Adesh Partap Singh

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EXPERIENCE

Motorola Solutions January 2025 – Present
Software Engineer Concord, ON

- Integrated Motorola's proprietary Portable Digital Repeater (PDR) data into an AI chatbot (BatChat) using Python, Langflow, and **Retrieval-Augmented Generation (RAG)** to enhance data accessibility and responsiveness
- Programmed and configured PDR channels and registers to enable RF communication between devices
- Ran Network scans using Nessus Tenable.io to check for any vulnerable ports or gateways before device launch

Neutron Controls May 2024 – August 2024
Embedded Systems Engineer Ottawa, ON

- Brought up a Battery Passport Chip (SEMPER NOR FLASH) which used SPI to transfer data from BMS to ECU
- Implemented communication protocols like **UART, SPI** and **I2C** for reliable ECU integration with peripherals, enhancing data transmission and system performance
- Boosted Infineons TC399 Tri-Core Microprocessor efficiency by **30%** with optimized algorithms, improving processing speed and responsiveness
- Redesigned and developed a BMS board (to a 16-cell version), ensuring robust hardware and firmware for optimal battery management and longevity

Accelerated Systems January 2024 – April 2024
PCB Hardware Designer Waterloo, ON

- Proficient in Altium, designed multi-layered boards (e.g., HV Buck Converters, Motor Controller, Sea-Keeper Gyro Stabilizer), optimizing PCB layouts for performance
- Simulated analog circuits with **LTspice** and **Matlab Simulink**, tested motors using BACDoor (the companys Motor Testing Software), analyzed results, and provided performance insights

PROJECTS

Stewarts Platform

- Built a **PID-controlled** Stewart Platform with six motors controlled using UART to balance a ball via inverse kinematics using real-time camera feedback
- Integrated I2C communication with a Raspberry Pi for real-time ball position tracking and platform control

Electrical Team Lead

- Spearheaded key projects such as the Levitating pod, **Battery Management System** (BMS), and **Motor Control Unit** for the G6 version of our Hyperloop Pod
- Bought in funding worth **$5000** by pitching our ideas and needs to the UWaterloo Finance Association

Other HW/SW Projects

- Implemented a Monte Carlo simulation for **Black-Scholes-Merton model**, to price European call and put options
- Utilized VHDL to design and implement various components, including multiplexers, shift registers, State Machines
- Proficient in Python development, utilizing libraries such as **OpenCV**, **OpenAI**, **pandas**, and **pygame** to create projects including a **Desktop Voice Assistant, Facial Recognition Attendance** and games like **Flappy Bird.**

EDUCATION

University of Waterloo September 2021 – May 2026
Bachelor of Applied Sciences, Mechatronics Engineer Waterloo, ON

- **Coursework**: Microprocessors Systems and Interfacing, Control Systems, Sensors and Instrumentation, Introduction to Microprocessor and Digital Logic, Embedded Systems Design, Power Electronics, Data Structures and Algorithms

SKILLS

Languages and Frameworks : C, C++, Python, HTML, CSS, JavaScript, React, and Firebase
Tools : Infineon Aurix, Tasking, Altium, Ki CAD, OrCAD, Arduino, Raspberry Pi, Proteus, Figma, Notion, Jira, GitHub

