSS |
| Debugging Tools | Oscilloscopes, Logic Analyzer, Multimeters, TDR, VNA, JTAG |
| Communication Protocols/Peripherals | GPIO, SPI, I2C, UART, ADC, DAC, Timers |
| Hardware Design Tools | PCB Design, Circuit Design, Altium, KiCad, LTSpice, ADS, HyperLynx, HFSS |
| Software Development and Simulation | Git, Simplicity Studio, STM32CubeIDE, MCUXpresso, MATLAB and Simulink, Gazebo, AutoCAD, SolidWorks, Microsoft Office |

## Experience

**University of Colorado, Boulder** **January 2025 - May 2025**
***Graduate Teaching Assistant*** | ***Internet of Things - Embedded Firmware***
- Guided students in debugging IoT systems on EFR32BG13 by resolving hardware communication bugs, updating APIs, and redesigning frameworks, helping solve around 60% of reported technical issues and improving stability.
- Optimized embedded firmware by refining peripheral communication and error handling. Updated course labs with hardware-focused improvements, leading to a 30% reduction in device failures and smoother project execution.

**Hydrobar Technologies** **May 2022 - July 2023**
***Import/Export Assistant*** | ***Mumbai, India***
- Managed billing, invoicing, and documentation for the supply of hydraulic motors, pumps, and equipment to domestic clients, ensuring accuracy and compliance with company and client requirements.
- Coordinated with logistics providers and internal teams to track deliveries and streamline dispatch operations, improving supply timelines and supporting efficient order fulfillment for clients like Mahindra & Mahindra and L&T.

**D.J. Sanghvi College of Engineering** **March 2020 - June 2021**
***Electronics and Simulation Engineer*** | ***ABU Robocon 2021***
- Collaborated on the design and optimization of control circuitry using ATmega series MCUs, enhancing circuit reliability by 30% through refined hardware development, contributing to an All-India Rank 9 at National ABU Robocon 2021.
- Managed system kinematics and dynamics and developed real-time simulations in ROS and Gazebo, boosting simulation accuracy and testing efficiency, achieving 5th place at ABU Robocon MATLAB competition 2021.

**EcoSys Efficiencies Private Limited** **March 2020 - July 2020**
***IOT System Development Intern*** | ***Google Firebase, KiCad***
- Designed and implemented an automated anti-theft framework by integrating motion sensors with microcontrollers, enabling discrepancy detection and enhancing warehouse security, resulting in a 30% reduction in inventory loss risks.
- Created a hardware-based data acquisition platform with motion and environmental sensors, enabling real-time warehouse monitoring and improving inventory tracking accuracy by 40% via Firebase integration.

## Projects

**Pocket Ranger | Silicon Labs, Altium, LTSpice, BLE**
- Designed and developed a low-power gaming system by interfacing two Blue Gecko MCUs over BLE, enabling real-time communication between a sensor-equipped controller and display unit, achieving a 35% improvement in power efficiency.
- Integrated a custom PCB integrating a joystick, MPU-6500, ambient light sensor, and OLED display, optimizing firmware with a BQ25570 PMIC for solar and battery charging, resulting in a 40% increase in overall system energy efficiency.

**Instrument Droid | Altium Designer, Atmega, Baremetal**
- Designed 4-layer PCB integrating microcontroller, DAC, and op-amp for VRM Thevenin resistance measurement (0.1Ω-10Ω) with UART validation, achieving 25% accuracy improvement through enhanced signal integrity.
- Programmed bare-metal firmware for dynamic load control and on-the-fly resistance calculation via $I^2C$ sensor integration, implementing Smart LED and buzzer feedback to enhance system diagnostics and operational reliability.

**High-Speed Interconnect Analysis | ADS, Hyperlynx, Sierra Circuits, Saturn PCB**
- Analyzed S-parameters of a differential microstrip line in mixed-mode and single-ended configurations, assessing impedance, reflections, and crosstalk behavior up to 12 GHz, achieving 90% simulation-to-measurement correlation.
- Modeled interconnect behavior using discrete LC elements and tightly coupled differential lines, replicating launch discontinuities and coupling with $< 5\%$ deviation, validating 50-56 Ω single-ended and 100 Ω differential impedance.