

ADESH PARTAP SINGH

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LinkedIn 

Personal Website 

GitHub 

EDUCATION

Bachelors of Applied Science, Mechatronics Engineering University of Waterloo

September 2021 - May 2026

- Computational Intelligence - ML
- Digital Control Applications
- Operating Systems
- Power Electronics and Motor Drives
- Microprocessor Systems
- Embedded Computer Systems
- Mechatronic System Integration - PLC's
- Algorithm Design & Analysis

WORK EXPERIENCE

Tesla - Controls Engineering Intern, San Diego

May 2025 - August 2025

- Developed a custom HMI and engineered a TCP/IP-based data transmission system in Python, allowing remote label printing across the Tesla network, streamlining manufacturing operations.
- Programmed PLCs in **Siemens TIA** Portal V18 to process real-time sensor data and visualize heat exchange rate and torque percentage using **Grafana** dashboards.
- Redesigned the recipe editor to incorporate advanced features including torque calculation, sliding window average/max/min analysis on live data, and an integrated alarm system for improved process monitoring.

Motorola Solutions - Software Engineering Intern, Concord

January 2025 - April 2025

- Implemented new features using C++ to an internal dashboard by adding real-time radio parameters, configuration features, enabling technicians to improve communication reliability in field units
- Conducted network vulnerability scans using **Nessus** and Tenable.io to identify open ports, insecure gateways, and potential threats prior to deployment of communication devices used by law enforcement.

Neutron Controls - Embedded Systems Intern, Mississauga

May 2024 - August 2024

- Prototyped the company's first Battery Passport system, enabling secure logging of cell-level data using **SEMPER NOR Flash** and Infineon TLE9018 via **SPI** communication.
- Engineered a custom LED indicator board to visually display real-time charge/discharge cycles on the BMS.
- Supported the BMS architecture upgrade from 12 to 18 cells, enhancing overall energy capacity.

Accelerated Systems Inc (ASI) - PCB Hardware Designer, Waterloo

September 2023 - December 2023

- Designed multi-layered boards like HV Buck convertor, DC Motor Controller, and Gyro Stabilizer.
- Simulated analog circuits using **LTspice** and **MATLAB** Simulink; tested and tuned motor performance using ASI's proprietary BACDoor software, providing actionable optimization insights.

ADDITIONAL INFORMATION

Relevant Projects & Skills

- Stewarts Platform - PID Control, UART, I2C, Inverse Kinematics
- JARVIS Chatbot - openai library, custom RAG capability, text to voice and vice versa capability
- Facial Recognition attendance system - OpenCV
- STM32 and other PCB's - Altium
- Monte Carlo simulation - BSM Model to calculate price of call/put options
- Stock Trading & Poker Bot - simulated real time outcomes using the best possible algorithms
- FPGA - VHDL, RTL programming

Electrical Team Lead - Waterloo

- Spearheaded key projects such as the Levitating Pod, Motor Control Unit, & Exterior Lighting for 6th Gen Pod
- Bought in funding of **\$5000** by pitching our Team to UWaterloo Finance Association, and other local groups.

Digiresfolio.com

- Found a startup for University of Waterloo students enabling online portfolio creation; achieved 100+ user signups within the first month, helping students showcase their technical projects.

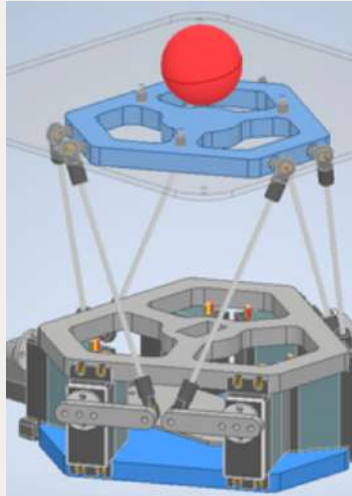
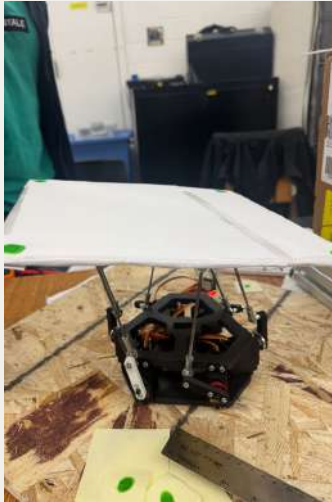
Tools: SCADA Ignition, Siemens TIA Portal, TwinCAT, Tasking, Altium, KiCAD, Matlab, Proteus, Figma, Jira

Languages: Python, C/C++, Verilog, JavaScript, HTML, CSS

PROJECTS PORTFOLIO

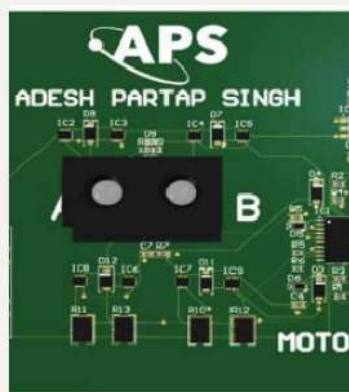
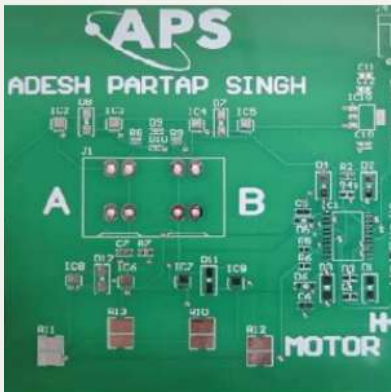
Aadesh Partap Singh

New Grad S'26



Ball Balancing Robot

Built a Stewart platform-based ball-balancing robot using Arduino and Raspberry Pi, with real-time control via custom **PID** control algorithms. Implemented **I2C** communication for synchronized data flow between sensors and controllers, enabling precise **6-DOF** motion stabilization.



