

RONISH NADAR

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SUMMARY

Robotics engineer pursuing an M.S. in Mechatronics & Robotics at NYU, with experience building autonomous systems that combine perception, planning, and control. Developed real-time robotics pipelines integrated LLM/VLM-based task planning for manipulation. Looking for entry-level robotics roles focused on embedded software and system integration.

SKILLS

Programming & Software: Languages: C, C++, Python, MATLAB; Tools: ROS/ROS2, OpenCV, NumPy, PyTorch, Simulink, Git, Linux (Ubuntu), Docker

AI & Perception: Vision-Language Models (Moondream); LLMs (Gemini, Llama); RAG; Transformers; YOLO; ArUco/AprilTag tracking

Robotics & Controls: SLAM; Path Planning (A*, D*, RRT/RRT*); Navigation stacks; PID, loop-shaping, LQR, MPC; Pure Pursuit; System ID

Estimation & Fusion: Kalman filters; sensor fusion (IMU, LiDAR, cameras, encoders, GPS)

Embedded & Electronics: STM32, Atmel, Arduino, ESP32, Raspberry Pi, NVIDIA Jetson; UART, I²C, SPI, CAN, RS485/RS232, MODBUS; Wi-Fi, BLE, LoRa, LTE/GSM; PCB design (Altium, KiCad, Eagle); HMI

Mechanical & Mechatronics: SolidWorks, Fusion 360; kinematics/dynamics modeling; 3D printing (FDM/SLA); actuator selection (servos, BLDC, steppers)

EDUCATION

New York University, Tandon School of Engineering

M.S. Mechatronics & Robotics (GPA: 3.914)

New York, NY

2024 – 2026

- Coursework: Robot Kinematics & Dynamics, Mechatronics, Automated Mobile Robots, Reinforcement Learning & Optimal Control, Linear Algebra, Networked Multi-Robotics Systems

University of Mumbai

B.E. Electronics & Telecommunications Engineering (GPA: 3.8)

Mumbai, India

2019 – 2023

- Coursework: Instrumentation & Control Systems, Image Processing & Machine Vision, Deep Learning, Robotics, ANN & Fuzzy Logic

RESEARCH EXPERIENCE

Mechatronics, Controls & Robotics Lab, NYU

Research Assistant | Autonomous Multi-Robot Control via LLM/VLM-Driven Embodied AI Frameworks

New York, NY

Jun 2025 – Present

- Architected a “zero-code” embodied-AI framework using Gemini 2.5 Pro and Moondream VLM to convert natural-language prompts into autonomous multi-robot task sequences.
- Engineered a hybrid navigation stack: RRT* for collision-free planning and a dual-stage Pure Pursuit + PID controller for high-fidelity tracking and precision terminal docking.
- Built a high-throughput distributed system (ZeroMQ RPC + 4-worker pool) for real-time command streaming to an ESP32 bridge via Wi-Fi, BLE, and ESP-NOW.
- Designed a centralized perception pipeline using multi-camera homography stitching, ChArUco calibration, and ArUco pose estimation.
- Validated performance through collaborative experiments (number ordering, word formation, color sorting) with online collision-aware replanning in dynamic environments.

EXPERIENCE

New York University, Tandon School of Engineering

Teaching Assistant | ROB-GY 5103 Mechatronics

New York, NY

Sep 2025 – Dec 2025

- Mentored graduate students on end-to-end integration of embedded software and hardware systems; supported debugging and system bring-up in weekly labs.
- Facilitated labs on Arduino-based microcontrollers, sensors, and actuator control for DC motors; guided circuit analysis and measurement.
- Supported instruction in control and signal processing concepts including feedback design, discrete-time systems, and A/D conversions.
- Resolved complex hardware/software integration issues; supported grading workflows and evaluations for homework and examinations.

