Sarthak Jain

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Education

Carnegie Mellon University – BS, Electrical & Computer Engineering & Robotics May 2028

- **GPA:** 3.8
- **Relevant Coursework:**Digital Systems Design, Signals & Systems, Linear Systems Analysis, Principles of Imperative Computation, Differential Equations, Linear Algebra

Experience

Research Assistant – Kantor Lab, CMU 2026 – Present

- Developing ROS 2-based perception and manipulation pipeline integrating **xArm 5** with vision-based disease detection for autonomous agricultural robotics.
- Implemented real-time computer vision system using **YOLO** in Python and integrated outputs into ROS 2 nodes for closed-loop actuation.
- Debugged latency and synchronization issues between perception and arm control under field deployment conditions. Tested and validated robot behavior on physical hardware in outdoor environments.

Engineering Intern – Fleeca 2023

- Designed and built an automatic wire cutting and stripping system integrating mechanical actuation and electrical control.
- Developed repeatable alignment fixtures and control logic to improve wiring consistency and reduce manual errors.
- Improved production efficiency by 22% through system redesign and process automation.

Project Experience

RedRobot Autonomous Competition Robot 2026

- Designed and implemented embedded control software using structured state-machine logic for autonomous navigation, object detection, and scoring.
- Integrated drivetrain control, ultrasonic sensing, and actuator coordination under real-time constraints.
- Performed iterative tuning and hardware debugging to ensure reliable behavior in competitive environments.

AI Air Hockey Table – Real-Time Vision-Control System 2026

- Built perception-to-actuation pipeline using Raspberry Pi camera for puck tracking and trajectory prediction.
- Implemented motion control logic for multi-axis stepper motor actuation with latency-aware prediction.
- Profiled full system loop (capture → processing → prediction → motor command) and debugged timing bottlenecks affecting intercept accuracy.

Mixed-Signal PCB for Sensor-Driven Robot 2025

- Designed 2-layer PCB in **Altium** integrating analog sensor front-end and motor drivers.
- Implemented signal conditioning and grounding strategy to reduce noise coupling between switching loads and sensor inputs.

5-Stage Pipelined RISC-V Processor 2025

- Designed synthesizable SystemVerilog processor with structured pipeline control and hazard mitigation.
- Developed cycle-level verification testbench to validate functional and timing correctness.

Technical Skills

Programming: C/C++, Python, SystemVerilog

Robotics & Middleware: ROS 2, ROS 1, state machines, motion control, perception-to-actuation pipelines

Machine Learning & Vision: PyTorch, YOLO, OpenCV, reinforcement learning

Systems & Software: Linux (Ubuntu), CMake, Git, multi-threading, build systems

Embedded & Hardware: Microcontrollers, motor drivers, PCB design (Altium), sensor interfacing, mixed-signal circuits