PROJECTS PORTFOLIO

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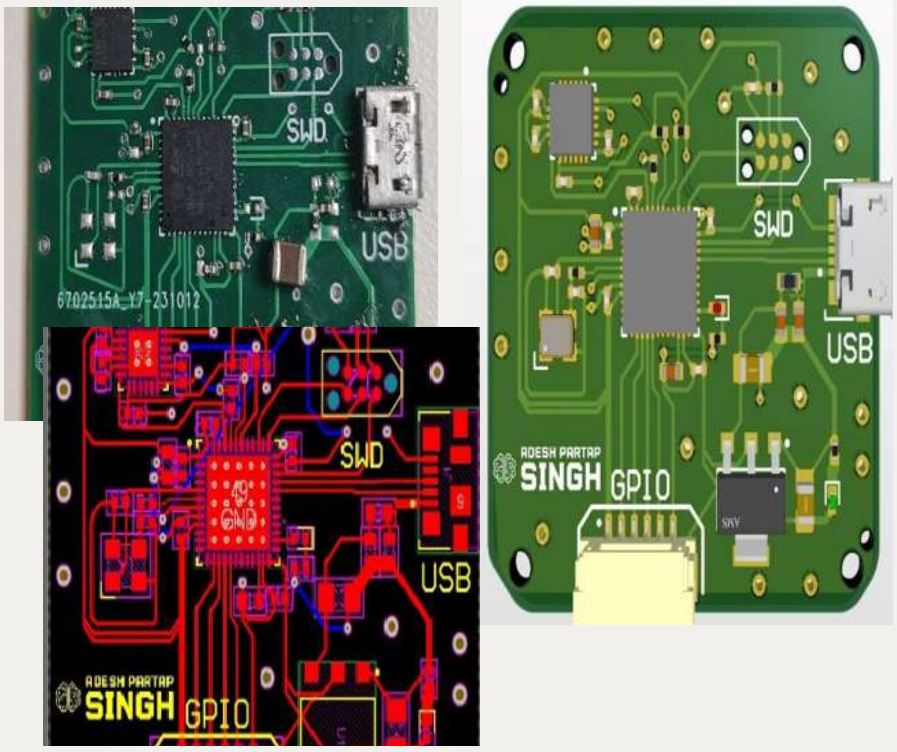
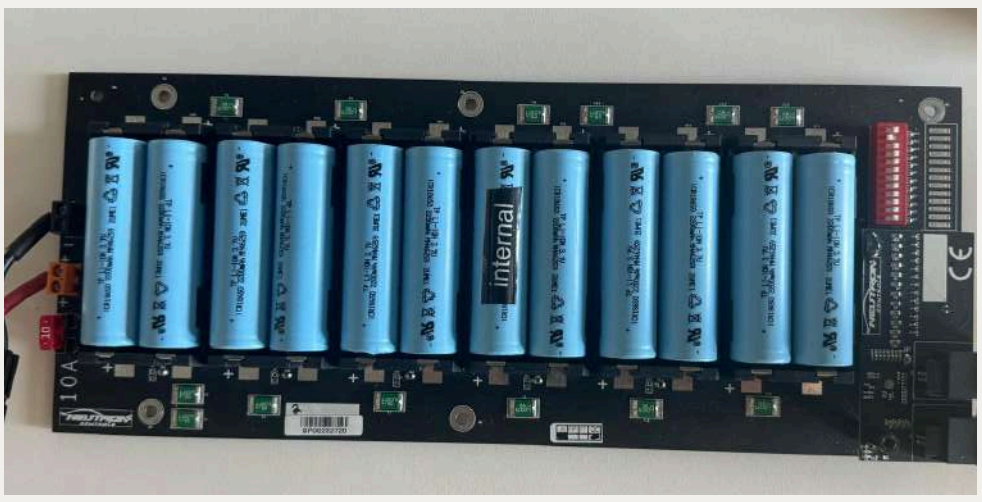
SUMMER 2025



