my equation

NANODEGREE
ROS 2

Precision in Every Pulse
Welcome to the Nano ROS Era

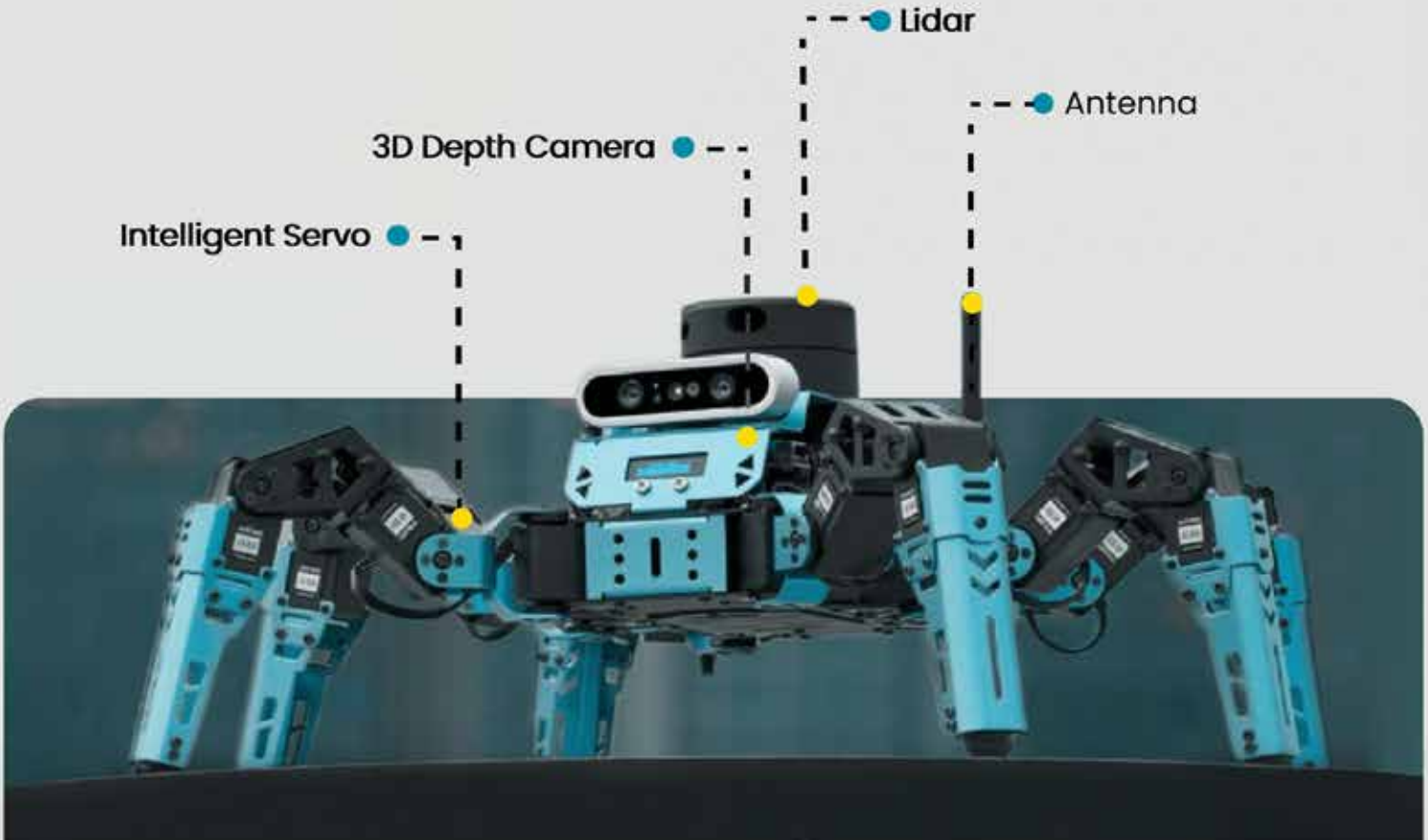


About ROS 2

ROS 2 (Robot Operating System 2) is the **next-generation robotics** middleware designed to build robust, scalable, and real-time robotic systems. With support from large industrial players like Open Robotics, NVIDIA, and Intel, ROS 2 is now the global standard for professional and research-based robotics. It brings modularity, flexibility, and security to robotic software development, replacing its predecessor, ROS 1.

