Jugal Upadhyay

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SUMMARY

- Robotics engineer with Master's in Autonomy and Robotics from UIUC, specialized in autonomous vehicles, robotic manipulation, Controls, Computer Vision, Perception, deep learning, and tactile sensing. Proficient in C/C++, Python, PyTorch, ROS, and deploying neural networks to embedded systems.
- Delivered impactful projects in robot manipulation, haptic feedback systems, visual perception, and autonomous control. Experience training and deploying deep learning models for robotics tasks with strong problem-solving and collaboration skills. Won Judges' Choice Award ↗ at NASA Space Apps Challenge for the project "Canopy." ↗

SKILLS

Programming/Scripting Languages: C, C++, Python, Java
Machine Learning: PyTorch, TensorFlow, OpenCV, Deep Learning, Imitation Learning, Reinforcement Learning, YOLO, scikit-learn
Robotics: ROS, Robot Manipulation, Grasp Planning, Control Systems, Robot Manipulators, Tactile Sensing, Autonomy, Path Planning, SLAM, Perception, Haptics, Gazebo
Control Systems: Stanley, Pure Pursuit, Model Predictive Control, PID
Hardware: ESP32, ESP8266, STM32, Raspberry Pi, Arduino, PCB Design, Sensors Integration, IoT Systems
Tools: MATLAB Simulink, Isaac Sim, Robosuite, Gazebo, RViz, Unity, Git

EXPERIENCE

Project Engineer Intern - July 2023 - July 2024
Environomics
- Engineered a dual-axis solar tracker ↗ system, optimizing solar panel alignment with the sun to maximize energy capture and efficiency by 35% and designed an interactive website ↗

ML/Computer Vision & Automation Engineer Intern - May 2022 - July 2022
VBC Hydraulics
- Developed and deployed a prototype automated text extraction system for aluminum pump surfaces using computer vision and OCR, reducing manual inspection time by 60%

PROJECTS

Advanced Control Systems for Autonomous Vehicles — Control Systems [Spring 2025]
- Developed multiple control algorithms ↗ including Stanley Controller, Model Predictive Control (MPC), Creep Control, and Reverse Driving for GEM e4 autonomous vehicle. ↗
- Achieved 40% improvement in lap time ↗ and 85% reduction in cross-track error.

Autonomous Vehicle Control & Object Detection — Computer Vision, Control, Deep Learning [Fall 2024]
- Implemented lane detection ↗ using edge detection, bird's-eye view transformation, and computer vision.
- Trained and deployed YOLOv8-based object detection model to recognize pedestrians ↗, traffic signals, and stop signs ↗ with 92% mAP on embedded hardware

BlueBoat Autonomous Docking System — Control Systems, ROS2 [Summer 2025]
- Developed trajectory tracking controller for autonomous USV docking system using ROS2 and MAVROS, implementing direct control approach with lookahead-based tracking achieving robust real-time performance
- Integrated controller with Hybrid A* planner and ArduPilot low-level control, enabling autonomous navigation ↗ with continuous trajectory updates.

Autonomous Humanoid Navigation (MINI DARPA Challenge) — Robotics, Computer Vision, Control [Spring 2025]
- Developed autonomous navigation for ROBOTIS MINI humanoid ↗ using monocular RGB camera and IMU. Implemented edge-based perception pipeline ↗ with 88% obstacle detection precision
- Deployed perception and control algorithms on embedded hardware achieving 30 FPS real-time processing

VR Haptic Gloves with Tactile Feedback — Robotics, Haptics, Deep Learning, Embedded Systems [Spring 2025]
- Designed vibrotactile haptic gloves ↗ with ESP32 integration for real-time tactile feedback in VR, enhancing user immersion by 45%. Developed Unity VR application with Meta Quest 3 hand tracking and sub-50ms latency wireless communication
- Integrated multi-modal sensory feedback combining vision and tactile sensing, demonstrating ↗ applications in teleoperation and manipulation training

EDUCATION

University of Illinois - Urbana Champaign - USA - August 2024 - December 2025
Masters of Engineering in Autonomy and Robotics
- **Coursework:** Robotics Manipulation, Computer Vision, Intro to Robotics, Safe Autonomy, Deep Learning, Humanoid Robotics, Autonomous Vehicles, Tactile Sensing and Haptics.

Nirma University - India - July 2020 - July 2024
Bachelors of Technology in Electronics and Communication Engineering with Minors in Computer Engineering