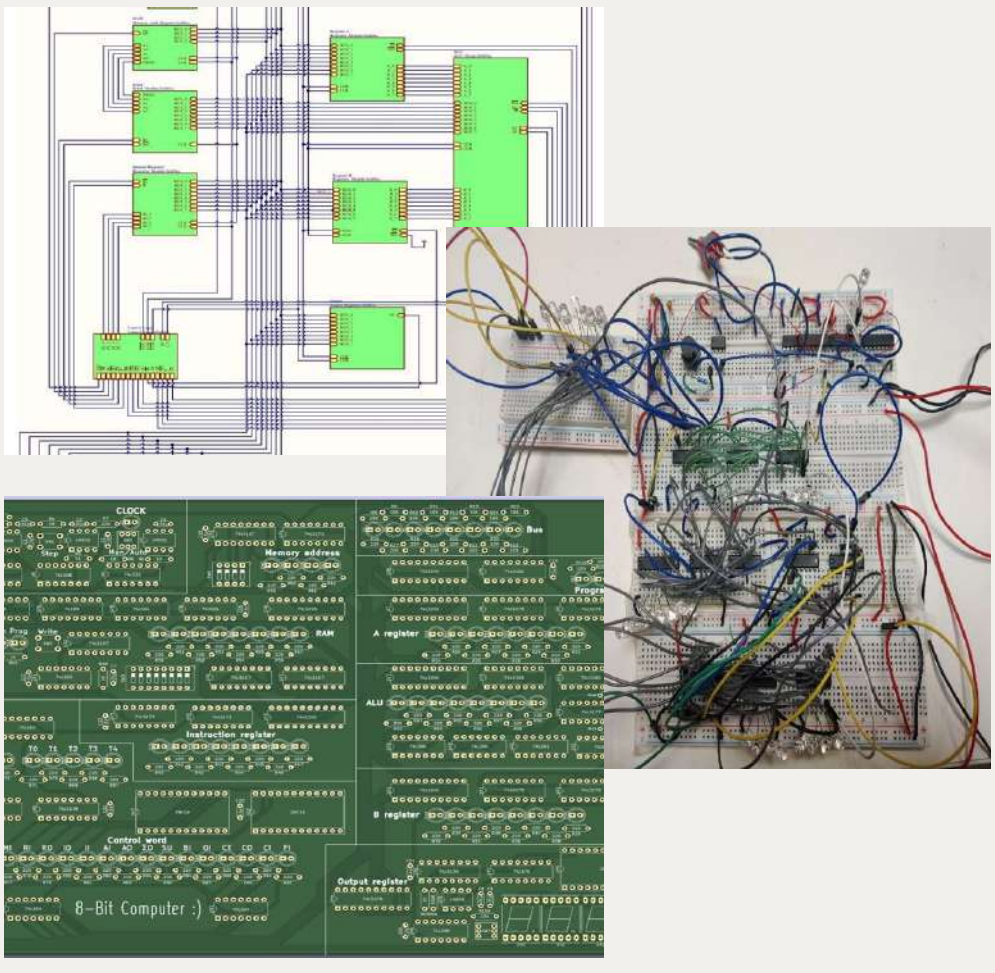
STM 32 Microcontroller

Designed an STM32 microcontroller for an RC car, utilizing an embedded **MPU 6050** chip to capture angles and hand orientation data. The chip processes the inputs to control the direction and movement of the car, enabling intuitive control based on the MPU's orientation. This setup allows for responsive and dynamic driving **using hand gestures**, leveraging the microcontroller's processing capabilities to translate sensor data into precise motor commands.



