
ROS2 Basics in 5 Days (Python)



Unit 1 Introduction to the Course

- Summary -

Estimated time to completion: **10 minutes**

This unit is an introduction to the **ROS2 Basics in 5 Days** course. You will have a quick preview of the contents covered in the course, and you will also view a practical demo.

- End of Summary -

1.1 What is this course about?

If you want to create intelligent robots of the future, you need to learn the **robot programming standards**. Currently, most service robots are programmed using ROS (Robot Operating System). **ROS is the standard for robotics programming**.

To become a robotics developer, you need to learn ROS!

To make a difference and create an intelligent robot, you need to learn ROS.

ROS2 is the latest version of ROS. The goal of ROS2 is to overcome the limitations of ROS, with particular attention to the creation of robotics products. For instance, ROS2 includes real-time features and embedded security, and it is better prepared for the industrial world.

The course aims to introduce you to the basic concepts you need to know to start working with ROS2. During the course, you will bypass all the unnecessary noise and focus on the ROS2 essentials. In particular, you will focus on practice. So, what do you say? Are you in?

1.2 Practice!

With the proper introductions made, it is time to start. And, as we always do in the Robot Ignite Academy, start with practice! In the following example, you will use a simulated MARA robot developed by Erle Robotics, running in ROS2. So, get started!

- Demo -

a) First, begin by sourcing the following ROS2 workspace:

► Execute in Shell #1

In []: source /home/simulations/ros2_sims_ws/install/setup.bash



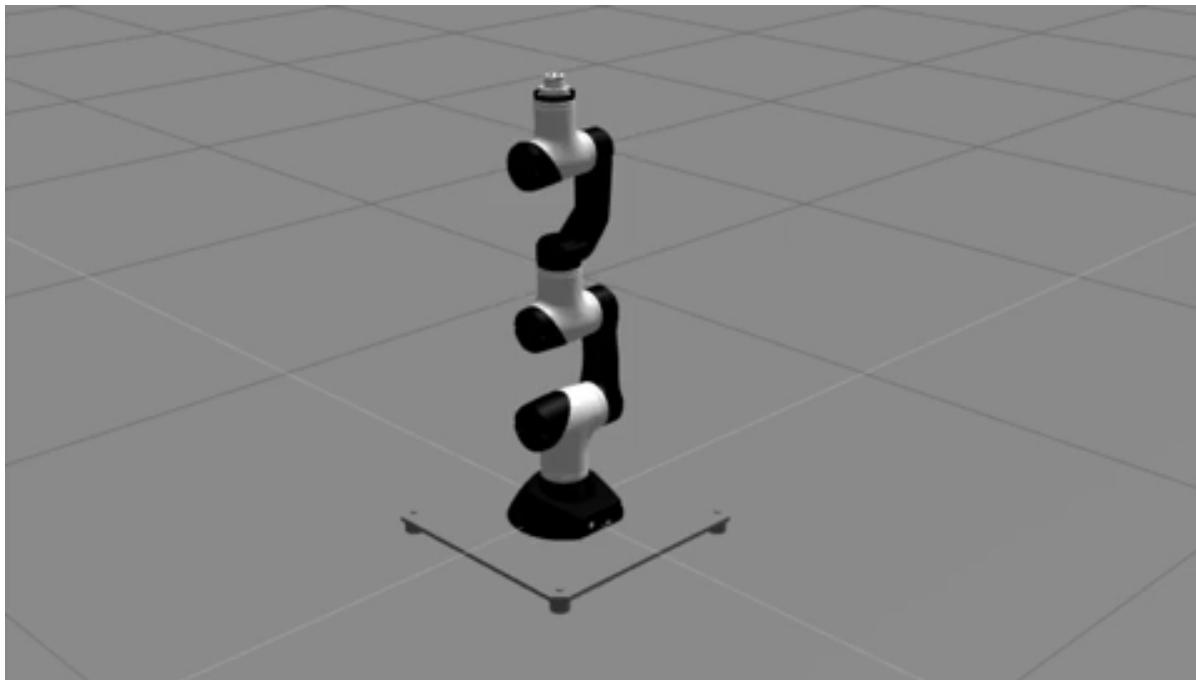
b) Now, execute a simple ROS2 program that will execute a motion of your simulated MARA robot.

► Execute in Shell #1

In []: ros2 run mara_minimal_publisher mara_minimal_publisher_v1.py



You should now see the robot moving its arm towards the ground.



In this example, you launched a ROS2 program. In this program, you publish messages in particular Topics, which tell the arm to move up and down continuously. Do not worry if you do not know what I am talking about yet! I promise you that by the end of this course, you will understand what is going on behind the scenes!

Whenever you want to stop the arm's movement, click **Ctrl + C** on your keyboard.

