Dhruv Lal
Email: dlal1520@gmail.com | Website: https://dhruvrajlal.com | US Citizen

Education

Carnegie Mellon University | Pittsburgh, PA
Master of Science in Mechanical Engineering - Robotics & Controls | Fall 2024 - Spring 2026
Relevant Coursework: Planning, Execution and Learning (16-782), Multivariable Linear Control (24-773), ML & AI for Eng (24-787)

Purdue University | West Lafayette, IN
Bachelor of Science in Mechanical Engineering | December 2019
Minor in Electrical Engineering | *Honors Dean's List & Semester Honors S'16, F'17*

Skills

Programming Languages: Python, C/C++, MATLAB, Verilog, Arduino, SQL
Software & Tools: CATIA, Fusion 360, LabVIEW, LTSpice, Git, CMake, ROS, Gazebo
Engineering: Control Systems Design, Path Planning, AI/ML, System Integration, Verification & Validation
Manufacturing: Soldering, Welding, Milling, Pneumatics, 3D Printing

Research Experience

Carnegie Mellon University - Mobile Manipulator Research Team | Pittsburgh, PA
Graduate Research Assistant under Professor Shimada | Fall 2024 - Present
• Built a simulation-in-the-loop nozzle trajectory planner (C++/CMake, 6-DoF + gantry) for spray concrete 3D printing over freeform rebar: simulator-conditioned per-layer velocity + orientation planning under stochastic deposition. 28.4% lower surface-height std dev, 12.8% per-layer coverage gain, 19.2% less rotation per layer vs. baselines on a Shimizu Corporation industrial structure
• Engineered collision-aware orientation correction as a global Viterbi DP over per-waypoint feasibility graphs with optimize-then-verify voxel collision checks using the conservative-advancement motion bound (FCL/C2A) to prevent end-effector tunneling

Stanford University - Nano Fabrication Lab | Stanford, CA
Research Assistant - Synthetic Nose Robot Project | June 2014 - May 2015
• Developed nano probes for synthetic robotic nose to detect toxins and cytokine signaling molecules
• Collaborated with interdisciplinary team on sensor integration and signal processing algorithms

Paper Publications

• “Nozzle-Trajectory Planning for Concrete - Spray 3D Printing of Complex Freeform Structures” targeted for RA-L - IEEE in March 2026

Robotics Experience

Purdue University - Senior Design Project | West Lafayette, IN
EMT Assisting Robot - Lead Systems Integrator | Fall 2019
• Designed and implemented autonomous EMT supply carrier robot aligned to customer requirements
• Developed risk management algorithm utilizing continuous control loops for obstacle detection and emergency stops
• Created Python-based unified testing framework for vision, drive, and safety subsystem integration
• Designed UI system to broadcast camera views with emergency notification capabilities

Evodyne Robotics | Mountain View, CA
CAD Design Engineering Intern | Summer 2019
• Designed and prototyped robotic accessories for task automation including refrigerator door manipulation
• Developed and 3D printed housing solutions for internal computing and sensor systems
• Calibrated redundant ultrasonic sensor arrays for autonomous robot navigation
• Engineered robotic armature extensions with false alarm reduction in constrained workspaces

Fellow Robots | San Jose, CA
Commercial Robot Fabrication Engineering Intern | Summer 2016
• Optimized robotic navigation algorithms for Big-Box retail shop floor aisles using computer vision
• Created rigorous test navigation framework using dual DSLR cameras and graduated QR code panels
• Determined optimal camera positioning (15° & 25° angles) and sensing distance (0.5m) through systematic experimentation

Industry Experience

Intel Corporation | Hillsboro, OR
Process Engineer | March 2022 - May 2024
• Conceptualized and deployed wafer recipe repository database with tool pairing, reducing error detection time by 25%
• Calibrated PID controller gains for nozzle dispensing rate control in semiconductor manufacturing for zero defect
• Updated operator safety systems for new production machines, reducing risk of delayed treatment incidents, and ensuring OSHA compliance
• *Received department award for improving preventive maintenance procedures for etch dispense length optimization*

Tesla | Fremont, CA
Energy System Designer II | August 2021 - January 2022
• Designed residential solar energy panel installations using proprietary Tesla CAD software
• Ensured compliance with multiple state, county, and utility safety regulations for optimal installation plans

Insense Inc. | San Jose, CA
Chip Manufacturing Testing Engineer Intern | Summer 2018
• Conducted optical and conductive consistency testing on processed chips using electron microprobe analysis
• Applied precise 1.5 mV testing protocols to ensure accurate transmission across chip architectures
• Collaborated with manufacturing team to optimize chip production processes for consistent quality