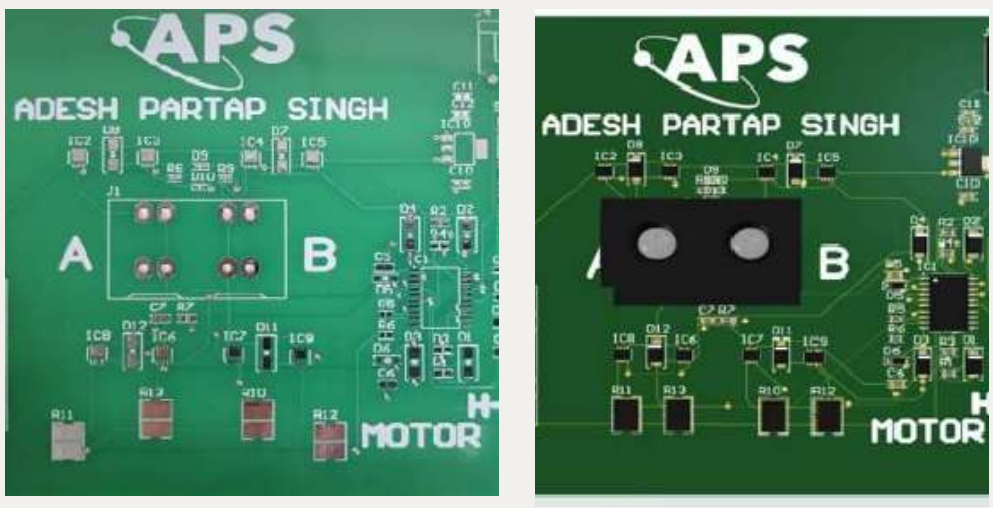
BMS Board

Designed a **Battery Management System (BMS)** board for my last company using Altium Designer, incorporating Infineon's **TLE 9012s** ICs for accurate communication and monitoring of State of Charge (SOC) and temperature. Developed the schematic and PCB layout, optimizing component placement and signal routing for noise reduction and thermal management.



8-bit Computer

Created a fully functional 8-bit computer system by integrating principles of digital electronics and low-level programming. The system includes various essential components such as **Registers**, a **System Clock**, an **Arithmetic Logic Unit (ALU)**, a **RAM** module, a **Program Counter**, and **CPU control logic**. This design enabled basic computational tasks, showcasing the practical application of theoretical concepts in computing.

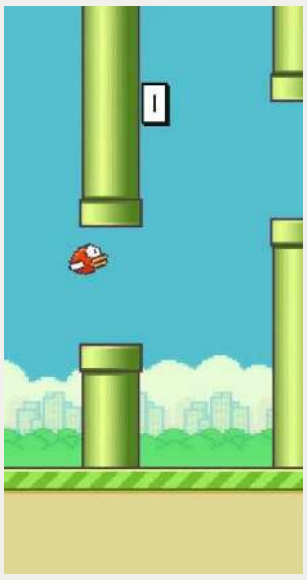


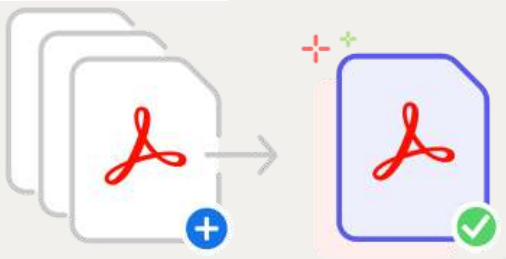
Motor Controller Board

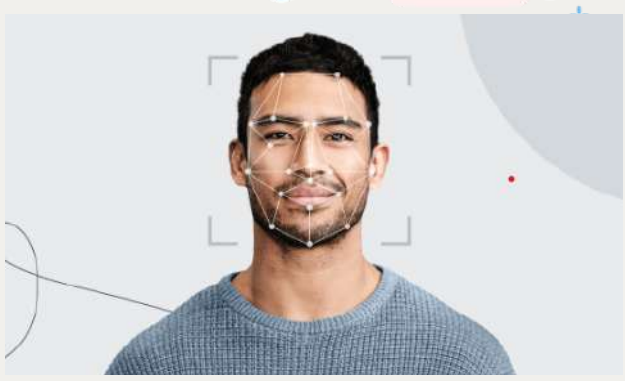
Designed a **12V H-bridge Motor Controller** on Altium, the primary focus being integrating the **Renesas HIP4081A** high frequency full bridge FET driver for optimal performance and efficiency. The design also incorporated protection mechanisms such as overcurrent and overtemperature detection to safeguard the system.

For more Projects and insights into my work and skills please visit:

GitHub **Website** **LinkedIn**

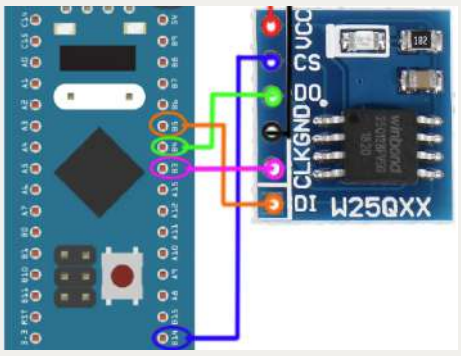


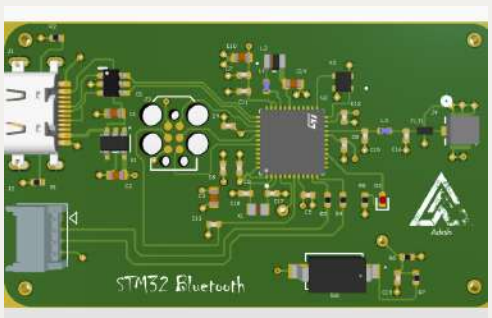




Python projects

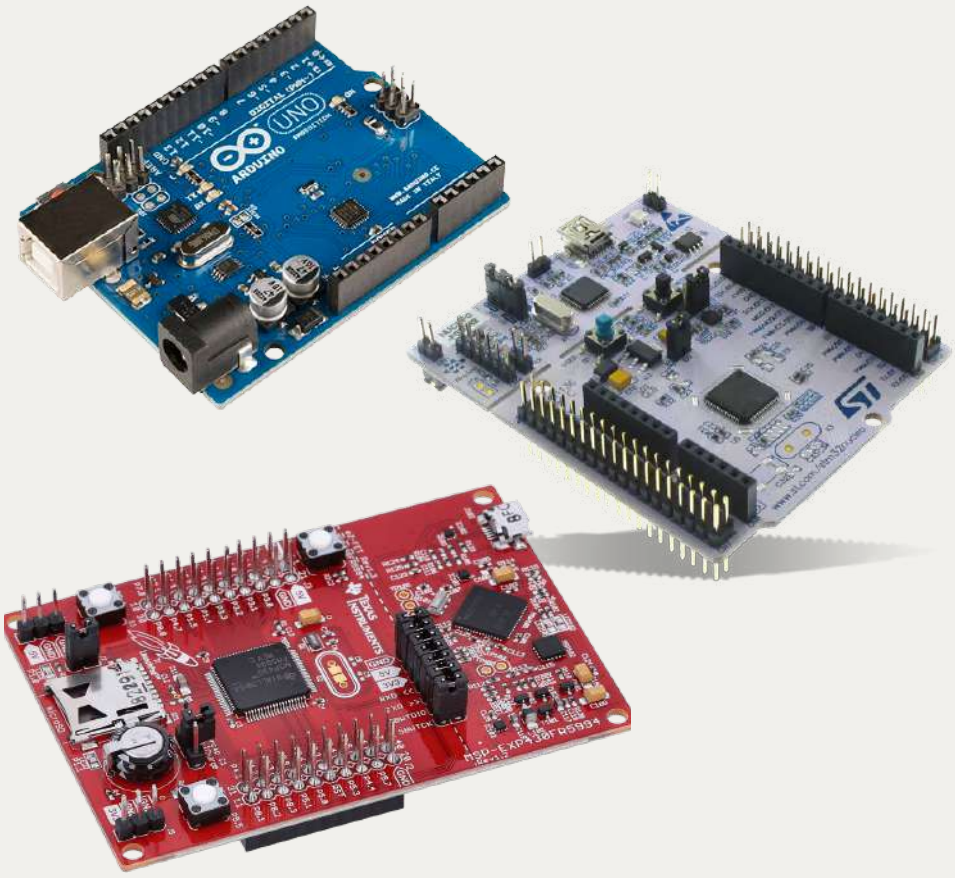
I have extensive experience working on diverse Python projects, including an **image resizer**, a **Weather app** (using Open Weather API), **OpenCV** projects like **face recognition attendance system**, game development in **Pygame,** a **personal finance tracking app** using **pandas** and other projects. These projects have honed my skills in Python programming and allowed me to gain a strong command of various Python libraries.





Device specific Drivers

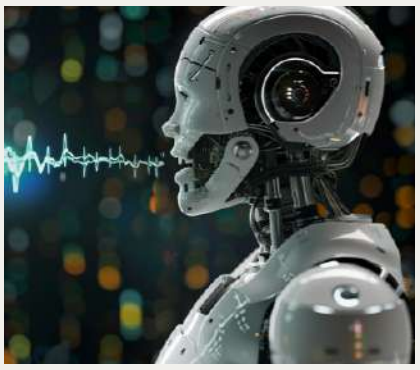
My expertise also includes working with **W25Q Flash**, **OLED** displays, **Bluetooth module, accelerometers**, **DHT sensors**, and **PWM controlled devices**. I focus on creating logical and efficient communication between hardware components and software applications. My projects highlight my ability to integrate and optimize systems, ensuring reliable and innovative solutions for a wide range of electronic applications.



