SHREYAS S RAI

ROBOTICS & AUTOMATION ENGINEER

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PROFESSIONAL SUMMARY

Final year Robotics & Automation Engineering student (graduating Jun 2026) with end to end experience building autonomous mobile robots, ROS 2 navigation stacks, and industrial robot integrations. Lead researcher on three government funded projects at IISc CPDM. Proven hardware to software depth: from custom PCB design and sensor fusion to SLAM, Nav2, and multi-robot cell orchestration. 4× robotics competition winner.

SKILLS

Mobile Robotics: ROS 2 Jazzy, ROS 1 Noetic, Nav2, SLAM (gmapping, Hector), AMCL, move_base, EKF sensor fusion, robot_localization
Embedded & Hardware: Raspberry Pi 5/4, Arduino, ESP32, BNO055 IMU, RPLiDAR, ToF sensors, PCA9685, I2C / SPI / UART / CAN, Motor control, PID, Actuators.
Programming: Python, C++, Embedded C, Linux (Ubuntu), Git
Robot Systems: ABB IRB (RobotStudio), FANUC (Roboguide), Modbus TCP/IP, multi-robot cell integration
Perception: OpenCV, LiDAR processing, Camera calibration, Object detection,Real-Time Image Processing
Design & Manufacturing: Fusion 360, Solid Edge, FDM 3D Printing, SLA 3D Printing (personal machine for 3 yrs), Fixture Design, Tolerance Analysis

INTERNSHIP EXPERIENCE

Product Development Intern, Centre for Product Design & Manufacturing (CPDM), IISc

Oct 2025 - Present

ArrayButton (Project Lead)

- Directed hardware and firmware engineering for a market ready acoustic situational awareness platform; drove transition from PoC to field deployment.
- Designed embedded control systems for high bandwidth, real-time acoustic streaming; validated against comprehensive environmental test matrices.

KYRA & GaitMate (Contributor)

- Supported embedded systems integration and mechanical prototyping on two additional government-funded projects (agentic AI and biomechanical gait analysis).

Summer Research Intern, Advanced Manufacturing Lab, IIT Dharwad

July 2025 – Sept 2025

Hybrid WAAM / DED Robotic Manufacturing Cell · ABB & FANUC Integration

- Designed and prototyped custom end-effector fixtures for an ABB industrial robotic arm to support Wire Arc Additive Manufacturing (WAAM) and Directed Energy Deposition (DED) processes, using Fusion 360 and FDM 3D printing for rapid iteration.
- Implemented Modbus TCP/IP and proprietary robotic communication protocols to integrate ABB IRB and FANUC robot controllers into a unified hybrid manufacturing cell, enabling coordinated multi robot task execution.
- Developed and validated motion programs in RobotStudio and Roboguide to sequence deposition paths, reducing manual programming time by standardising trajectory templates.

KEY PROJECTS

Wheeled AMR - ROS 2 Navigation Stack — Jan 2026 – Present

ROS 2 Jazzy · Ubuntu 24.04 ARM64 · Raspberry Pi 5 · RPLiDAR A1 · BNO055 · Nav2 | github.com/SH047

- Building a wheeled AMR from scratch on Raspberry Pi 5 (Ubuntu Server 24.04 ARM64); full ROS 2 Jazzy environment deployed and verified on hardware.
- Integrating RPLiDAR A1, wheel encoders, BNO055 IMU, and ToF sensors into an EKF fusion pipeline using robot_localization for robust state estimation.
- Deploying Nav2 stack with SLAM Toolbox for real-time mapping and autonomous point to point navigation in indoor environments.

ECHO-Q - Open Source Quadruped Autonomous Robot — Jan 2024 – Jan 2026

Raspberry Pi, Ubuntu 20.04 (Focal), ROS, Robot Kinematics, OpenCV,Machine Vision, LIDAR,IMU | github.com/SH047

- Engineered a full quadruped from scratch: custom SLA/FDM chassis (carbon fibre-infused PLA), 12× 25 kg servos via I2C PCA9685, and Dingo based geometric IK for dynamic gait control.
- Built EKF sensor fusion pipeline (BNO055 + LiDAR + Pi Cam) and full ROS navigation stack (gmapping → AMCL → move_base) for autonomous indoor navigation.
- Designed custom PCB: star-point power distribution, parallel MOSFET switching (Infineon IPD90P04P4L-04), TPS54560 buck converter, TCA9548A I2C mux.
- Showcased at 4 collegiate competitions and won all four.
- KSCST Funded Project

End to End Autonomous Navigation Robot — Nov 2025 – Jan 2026

ROS Noetic · LIDAR · Raspberry Pi · Custom Chassis · FDM Fabrication

- Built ground-up AMR: mechanical design in Fusion 360, custom motor driver electronics, full ROS navigation stack and zero third-party kits.
- Tuned gmapping → AMCL → move_base/DWA pipeline for reliable autonomous navigation in cluttered indoor environments.

Vital EMG-Controlled Prosthetic Arm — Aug 2023 – Dec 2023

Arduino Nano · EMG Sensor · Signal Conditioning · Servo Actuation · Embedded C · 3D Printing

- Designed 2-stage amplifier + 20–500 Hz bandpass filter for sEMG acquisition and real-time threshold based gesture classification.
- Fabricated 5-DOF underactuated hand with tendon-driven linkages in Fusion 360; FDM printed in PLA.

EDUCATION

Rajarajeshwari College Of Engineering — Nov 2022 - Jun 2026
Bachelor of Engineering (B.E.): Robotics & Automation Engineering
GPA: 8.6

PES College — May 2020 - Jun 2022
Pre-University Course (PUC)
Percentage : 75%

ACHIEVEMENTS

- IISc ROBOArena Winner (Intelligent Machines Arena Challenge, 2025)
- 4× College-Level Competition Winner with Cash Grants:
  Won all four college level competitions entered while showcasing ECHO-Q,Also funded by KSCST.
  Innovation in robotics and autonomous systems - including INNOVATE 2K24,2K25 (RRIIC).
- Lead Researcher Government-Funded Projects at IISc:
  Selected as project lead for ArrayButton among IISc CPDM's government-funded initiatives,
  also contributing to KYRA and GaitMate projects simultaneously.
- Open-Source Contributor & 3D Fabrication: ECHO-Q codebase and hardware files publicly released. Personal owner of both FDM and SLA 3D printers for 3+ years fabricating production quality parts for every robotics project.

Open to relocation or remote roles · Available from June 2026