Our ROS 2 Nano Degree program is designed to provide students, professionals, and enthusiasts with hands-on training in ROS 2 using Ubuntu 22.04 and the Humble distribution

Learners will develop and simulate complete autonomous robot systems, gaining skills applicablein industrial automation, autonomo us vehicles, drones, and service robotics.



About My Equation

My Equation™ is India's fastest-growing new-age upskilling company focused on practical, project-based learning across advanced tech domains.



My Equation™ is a skill-tech platform dedicated to transforming engineering education. We offer vocational training through industrial programs, nano degrees, live sessions, and real-world projects. Our services include career guidance, interview prep, and internship opportunities.

With over 40+ products, connections with 2200+ colleges, and a monthly reach of 88 Lakh + over our socials , we're bridging the gap between college and industry, making engineers industry-ready.

- Total Learners Trained: **40,000+ mentees**
- Domains Covered: Robotics, AI/ML, Electric Vehicles, IoT, Mechanical Design, Industrial Automation
- Placement Conversions: **100+ learners** placed or onboarded in internships via our ecosystem

Scope Of Work After Learning

After completing this **3-month ROS 2 Nano Degree**, learners can apply to roles such as:











Top Recruiters in this Space

NVIDIA · iRobot · Boston Dynamics · amazon robotics · ABB · FANUC · KUKA · TESLA · BOSCH

Achievements

Featured by AIC-GUSEC as a Top Skill tech Upskilling Initiative

- ★ GUSEC Atal **Innovation of the Year Award**
- ★ Featured in Ahmedabad mirror
- ★ Incubated under **NASSCOM Startups**
- ★ Part of the NVIDIA Inception Program
- ★ Part of ibm for startups , mongo db for startup
- ★ Semi-finalist in the TiE Udaipur "CON" Competition
- ★ Incubated under NASSCOM Startups
- ★ Part of the NVIDIA Inception Program
- ★ Trained over **40,000+**people and have connected with over **2200 + colleges** across **5800 + mhrd** approved colleges across india
- ★ INCUBATED
  - **ACIC BMU**
  - **GNDU**
  - **PIEDS - BITS PILANI**
  - **AIC GUSEC**



Content Overview

1. ROS 2 & Linux Environment Setup

- Install Ubuntu 22.04 and ROS 2 Humble for robot software development
- Understand ROS 2 filesystem layout and package structure
- Use VS Code, CLI, and colcon to manage and build ROS projects
- Configure ROS 2 environment variables and dependencies
- Explore ROS 2 terminal tools like ros2 pkg, ros2 node, ros2 topic
- Practice verifying installations and resolving dependency issues

2. Linux and Ubuntu FundamentalsSetup

- Install Ubuntu OS tailored for ROS 2 compatibility
- Learn basic Linux commands for navigation and file management
- Use terminal operations like cd, ls, grep, chmod, and sudo
- Understand directory structures, permissions, and system updates
- Practice package management using apt and snap
- Learn to edit files using nano, vim, and configure network settings

3. Introduction to ROS 2

- Understand what ROS is and its role in robot application development
- Compare ROS 1 vs ROS 2 in terms of architecture, performance, and reliability
- Study ROS 2 design principles, modularity, and layered architecture
- Explore real-world ROS 2 use cases in industries and research
- Understand core libraries like rcl, rclcpp, and rclpy for node creation
- Learn DDS-based communication and how ROS 2 uses publishers/subscribers

Content Overview

4. ROS 2 Foundations & Node Programming

- Create and organize ROS 2 workspaces and packages
- Write publisher, subscriber, and service nodes in Python or C++
- Use colcon to build, compile, and run ROS 2 projects
- Automate node execution with ROS 2 launch files
- Practice using TurtleSim to control robots with topics and services
- Explore ROS 2 command-line tools (ros2 run, ros2 topic echo, etc.)

