Harsh Rana

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SUMMARY

Results-driven Robotics Engineer with 3+ years of experience designing, troubleshooting, and deploying custom robotic systems. Expertise in rapid prototyping, manufacturing, and advanced control systems, with a strong focus on delivering Industry 4.0-ready solutions that drive operational efficiency and innovation.

PROFESSIONAL EXPERIENCE

Vention Robotics | *Robotics Engineer [Capstone – UC Berkeley]* Aug 24 – Present

- Developed a ROS2 package with CUDA-accelerated library for motion planning of custom industrial robot solutions (ROS2, Python).
- Generated optimized trajectories for robotic arms within 100ms (60 x faster) in environments having multiple static and dynamic obstacles.
- Designed and integrated additional prismatic joint (x/y axis gantry) setups with industrial robots like UR and Franka for motion planning.

Bajaj Automobile | *Robotics and Automation Engineer* Aug 23 - May 24

- Managed $2.25M daily production by integrating Fanuc robots for India's first fully automated robotic assembly line for engine assembly.
- Saved $30,000 daily revenue penalty by eliminating robot collisions through perception, which reduced line-breakdown instances.
- Achieved 98% accuracy for part detection and picking by integrating 3D Cognex vision systems with iRVision using GD&T principles.
- Developed path plans for autonomous mobile robots and trained 15 technicians on SLAM, ensuring 0% delay for part replenishment.

Precision Manufacturing Lab - IIT Guwahati | *Manufacturing Engineer [Bachelor Thesis]* [DOI] [Patent] (filed) Aug 22 - May 23

- Designed & developed a closed kinematic Additive Manufacturing robot system under $500 using 3D printing with C++, python & MATLAB.
- Achieved 50% reduction in print time, 75% increase in workspace, and improved maneuverability and rigidity even during rapid movements.

Bajaj Automobile | *Mechanical Engineer* May 22 - July 22

- Reduced 15% cost of silencer by designing a part unification U-form press and horizontal CAM manufacturing process for sheet metal.
- Eliminated welding requirement, resulting in improved silencer aesthetics using Hydroforming method for complex curved cone geometry.
- Performed research into asymmetric sheet metal spinning and generated G-code by simulating it for a 5–axis CNC machine in NX CAM.

PROJECT EXPERIENCE

Robotic arm for Household automation | *Red Rabbit Robotics inspired Open-source design* Jan 25 – Mar 25

- Manufactured a cost-friendly robotic arm under $800 with ROS2, Moveit2 & Python using 3D printing.
- Manufactured a 7-axis human scaled robot arm, with STS servos and planetary gear joints, capable of lifting light payloads up to 3.5kg.
- Developed the control architecture using ROS2 and Moveit2 framework for pick-and-place tasks.

NASA – Solid State Sensor | *Deep Tech Innovation Lab – UC Berkeley* Aug 24 -Dec 24

- Led commercialization assessment for NASA's CO2 sensor as part of an cross-functional team of MBA, JD, and MEng students.
- Developed IP strategy by analyzing 50+ patents and regulations, enabling clear path to commercialization while minimizing legal risks.
- Conducted 25+ stakeholder interviews across target industries, uncovering critical market and validated $500M+ market opportunity.

Unmanned Ground and Aerial Vehicles | *Robotics and Aeromodelling Club (Project Manager) - IIT Guwahati* Aug 20 - May 23

- Led student teams in 2 pan-India inter-IIT competitions, achieving 2nd & 4th out of 23 teams for obstacle detection and terrain navigation.
- Fabricated remote-controlled aircraft using Pixhawk flight controller equipped with MAVLink protocol for autonomous planned flights.
- Developed a ROS package in Python for obstacle avoidance and autonomous takeoff & landing for unmanned aerial vehicles

EDUCATION

University of California at Berkeley | MEng. Mechanical Engineering – Control of Robotics and Autonomous Systems Aug 24 - May 25

- Experiential Control Systems (MPC), Design of µ-processor based systems, Deep Tech commercialization

Massachusetts Institute of Technology | Industrial Revolution 4.0 - Professional certificate (Online) Dec 23 - Dec 24

Indian Institute of Technology Guwahati | Bachelor of Technology in Mechanical, Minor in Electronics & Communication Aug 19 - May 23

SKILLS

Programming Languages: Python, C++ **Software tools:** SolidWorks, AutoCAD, NX, Ansys, MATLAB, Git, Gazebo, MuJoCo, Excel

Frameworks & Libraries: Linux, ROS, ROS2, MoveIt, OpenCV, CuRobo, SLAM, PyTorch, MPC, MARLIN

Technical skills: Robot kinematics and dynamics, robotic system development, sensor integration, SLAM, path planning, and navigation

Industrial skills: Fanuc, AMR, DFM, Lean Manufacturing *(TPM, Six Sigma, 5S, JIT, Poke-yoke, Kaizen)*, GD&T, IIOT, BOM, SOP

Hardware skills: Welding, Stepper/ DC/ BLDC/ linear actuators, IR/ ultrasonic/ temp sensors, Arduino, Mill, Lathe, CNC, Laser, 3D printing

Soft skills: Teamwork & collaboration, project management, stakeholder & vendor communication, building analytical reports, troubleshooting