Motor Controller Board - Waterloop

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.



Ball Balancing Wheelchair

Built the controls and electronics subsystem for a self-balancing, lean-controlled wheelchair basket chair (4th-year Mechatronics capstone), a ballbot-style platform riding on an omnidirectional ball that frees a player's hands to dribble, pass, and shoot while moving; developed and tuned a MATLAB/Simulink model of the self-balancing algorithm to reject lateral disturbances and convert body-lean into motion, validating a sub-100ms response target ahead of fabrication; specified the core hardware stack including the microcontroller, high-torque brushless DC motors, IMU, and encoders, sizing the drivetrain for 5 mph top speed, full 360° on-axis rotation, and 2+ hours of continuous runtime; implemented embedded control logic in C/C++ and owned the simulation-to-firmware handoff within a 5-person team.



Real-Time Monitoring Dashboard for Tesla (Grafana + InfluxDB)

Designed and implemented a real-time Grafana dashboard for Tesla, integrating with InfluxDB to monitor and visualize critical system metrics such as Mixer Speed, RPM, Torque, and user logins; improved data observability and enabled faster issue detection and performance analysis.

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

GitHub



Website



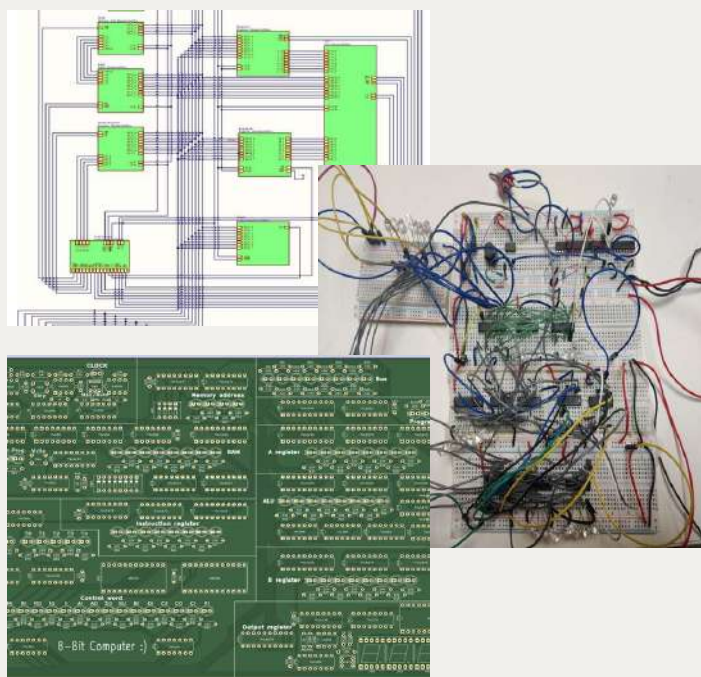
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Printing Automation System

I developed a Python automation system to segregate Anodes and Cathodes at Tesla's San Diego Plant using **Zebra scripting**. Custom labels were created to accurately identify and sort materials based on type. The system integrated with the plant's inventory, scanning and categorizing parts in real-time. Zebra label-printing capabilities ensured precise tracking and minimal errors. This solution streamlined the sorting process and improved production efficiency.



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.



Parallel MJPEG Decoder on Kria KV260 (ARM + FPGA Co-Design)

Designed and implemented a real-time parallel **MJPEG423 video decoder** on the Xilinx Kria KV260 (ARM A53 + FPGA), achieving ~50 FPS at 1080p through a two-thread pipelined architecture with strip-level CPU-FPGA overlap, timerfd-based 60 Hz periodic rendering, triple-buffered ring queue synchronization (pthread mutex/condvar), and a modified Linux CMA kernel driver allocating 24 MiB across 6 DMA channels



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.

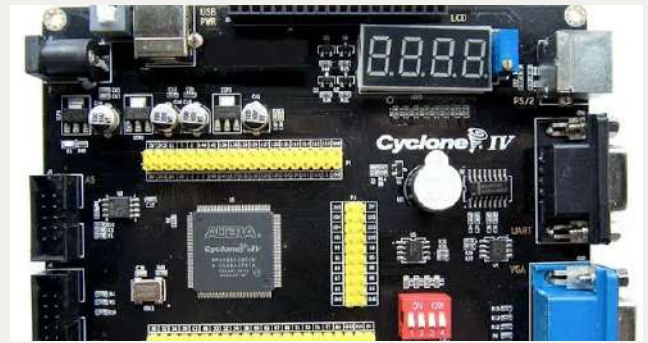
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Finance In C++

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 Altera **Cyclone IV**, 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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