5. Simulation with Gazebo & RViz

- Set up 3D robot simulations using Gazebo
- Visualize robot data and sensor streams using RViz
- Install and simulate TortoiseBot in Gazebo for hands-on practice
- Define robot structure using URDF (Unified Robot Description Format)
- Enhance simulation with Gazebo plugins for mobility and perception
- Understand basic odometry to estimate robot movement over time

6. TortoiseBot Package Exploration

- Work with the description package (URDF, meshes, robot models)
- Launch complete simulation scenes using the Gazebo package
- Understand firmware-level control for wheels, sensors, and encoders
- Explore SLAM capabilities for mapping and localization
- Use the navigation package for path planning and autonomous movement
- Combine multiple packages using the bring-up launch system

Content Overview

7. Manipulation with TortoiseBot

- Create and organize ROS 2 workspaces and packages
- Add links, joints, and actuators to simulate robotic arms or manipulators
- Integrate the custom URDF with Gazebo simulation environment
- Modify inertial, visual, and collision properties of robot parts
- Complete the setup with launch files and plugin support
- Test manipulator behavior and verify joint movements in simulation

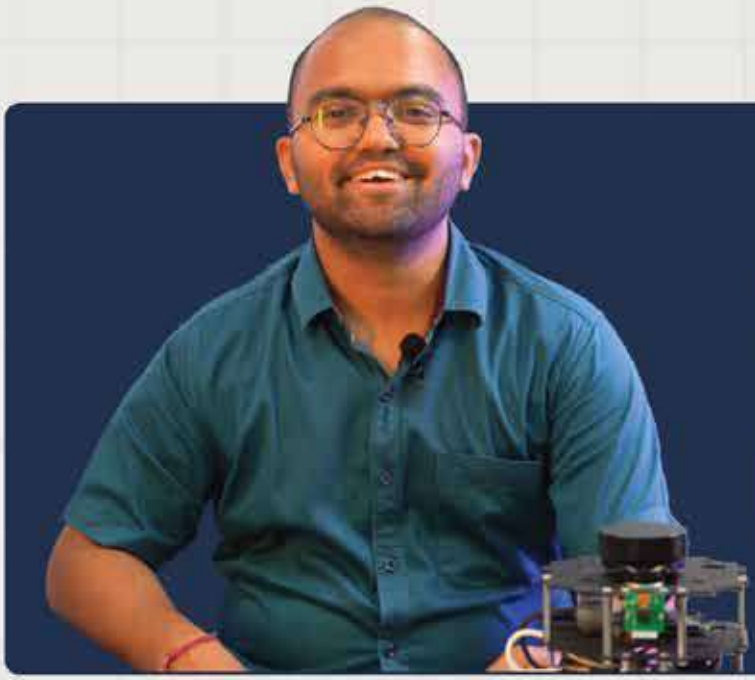
8. Implementing Plugins with URDF

- Simulate differential drive robots using the drive controller plugin
- Add LIDAR plugins to detect distances, obstacles, and walls
- Integrate camera plugins for visual perception and object tracking
- Combine multiple sensors in a single URDF for complete robot design
- Configure plugin parameters for real-world accuracy
- Visualize sensor output in RViz and validate with simulation

9. SLAM, Navigation & Vision Integration

- Design and simulate your own custom Gazebo world
- Understand SLAM (Simultaneous Localization and Mapping) fundamentals
- Integrate SLAM algorithms into URDF-based simulations
- Use ROS 2 Navigation Stack for path planning and obstacle avoidance
- Implement camera vision tasks using OpenCV with ROS 2 nodes
- Develop image-based navigation, detection, or visual feedback systems

Our Mentor Pool



Shubham Nandi

Co-Founder at **RigBetel Labs**

ROS 2 Expert



Navaneetha

Robotics Engineer at **Thedush Robotics**



Abdul

Robotics Developer at **ADsafe Solutions**



Deiva Prakash

Robotics software Engineer @ **GOAT Robotics**



Keivalya

Researcher @ **PARCS/NeU**



Sukumar

Senior Research Engineer at **LG Electronics**



Adit Sule

ROS Developer @ **Larsend & Tourbro Technological Services**



Mohit Kumar

Graduate Engineer Traineee @**Addverb**

Certificates

2 Level Certification

My Equation will provide 2 level certification for all the mentees who will excel the program.



