

# Learn2ROS

Code the Future of Robotics.

## Beginner: ROS Basics

Start with the fundamentals of ROS, including installation, core concepts, and basic commands. Work through introductory tutorials and set up your first ROS workspace.

## Simulation Practice

Use simulators like Gazebo to test and refine your ROS robotics skills. Practice building and deploying complete robotic systems in a simulated world.

## Further Learning

Explore ROS 2, participate in the ROS community, and contribute to open-source projects to deepen your robotics expertise.

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## ROS Navigation

Learn about ROS topics, services, messages, and how to control robot movements. Explore ROS navigation stacks and integrate a simulated robot in a virtual environment.

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## Advanced: Perception & Manipulation

Tackle advanced ROS topics such as machine vision, sensor integration, and robotic arm manipulation. Work on real-world projects with sensors and actuators.

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## Capstone Project

Apply your ROS knowledge in a project setting by designing, programming, and testing a robotic system from start to finish.

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## **Week 1: Introduction to ROS**

**Session 1:** What is ROS? History, applications, and ecosystem

**Session 2:** Setting up Ubuntu & installing ROS (Noetic or ROS 2 Humble)

## **Week 2: ROS Basics**

**Session 3:** ROS architecture – nodes, topics, messages, master

**Session 4:** Writing your first publisher and subscriber in Python

## **Week 3: ROS File System & Tools**

**Session 5:** Understanding ROS packages, workspaces, and catkin/colcon build

**Session 6:** Using core ROS tools: rosrn, roslaunch, rosnnode, rostopic

## **Week 4: Communication & Visualization**

**Session 7:** Custom messages and services

**Session 8:** Visualizing data with RViz

## **Week 5: Simulations with Gazebo**

**Session 9:** Introduction to Gazebo simulation environment

**Session 10:** Spawning robots and controlling basic movement in simulation

## **Week 6: Working with Sensors**

**Session 11:** Subscribing to LIDAR, camera, and IMU data

**Session 12:** Intro to sensor fusion basics

## **Week 7: Robot Control and Navigation**

**Session 13:** Writing basic motion commands (Twist messages)

**Session 14:** Intro to ROS Navigation Stack (localization & mapping concepts)

## **Week 8: Mini Project & Community**

**Session 15:** Build a mini-project (e.g., TurtleSim obstacle avoidance or line follower)

**Session 16:** Exploring ROS community resources, repositories, and career paths