Kunal Kumar

linkedin.com/in/kunalK2310 • Portfolio • kk858@cornell.edu • +1 (607)-327-2484

Education

Cornell University — Ithaca, NY
- Master of Science, Systems Engineering, Rob and Sara Blackall Fellowship — May 2024
- Graduate Research Assistant- Organic Robotics Lab, Bio-Inspired Fluid Lab

Punjab Engineering College — Chandigarh, India
- Bachelor of Technology, Mechanical Engineering — Jul 2022

Technical Skills

- **Programming & Tools-** Python, C++, MATLAB, Simulink, LabVIEW, Embedded Linux (RaspberryPi), CLI Tools (htop, crontab), Real-Time Kernel (Preempt-RT), ROS, Arduino
- **Sensors & Controls-** Microcontrollers (RaspberryPi, Arduino, STM32), PID Control, PWM, I2C/SPI/UART, Sensor Fusion, Signal Filtering, Low-Level Register Programming
- **System Design & Modeling-** Model-Based Systems Engineering (MBSE), SysML, Interface Definition, V&V Matrices, FMEA, FTA, Requirements Traceability, Root Cause Analysis, Test Planning & Execution
- **Prototyping & Mechanical Design-** SolidWorks, Fusion 360, CAD/CAM, Test Fixture Design, 3D Printing, CNC Machining, Laser Cutting, Design for Assembly & Design for Manufacturing
- **Instrumentation & Data Acquisition-** LabVIEW, NI DAQ Systems, Oscilloscopes, Signal Conditioning, Vibration Testing, Bode Plot Analysis, Statistical Data Interpretation
- **Certifications-** *Coursera*: Deep Learning Specialization | Big Data Specialization | Self-Driving Cars Specialization, Manufacturing Process with Autodesk Fusion 360 | Six Sigma Advanced Analyze Phase | *Cornell:* Leading from Strengths | INCOSE ASEP (Associate Systems Engineering Professional)

Relevant Experience

Lab Manager — System Dynamics and Mechatronics — Ithaca, NY
Cornell University — Sep 2024 – May 2025
- Facilitated closed-loop PID experiments using LabVIEW and NI DAQ systems to build control intuition. Conducted frequency response testing using Bode plots in rotor dynamics labs; used vibration shakers, amplifiers, and DVFs to analyze resonance, beam vibration, and harmonic modes.
- Gained hands-on experience with sensors, signal filtering, and low-level microcontroller programming using direct register access and port manipulation
- Conducted root-cause troubleshooting and maintained lab equipment (actuators, amplifiers, safety interlocks) to ensure operational reliability.
- Coordinated with student teams to support experiment execution and reinforce best practices in documentation and lab safety.

Advanced Bio-Robotics System for Agricultural Automation — Ithaca, NY
Team Lead, Machine Learning and Hardware Integration — Feb 2024 – Aug 2024
- Directed development and system integration of an autonomous robotic platform combining sensors, actuators, and vision-based classification for agricultural tasks.
- Developed and executed test plans to validate subsystem interoperability and system-level performance; used FMEA to identify and mitigate failure modes.

Untethered Microcombustion for Soft Robotics — Ithaca, NY
Research Assistant, Organic Robotics Lab — Sep 2023 – May 2024
- Designed experimental test fixtures and methodical test plans to validate combustion requirements, including flow rate optimization through controlled variable testing; performed statistical analysis of combustion performance data to identify ideal operating parameters for untethered soft robotics applications. Thesis Link

Cornell Cup MiniBot Robotics System — Ithaca, NY
Systems Engineering Lead — Sep 2022 – May 2023
- Led verification planning using systems engineering tools: V&V matrices, interface diagrams (N2), and system process flows.
- Performed risk analyses including FMEA and FTA to support design validation at the module and system level.
- Coordinated across electrical, software, and mechanical subsystems to integrate features and ensure functional alignment with requirements in a student project team.
- Benchmarked performance metrics against design goals; maintained traceability from requirements through test execution. Report Link