CERTIFICATE
OF COMPLETION

This certificate is proudly presented to

Tirth Kalaria

for successfully completing the **ROS2 Nano Degree** presented by My Equation. The candidate has been sincere while attending the entire training program.

Koustuv Mohanty
Chief Operations Officer
My Equation

Company Seal

Ratified By:

Backed By:

Sample Certificate

Ratification from :





Robot Operating System 2

Sample LOR

Levels of **Certification**

Certificate of **Participation** → **LOR** for **Top Performers**

PROJECT AND
FURTHER DETAILS



Project 1

Warehouse Inventory Robot

Objective :- Design and deploy an autonomous mobile robot that automates inventory tracking and updates warehouse stock in real-time.

Key Capabilities:

1. Autonomous navigation using ROS 2 Navigation Stack (Nav2) in a simulated warehouse
2. Real-time mapping and localization with SLAM to adapt to dynamic inventory layouts.
3. Integration of camera and QR code scanner using OpenCV and image_transport.
4. Database communication using ROS services to update stock records on a remote server



Tools & Concepts

- Nav2, AMCL, Map Server, Path Planning
- OpenCV with ROS 2 bridge, CV zone for QR scanning
- ROS 2 Services & Actions, RViz and Gazebo Simulation
- SQLite / Firebase / MySQL integration for inventory database
- Custom Gazebo World simulating warehouse racks, shelves, and loading zones

Outcome: Build a scalable inventory robot concept, deployable for small or medium logistics centers.

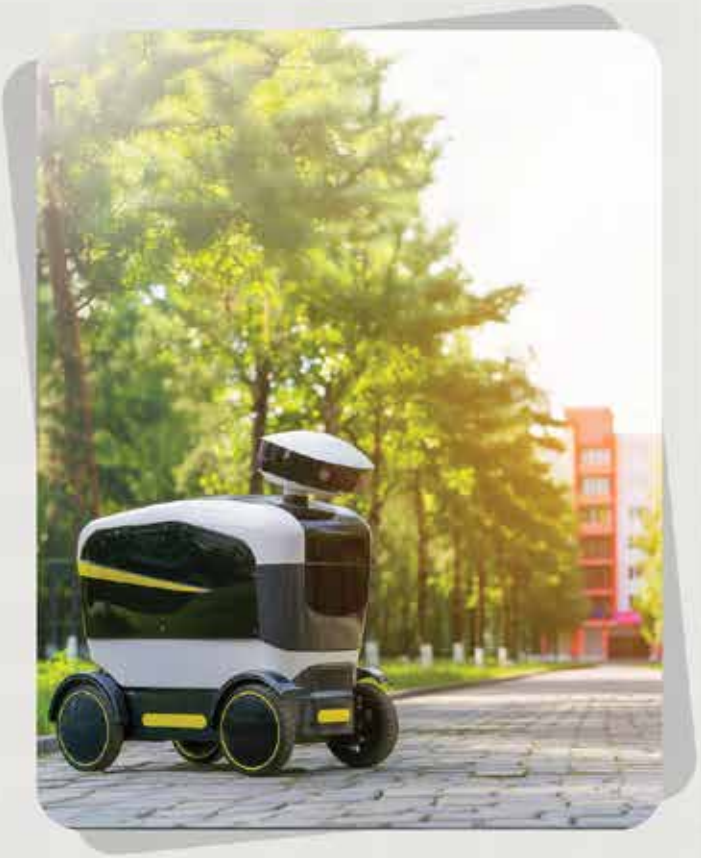
Project 2

Campus Delivery Bot

Objective :- Build a robot that autonomously picks up and delivers packages across a simulated campus environment.

Key Capabilities:

1. SLAM-based autonomous exploration using ROS 2 and Cartographer for indoor/outdoor localization.
2. Package pickup/drop-off using a servo-actuated mechanism triggered via ROS actions
3. Voice or touch-based interface for destination input using ROS parameters or UI nodes.
4. Obstacle avoidance and rerouting using DWB local planner and costmap tuning.



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