Khushant Khurana

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EDUCATION

The Cooper Union for the Advancement of Science and Art, New York City, NY Sep 2024 - May 2025

Master of Engineering in Mechanical Engineering GPA: 3.83/4.0

The Cooper Union for the Advancement of Science and Art, New York City, NY Aug 2020 - May 2024

Bachelor of Engineering in Mechanical Engineering (Minor - Computer Science) GPA: 3.81/4.0

INDUSTRIAL EXPERIENCE

Defense Science and Technology Graduate Intern | *Lawrence Livermore National Laboratory* May 2025 - Aug 2025

- Developed latent space system identification algorithms in GPLaSDI, a reduced-order modeling framework that leverages machine learning for nonlinear dimensionality reduction.
- Conducted research on Fourier Neural Operator (FNO) architectures and their integration with reduced-order models to predict solutions to nonlinear partial differential equations (PDEs).

Aviation Systems Engineer Intern | *Garmin International* May 2024 - Aug 2024

- Modeled the short period dynamics of an aircraft - linearized trim state models, servo dynamics, and structural mode filters - to design a PD controller for pitch attitude tracking.
- Implemented algorithms to capture time domain response characteristics of the closed-loop system - overshoot, rise time, and steady-state time - when subjected to a reference step input.
- Developed an optimization scheme to tune the gains of the PD pitch controller, in flight, using Newton's method, and tested it on the hardware-in-the-loop (HIL) test bench.
- Performed system identification on aircraft's lateral dynamics to determine the pole for roll mode and tuned the gains of the PD roll controller using basic pole placement.

Controls Intern | *Oshkosh Corporation* May 2023- Aug 2023

- Modeled and simulated Modular Battery Thermal Management System in Amesim Simcenter to help the design team with their choice of mechanical devices through various parameterized simulations.
- Integrated the Modular Battery Thermal Management System model with Simulink and cosimulation to foster the development of the model-based control laws.
- Developed a Python script to automate the extrapolation of the efficiencies of an E motor of a medium duty vehicle and generate a completed 2D test data set for easy injection into the Amesim model.
- Developed a Python script to automate the process of extracting CAN signals from a .mat file, removing high-frequency noise, and down-sampling according to the user requirements to allow easier processing for hardware-in-the-loop systems.

RESEARCH

Crazyflie's Real-Time Trajectory Optimization Using Dynamic Programming. | *Cooper Union* Sep 2024 - March 2025

- Implemented real-time trajectory optimization for a quadcopter to generate and follow an optimal trajectory to reach a target, using Model Predictive Control (MPC) with multiple shooting.
- Used Robot Operating System (ROS2) as a middleware to integrate the hardware, motion capture sys system, and the non-linear optimization solver.

LEADERSHIP EXPERIENCE

Steering Sub System Lead | *Cooper Union Formula Motorsports Team* Aug 2022 - April 2023

- Analyzed 2021's car track data for multiple laps to validate the steering geometry for 2022's car.
- Machined tie rod clevises, toe link clevises, rocker mounts, control arm clevises, wheel pegs, brake bobbins, pedal spacers, and shock end caps using mill and lathe.

Suspension Sub System Lead | *Cooper Union Formula Motorsports Team* Aug 2021 - May 2022

- Validated the 2021's suspension geometry and chosen suspension parameters, such as castor and king pin inclination, using multibody simulations provided by Amesim Simcenter.

- Designed the control arms, rockers, and push rods for the suspension assembly and validated the linkages using Finite Element Analysis.

PROJECTS

Controlling Data Driven Systems Using System Identification and Model Reduction | *Cooper Union* Jan 2024 - May 2024

- Subjected datasets - flow over airfoil and dynamics' models - to Principle Component Analysis (PCA) and Singular Value Decomposition (SVD) for model reduction.
- Performed system identification using methods such as Dynamic Mode Decomposition (DMD), Eigensystem Realization Algorithm (ERA), and Sparse Identification of Non Linear Dynamics (SINDy) to generate linear models/polynomial fittings for nonlinear systems.
- Designed controllers such as Linear Quadratic Controller (LQR) and Model Predictive Control (MPC) to control the low dimensional systems.

Implementing a PID controller on Irobot Create for Following a Wall While Mapping an Enclosed Space | *Cooper Union* Jan 2024 - May 2024

- Designed a PID controller for Irobot, using the Robotic Operating System (ROS), to follow the external parameter of an enclosed space.
- Implemented a mapping algorithm that discretized the 2D space into a dynamic matrix and stored the robot's position as a grid point.

Implementing Guidance, Navigation, and Control System for a Missile to Intercept a Target | *Cooper Union* Jan 2023 - Dec 2023

- Designed a Linear Quadratic Gaussian Controller for estimating and controlling the longitudinal state of a missile to intercept a 2D target projectile.
- Implemented a simple 2D geometric model as the guidance system of the missile and a traditional PID controller for tracking the commanded flight path angle.

Simulating Dynamics and Controllers for Unmanned Aerial Vehicle | *Cooper Union* Sep 2022 - Dec 2022

- Implemented and simulated a 6 DOF model for fixed wing dynamics with linear aerodynamic models of the control surfaces.
- Designed PID controllers for the linear roll, pitch, and yaw autopilots to follow a pre-set trajectory.

AWARDS AND SCHOLARSHIPS

Summa Cum Laude Graduate | *Cooper Union* May 2024

Tau Beta Pi Engineering Honor Society | *Cooper Union* 2023 - 2024

Merit Scholarship | *Cooper Union* 2020 - 2024

New York Community Trust Scholarship | *New York Community Fund* 2021 - 2025

Dean's List | *Cooper Union* 2020 - 2024

Salutatorian | *Queens High School for Sciences* June 2020

SKILLS

Coding: Python, MATLAB, Simulink, C++, LaTeX

Programs: Robot Operating System (ROS 2), PyTorch, Gazebo, Git, LabView, Google Earth Engine, Amesim Simcenter, SOLIDWORKS, Arduino C, Ansys Workbench, Microsoft Office

Systems & Environments: Linux, High Performance Computing Systems, Slurm, LSF

Languages: English, Hindi, Punjabi