Firmware Development

I have extensive experience programming various microcontrollers and chips, including **STM32**, **Arduino**, and **MSP430**. I have mastered communication protocols such as **I2C**, **SPI**, and **UART**, enabling efficient and reliable embedded system development. My proficiency includes low-level hardware interfacing, real-time data acquisition and conversion using **ADCs**, and communication optimization for enhanced performance and reliability.

OpenAI



J.A.R.V.I.S AI Assistant

Developed a voice-activated AI assistant using Python and **OpenAI's GPT-3 API**, automating web tasks, playing music, providing real-time information, and executing system commands, showcasing expertise in AI integration and user-friendly application design.

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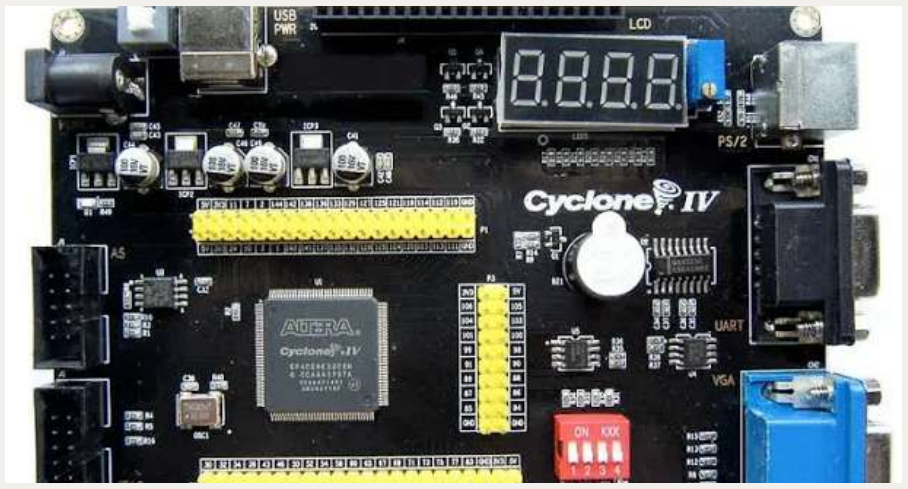
Finance In Cpp

Developed algorithms in C++ for trading options, leveraging the **Black Scholes model** to calculate option pricing and inform trading strategies. Additionally, created an **Amortize Engine** to calculate and display mortgage payments for property buyers, providing detailed breakdowns of principal and interest over the loan term. I have a strong understanding of financial mathematics and software development, developing practical tools for financial analysis and decision-making.



FPGA Programming

Gained experience in programming FPGAs using Intel **Quartus Prime**, where I developed simple state machine projects. Implemented various electronic components, including **comparators**, **multiplexers**, and other **combinational logic** gates, showcasing a solid understanding of digital design and hardware description languages.

Being a Mechatronics Engineer, I have dedicated the past few years to honing my skills in both Electronics and Software. My projects reflect my expertise and commitment to excellence in the field. Some of my other projects include building solar charger system, designing advanced power electronics systems like Buck/Boost Converters, engineered and programmed robotic arms for precise automated tasks, and built drones for various applications such as aerial surveillance. In addition to these projects, I have contributed to numerous significant projects, collaborating with large companies and teams to deliver cutting-edge solutions. My diverse experience and technical proficiency make me a versatile and innovative engineer, ready to tackle new challenges and drive technological advancements.

As you review my resume, please recognize that I selectively apply to opportunities and have chosen your company based on my genuine interest and career goals alignment. I am eagerly looking forward to the potential of discussing in detail how my skills and unwavering dedication can augment your team's efforts. Your consideration is of immense value to me, and am brimming with excitement about the prospect of an interview from you and showcasing my abilities in-person.

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