

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	GPA: 3.81/4.0

INDUSTRIAL EXPERIENCE

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

- Work on latent space system identification in GPLaSDI : a LaSDI-based framework that relies on Gaussian process (GP) for latent space ODE interpolations.
- Use Fourier transforms as intermittent layers for GPLaSDI's autoencoder to allow faster training.

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.
- Designed a Graphical User Interface in MATLAB to synthesize the auto-tuning process and make it easier for Flight Test Technician to test the algorithm on an aircraft.
- 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.
- Modeled the E-motor and the vehicle in Amesim Simcenter using the generated test data set to determine the thermal loss when subjected to UDDS drive cycle.
- 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 Trajectory Optimization Using Dynamic Programming for Obstacle Avoidance. | *Cooper Union* Sep 2024 - Present

- Perform real-time trajectory optimization for a quadcopter to navigate around obstacles and reach a target, using Model Predictive Control (MPC) with multiple shooting.
- Use Robotic Operating System to provide a common framework for the hardware, mocap system, and model predictive controller.

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.
- Designed the steering stops and performed an impact test to ensure its longevity.

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

- ## PROJECTS

- 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.

- 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.

- 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.

- Implemented and simulated a 12 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.

Summa Cum Laude Graduate <i>Cooper Union</i>	May 2024
Tau Beta Pi Engineering Honor Society <i>Cooper Union</i>	2023 - 2024
Merit Scholarship <i>Cooper Union</i>	2020 - 2024
New York Community Trust Scholarship <i>New York Community Fund</i>	2021 - 2025
Dean's List <i>Cooper Union</i>	2020 - 2024

Languages: English, Hindi, Punjabi