PANEENDRA KUMAR

Mechanical Engineer| Robotics Enthusiast
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EDUCATION:

Degree	School	Year	Grade
Bachelor's-Mechanical Engineering	National Institute of Technology Durgapur	2024-2028	Sem1-9.02 Sem2-8.94
Class 12 (CBSE)	Mangal Vidyalayam	2022-2024	459/500
Class 10 (CBSE)	Mangal Vidyalayam	2020-2022	483/500

TECHNICAL SKILLS

- Robotics & Simulation: ROS2 (Humble), Gazebo, RViz, URDF Modeling,
- Mechanical Design (CAD): SolidWorks, Autodesk Fusion 360, AutoCAD, ANSYS (FEA basics).
- Embedded Systems: Raspberry Pi 5, ESP32, Arduino, I2C/SPI/UART Protocols, PWM Motor Control, Sensor Fusion (IMU).
- Programming & AI: Python, C++, YOLOv8 (Object Detection), OpenCV, TensorFlow Lite.
- IoT & Cloud: MQTT Protocol, Google Firebase

PROJECTS

1.Bluetooth Controlled & Obstacle Detection Robot
Arduino Uno, Ultrasonic Sensors, L298N Driver

- Developed a dual-mode mobile robot capable of manual Bluetooth control and autonomous obstacle avoidance.
- Coded priority-based interrupt logic to override manual commands when ultrasonic sensors detect objects within 20cm.
- Designed the chassis layout for optimal weight distribution of battery and motor driver components.

2.Gesture Control Teleoperation Robot
Arduino Nano, MPU6050, HC-05 Bluetooth

- Engineered a wearable telemetry glove utilizing an MPU6050 IMU (6-Axis) to control robot velocity via hand pitch and roll.
- Implemented a Complementary Filter to fuse accelerometer and gyroscope data, reducing sensor drift and noise.

- Configured Master-Slave Bluetooth communication (HC-05) to achieve low-latency (<50ms) wireless control.

3.Autonomous Waste Segregation System with ROS2 & Computer Vision
Techmela Event | Raspberry Pi 5, ROS2 Humble, Python,TFlite

- Developed a vision-based robotic manipulator on ROS2 Humble to identify and segregate waste (biodegradable vs. non-biodegradable).
- Implemented a CNN Deep Learning custom-trained model on Raspberry Pi 5 for real-time object detection and classification trained on 50000+ 16 different types of waste
- Winner Of the Techmela 2026

4.Smart City Waste Management System (IoT & Cloud)
Smart India Hackathon (SIH) 2025 | ESP32CAM, IoT, Firebase

- Architected a scalable IoT solution using ESP32 microcontrollers and ultrasonic sensors to monitor bin fill levels in real-time.
- Established a robust MQTT communication layer to transmit telemetry data to Google Firebase.
- Built a platform for both user and municipal Authorities to provide live dashboards and dynamic route optimization for collection vehicles.

5.Voice-Controlled Mobile Robotic Assistant (Ongoing)
Research Project |Natural Language Processing, C++,Inverse Kinematics,ROS2,Jetson Nano

- Integrating an Android-based Speech-to-Text engine to parse voice commands for hands-free navigation.
- Programming a Finite State Machine (FSM) to handle logic transitions between idle, listening, and navigation modes.
- Designing a custom robotic arm that suits the need of the project.

In short: project 5 focuses on building a autonomous 4 wheeled bot equipped with LIDAR and voice recognition modules and a robotic arm (6 – axis) mounted on top of it to pick and get the object based on the users request.