Skill Development Laboratory (Skill Lab)

ARJUNA Robotics & Autonomous Systems Laboratory

About the Skill Lab

The Skill Development Laboratory of the Department of Robotics and Automation, JSS Academy of Technical Education, Bengaluru is established to provide advanced hands-on training in Autonomous Mobile Robotics and AI-enabled systems. The lab is equipped with the ARJUNA Edu Bot, an industrial-grade ROS-based Autonomous Mobile Robot developed in collaboration with Newrro Robotics.

This platform enables students to work on real-time robotic applications such as:

- Autonomous Navigation
- SLAM (Simultaneous Localization and Mapping)
- AI-based perception
- Obstacle avoidance
- Delivery robot systems
- Multi-robot communication

The Skill Lab bridges the gap between academic robotics concepts and real-world industrial autonomous systems.

Objectives of Skill Lab

- To provide practical exposure to ROS-based Autonomous Mobile Robots.
- To train students in SLAM, navigation, and AI-enabled robotics systems.
- To develop competency in real-time robotic programming using Python and C++.
- To enable students to implement industrial-level navigation and perception algorithms.
- To promote research and innovation in autonomous robotics.

Facilities Available

Infrastructure & Facilities

- ARJUNA Autonomous Mobile Robot Platform
- NVIDIA Jetson Nano / Orin Nano AI Computing System
- 7-inch Capacitive Touch Display (1024×600 IPS)
- Li-ion Battery with BMS protection
- Smart Robot Manager Board
- Servo Driver Expansion Board (ESP32-based)
- High-speed WiFi & Bluetooth connectivity
- Dedicated robotic testing and mapping area

Equipment & Resources

Major Equipment

The Skill Lab is equipped with advanced industrial-grade components including:

- 360° LiDAR Scanner (up to 12m range)
- RGB / RGB-D AI Camera
- IMU BNO055 (9-axis orientation sensor)
- Ultrasonic Sensors (2cm–400cm range)
- Smart Servo Motors (20 kg.cm torque with magnetic encoder)
- Mecanum Wheels & Rubber Wheel Configurations
- Jetson Nano 4GB AI Developer Kit
- ROS-based Navigation & Mapping Stack

Skill Areas Covered

Domains Covered

Students are trained in the following advanced domains:

- Robot Operating System (ROS)
- ROS2 Framework
- SLAM (2D & Basic 3D Mapping)
- Localization (AMCL / EKF-based sensor fusion)
- Path Planning (Dijkstra, A*, Dynamic Window Approach)
- LiDAR-based obstacle avoidance
- AI Vision & Object Tracking
- Voice-Controlled Robotics
- Master-Slave Multi-Robot Systems

Activities Conducted

The following practical programs are conducted in the Skill Lab:

- Autonomous Navigation (without obstacle avoidance)
- Navigation using BUG-0 and BUG-1 algorithms
- Object Following using LiDAR
- Object Tracking using Camera (color detection)
- Autonomous Docking Simulation
- Delivery Robot Algorithm Implementation
- Voice-Controlled Robot Operation
- Manual Teleoperation using VNC
- Multi-Robot Communication over WiFi

Faculty & Supporting Staff

Teaching Faculty

- **Dr. Ramya M V** – Professor & Head
- **K S Mahesh** – Assistant Professor
- **Deeksha B S** – Assistant Professor

Supporting Staff

- **Ranjani S N** – Instructor
- **Niranjan N S** – Foreman
- **Gurumurthy S S** – Helper

Student Outcomes & Benefit

Skill Development Outcomes

Students gain hands-on experience in:

- Industrial ROS-based robotic platforms
- Real-time AI implementation on Jetson platform
- Sensor integration and calibration
- Autonomous system debugging and testing
- Multi-sensor data fusion
- Industrial AGV simulation

This lab enhances students' readiness for careers in Robotics, Automation, AI, and Autonomous Systems.

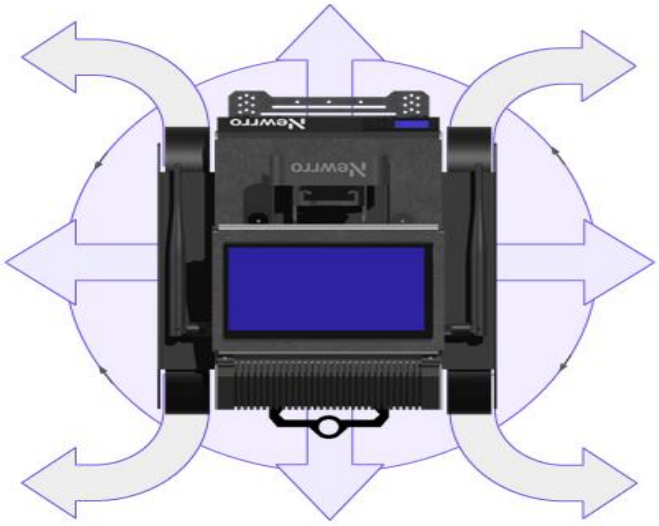
Industry Collaboration

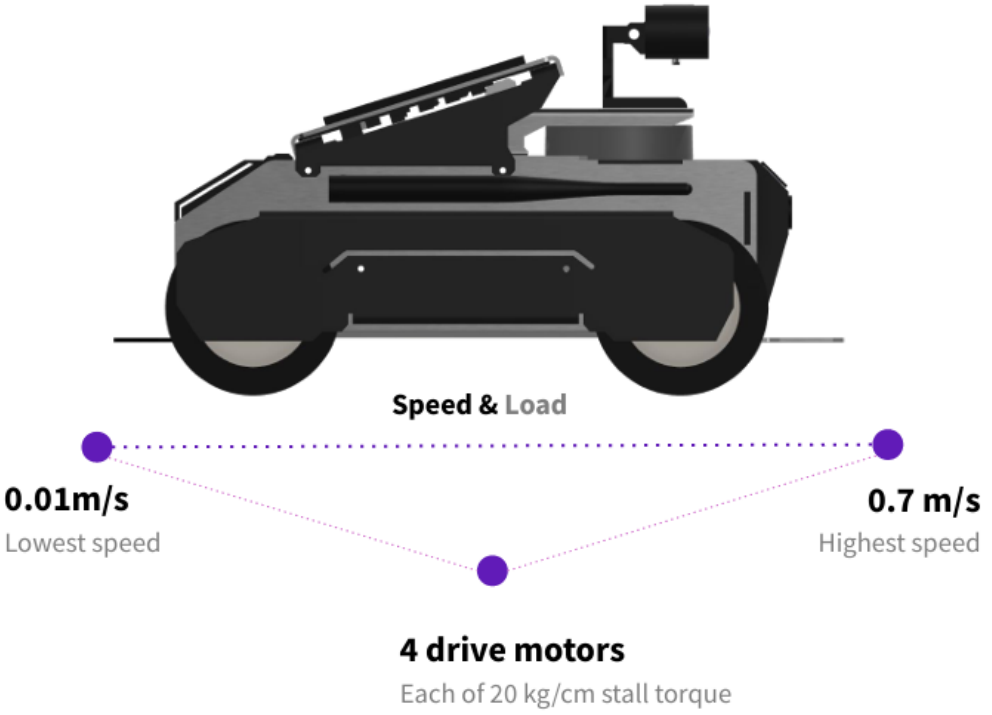
Collaboration with Newrro.

The Skill Lab operates in collaboration with **Newrro.**

Gallery Section

Skill Lab Gallery





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