Jatin Sikka

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Education

University of Texas, Austin, TX

Master of Science, Ph.D. track in Mechanical Engineering | Focus in Robotics

Relevant Coursework: Intro to Machine Learning, Intro to Deep Learning, Human Centric Robotics (Controls + RL)

North Carolina State University, Raleigh, NC Dec 2024

Bachelor of Science in Mechanical Engineering | Minor in Computer Programming **GPA: 3.81/4.00**

Relevant Coursework: Statics, Dynamics, Mechanics, Controls, Fluids, Thermodynamics, Mechatronics Design, MATLAB, Java, Python, C, Data Structures & Algorithms, Operating Systems, Discrete Math

Technical Skills

Programming: Python, Java, C, MATLAB, Linux, Git, PyTorch, Docker, SQL, Tableau, W&B

Robotics: MuJoCo, Isaac Lab, PyBullet, ROS, OpenAI Gym, PPO/TRPO, Control Theory

Mechanical: SolidWorks, CATIA, AutoCAD, 3D printing, Laser/Water cutter, CAE, GD&T, DFM, PLC

Leadership Experience

Senior Design Teaching Assistant, UT Austin Aug 2025 - Present

- Mentoring **6 teams-** including a **robotic hand, a NASA Artemis rover, and an ML-based industrial defect-detection system**, from concept to prototyping, guiding project planning, and iterative design.
- Advised teams on risk management, documentation standards, subsystem integration, and effective communication across mechanical, electrical, and software groups.

Research Experience

Human Centered Robotics Lab, UT Austin Sep 2025 - Present

Long-horizon loco-manipulation for Humanoids *Advisor: Dr. Luis Sentis*

- Building a **hybrid loco-manipulation control framework** by integrating locomotion controller with **RL** based **PPO**-trained manipulation policies, enabling long-horizon factory tasks in MuJoCo with reward design.
- **Training** lightweight **LLMs** for SOP-driven high-level retrieval and planning to generate multi-step task plans and sequence MuJoCo skills with pre/post-condition checks.

Intelligent Controls Lab, NC State University Aug 2023 – October 2024 + Summer 2025

Controls and AI Framework for robotics *Advisor: Dr. Donggun Lee*

- Extended **Reinforcement Learning** based algorithm **TRPO** for safe navigation policy updates, creating a simulation environment using pybullet and OpenAI Gym to support adaptable and secure vehicle navigation.
- Researched and implemented Hopf Lax formula to solve open loop optimal control problems using **Python,** demonstrating a significant advantage over traditional direct optimization method in computation speed**.**

Ultrasonics Characterization Lab, NC State University Aug 2023 – Dec 2023

Development & testing of lung phantoms to mimic pulmonary fibrosis & edema *Advisor: Dr. Marie Muller*

- Utilized **SolidWorks** to design a proof of concept for an interlocking hydrogel lung phantom
- Conducted **MATLAB** analysis and experiments on hydrogel-based lung phantoms, measuring sound speed and attenuation to simulate human lung tissue properties for ultrasound diagnostics.

Professional Experience

Body In White (BIW) MY & Cybertruck, Tesla Motors May 2023 – Aug 2023
Quality Data Engineering Intern Austin, TX

- Engineered a BIW data-visibility pipeline by integrating **Python** scripts with live **SQL** queries, automating data extraction, transformation, and real-time updates for quality metrics
- Developed 10 interactive **Tableau** dashboards (castings, welds, adhesives, audits) with heatmaps, Pareto charts, and trend analytics to enable real-time defect monitoring and root-cause analysis
- Reduced analysis time by **93%** through automated metrology data analysis (74-point features, 394 raw measurements), generating trends and statistical insights with **MATLAB** to support engineering decisions.
- Generated Sixpack reports in **Minitab** to analyze new hood fixture performance, enabling in-depth process evaluation and optimization.

Plastics MS & X, Tesla Motors Jan 2022 – May 2022
Mechanical Engineering Intern Fremont, CA

- Designed stripper plates for the rocker punch machine using **SolidWorks** and **3D-printed** a prototype, mitigating 95% of quality issues during punch retraction.
- Enhanced space utilization by 35% through the design and integration of subassembly, rocker room, tool & die, and machine shop components into the master layout using **AutoCAD**.
- Designed and **3D printed** M3 Frunk Clip covers, achieving a 97% reduction in scratching and warping during transportation to General Assembly.
- Engineered a spring-loaded installation tool for installing PA sensors for MS/MX, reducing sensor NSP.

Hengstler Dynapar, Fortive Aug 2021 – Dec 2021
Program Management + Mechanical Design Engineering Rotational Intern Gurnee, IL; Elizabethtown, NC

- Led in a plant acquisition project by overseeing transition of two assembly cells having an estimated revenue of **$500k** per month.
- **Trained** two new operators on assembly cell procedures, quality standards, and safety protocols.
- Enhanced efficiency by 33% through the design, **3D printing**, and integration of module and PCB fixtures.
- Increased operational safety by 70% while maintaining efficiency by designing and implementing custom safety enclosures in **SolidWorks**.

Technical Experience

Mechanical and Aerospace Engineering Department, NC State University May 2021 – Aug 2021
Design Shop Assistant Raleigh, NC

- Used **AutoCAD** to design ornaments and to create an art piece for the new design studio.
- Supported the manufacturing of parts for graduate students and professors in the machine shop using laser and waterjet cutters.
- Used **SolidWorks** and waterjet cutter to design and fabricate a safety cover for the bench grinder.

Wolfpack Motorsports FSAE, NC State University Aug 2020 – Aug 2022
Aerodynamics Engineering Team Member Raleigh, NC

- Designed components, including rear wing, side wing, and side pods, using **CREO** and **SolidWorks**.
- Conducted **CFD simulations** to optimize aerodynamic performance, improve design efficiency, and support data-driven decision-making in component development.
- Supported in manufacturing components through machining and carbon fiber layups.

Projects

- **SO-101 Arm RL Controller:** Trained a PPO policy in Isaac Lab with custom reward shaping, currently implementing deployment on real hardware for multi-pose execution.
- **Atlas Whole-Body Control (QP + DCM Planner):** Implemented a QP-based whole-body controller and integrated a DCM walking planner to generate stable locomotion trajectories for the Atlas humanoid.
- **Manipulator Control Framework (3-DOF Arm):** Developed joint-space, operational-space, and whole-body torque controllers in PyBullet using Pinocchio-based dynamics.
- **MNIST Deep Learning Pipeline:** Implemented softmax regression and a 2-layer MLP with full backprop, SGD, batching, and hyperparameter tuning without deep-learning libraries.
- **CNN & Imbalanced Learning (CIFAR-10):** Built a CNN from scratch and trained PyTorch models with class-balanced focal loss to address dataset imbalance.
- **Robotic Arm:** Developed a custom-built robotic arm equipped with a camera and a basic machine learning algorithm using to autonomously identify and sort objects using Inverse Kinematics.
- **Automated Water level Control System [*Senior Design 1St Place*]:** SolidWorks-designed, 3D-printed system using Raspberry Pi control to autonomously manage water level from sensor and solenoid inputs.
- **Autonomous UAV:** Developed an RC Fixed Wing UAV using Bixler Airframe, Matek Flight Controller and Ardupilot Autopilot for applications like aerial Surveillance, mapping, and delivery services.
- **Path Following Robot:** Developed a robot featuring an array of IR sensors, integrated with a microcontroller, motor driver, and a DC motor for automated navigation in industrial automation.