- Developed firmware and PCB designs for high-voltage IoT energy monitoring devices; supported deployments of 10,000+ units and improved fault monitoring to reduce field downtime by 15%.
- Modernized legacy bank security infrastructure by engineering retrofit embedded solutions enabling real-time telemetry and remote monitoring.
- Built custom factory test jigs and automated validation workflows, reducing test cycles for 1,000+ devices from 14 days to 3 days ($4.6\times$ throughput).
- Delivered production firmware in C/C++ across STM32/ESP32/Raspberry Pi; built Python tooling for test automation; integrated HMIs and comms stacks for configuration and visualization.

PROJECTS

High-Fidelity Dual Track Ackermann Drive Simulation

Sep 2025 – Dec 2025

- Developed a 4-wheel double-track Ackermann simulation; modeled rigid-body dynamics via Newton–Euler equations and linear tire cornering stiffness for a 12 kg platform.
- Engineered a Sliding Mode Controller (SMC) with smoothed tanh reaching law to reduce chattering; verified stability via Lyapunov candidate functions.
- Implemented Hybrid A* planning and B-spline interpolation to generate curvature-aware paths for obstacle avoidance in dynamic environments.
- Optimized the control loop for 100 Hz while enforcing constraints (45° steering limit, 8 Nm torque saturation); validated tracking under varying friction/damping disturbances.

Punch ‘n’ Pop: Rehabilitative Motion-Controlled Game

Jan 2025 – May 2025

- Built an accessibility-focused system bridging physical motor exercises with real-time digital interaction for users with limited dexterity.
- Implemented sensor fusion combining OpenCV color tracking (HSV filtering) and MPU6050 IMUs for multi-quadrant gesture detection and movement validation.
- Developed a high-frequency motion heuristic using jerk at 100–200 Hz to classify strike intensity and suppress noise.
- Built a low-latency communication stack using ESP32 + ESP-NOW for sub-millisecond sensor-to-hub transfer; integrated a Python engine for rendering, scoring, and data synchronization.

Mapping Robot: SONAR Point-Cloud Mapping & ROS Visualization

Sep 2024 – Dec 2024

- Developed a differential-drive robot with an ESP32 Micro-ROS node streaming sensor data at 20–50 Hz over Wi-Fi to a ROS2 ground station.
- Implemented pose estimation via MPU6050 IMU + magnetic encoders using complementary and Kalman filters.
- Designed a 360° scanning SONAR module with 1° resolution to generate real-time point clouds of obstacles up to 400 cm.
- Optimized ROS publisher/subscriber throughput, reducing end-to-end latency by 30%.

TATA Power: 110 kV Insulator Cleaning Robot

Aug 2022 – Jan 2023

- Developed a 4-DoF SCARA manipulator for high-voltage (110 kV) environments; implemented inverse kinematics and motion planning for automated cleaning trajectories.
- Architected modular embedded hardware with custom PCBs and distributed firmware coordinated by a Raspberry Pi master to improve field diagnostics and repair.
- Integrated IR thermography for hotspot anomaly detection and an OpenCV-based vision pipeline for line-following navigation; reduced routine inspection time by $3\times$ and improved field efficiency by 40%.

LEADERSHIP & ACTIVITIES

Robotics & Automation Wing (ROBOCON Team)

Team Vice President | Electronics & CAD Designer

Mumbai, India

Aug 2019 – May 2022

- Led a 20-member interdisciplinary team through the ABU Robocon build cycle; owned execution across electronics/embedded integration and competition-readiness.
- Organized 6+ hands-on workshops and mentored 100+ junior students on embedded systems, PCB design, and robot subsystem integration.
- Designed and debugged custom PCBs and firmware for robot subsystems; implemented an RS485-based modular bus to simplify wiring, improve reliability, and accelerate troubleshooting.
- Built lightweight CAD replacements via 3D printing, reducing robot mass by 20% while maintaining structural integrity for omni-wheel maneuvering.
- Won 3rd Prize (National), Pragati Business Competition for an agricultural robot concept and prototype demonstration.