- End of Demo -

1.3 What will you learn with this course?

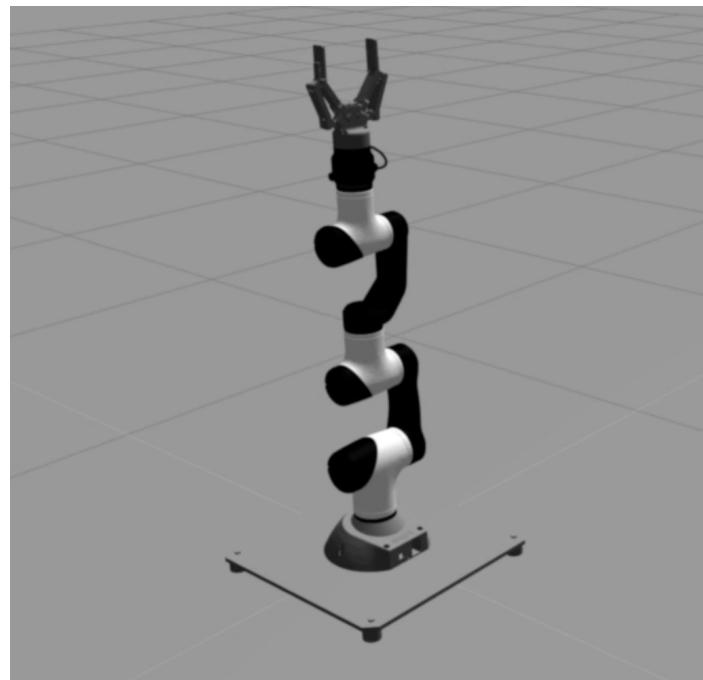
In this course, you will be presented with the following topics:

- Basic Concepts of ROS2: Packages, Launch Files, Nodes, Client Libraries, etc.
- How Topics work: Publishers and Subscribers
- How Services work: Clients and Servers
- How Actions work: Clients and Servers
- How to manage Multithreading in ROS2 (Executors and Callback Groups)
- Basic Debugging Tools: Logging system, RVIZ2.

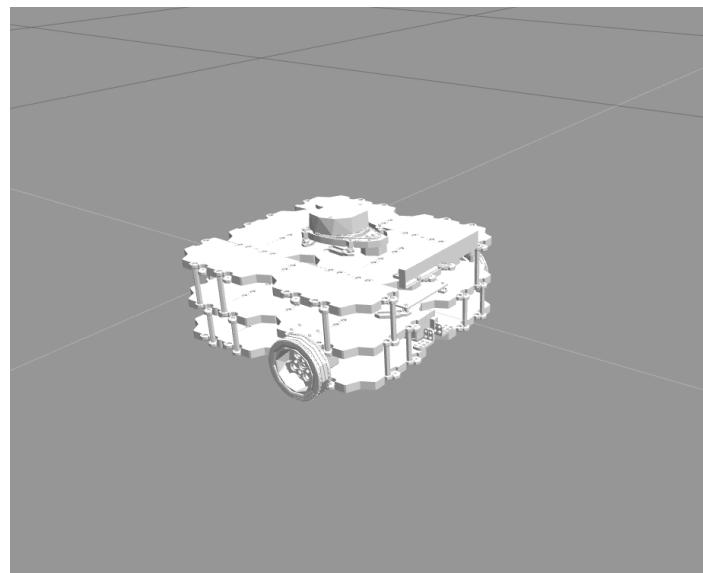
1.4 How will you learn all this?

You will learn through hands-on experience from day one! During the course, you will work with the following simulated robots.

MARA robot:



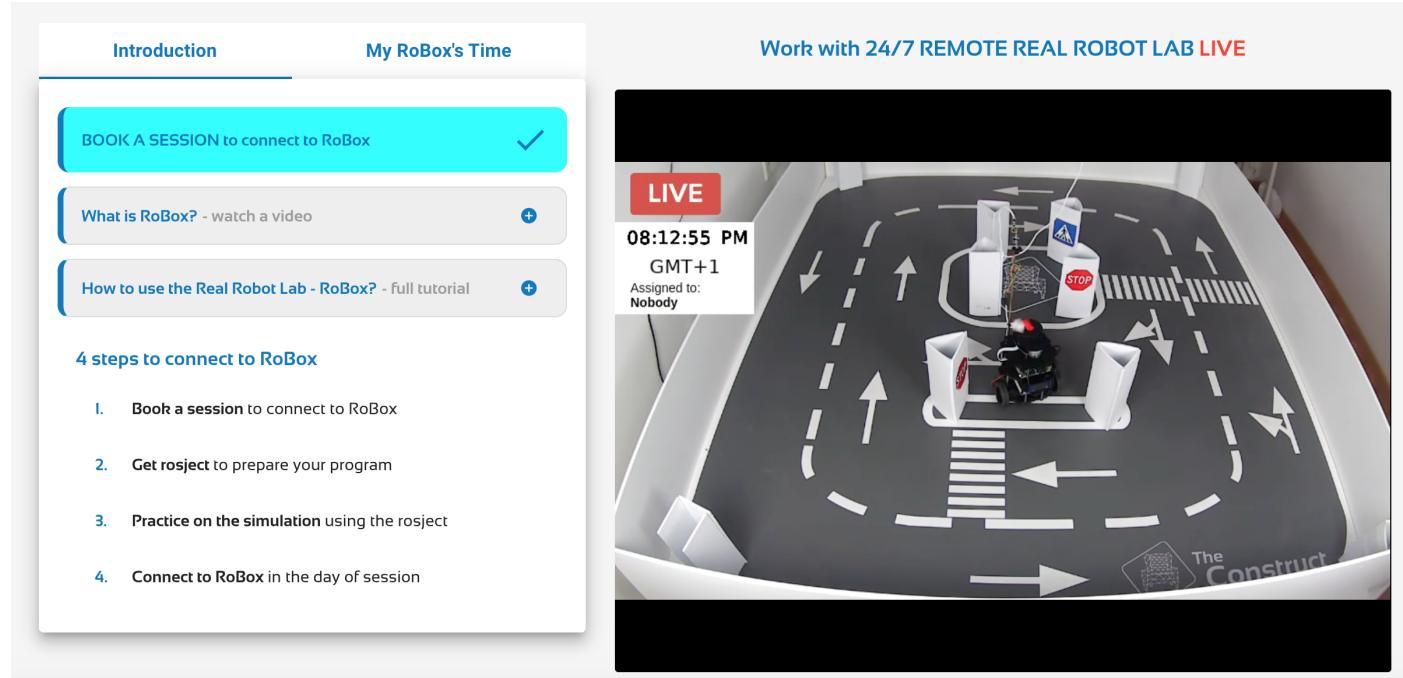
TurtleBot 3 Waffle:



1.5 Apply what you learned to a Real Robot Project

As you master the different ROS2 concepts, you will apply everything you learned during the course in a complete robot project. And I am not talking about any robot project, but a project based on a **real robot** located in our Barcelona facility.

For this purpose, you will use the **Real Robot Lab** (<https://app.theconstructsim.com/#/RealRobot>) tool. This amazing tool will allow you to remotely control and run your ROS2 programs with a real robot, from any place in the world.



The screenshot shows the 'My RoBox's Time' section of the Real Robot Lab interface. At the top, there are two tabs: 'Introduction' (selected) and 'My RoBox's Time'. Below the tabs, there are three cards:

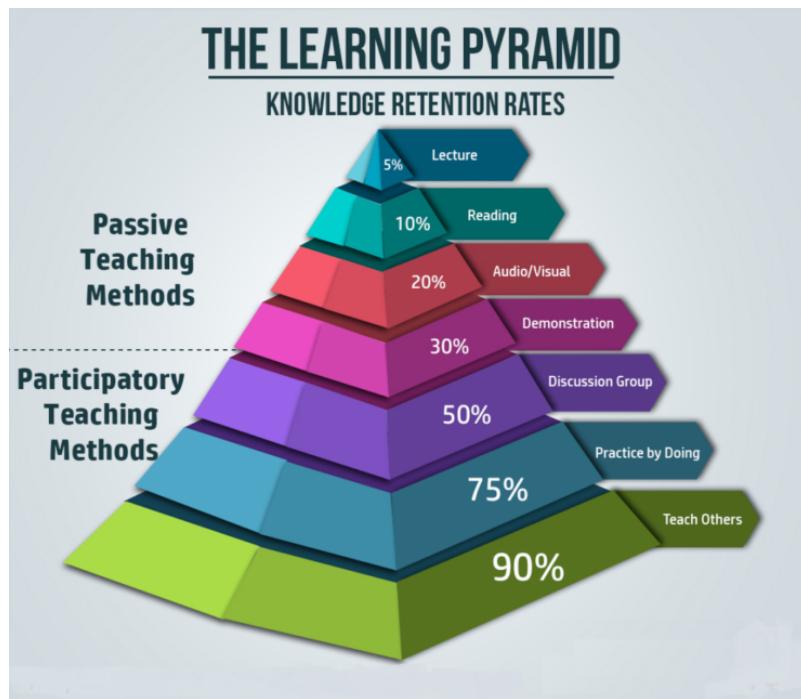
- BOOK A SESSION to connect to RoBox** (with a checkmark icon)
- What is RoBox? - watch a video** (with a plus icon)
- How to use the Real Robot Lab - RoBox? - full tutorial** (with a plus icon)

Below these cards, a section titled '4 steps to connect to RoBox' lists the following steps:

1. Book a session to connect to RoBox
2. Get rosject to prepare your program
3. Practice on the simulation using the rosject
4. Connect to RoBox in the day of session

To the right of this panel, a large window displays a live session titled 'Work with 24/7 REMOTE REAL ROBOT LAB LIVE'. The window shows a 3D simulation of a robot in a circular arena with various obstacles and arrows indicating movement paths. The interface includes a 'LIVE' button, the time '08:12:55 PM', 'GMT+1', and 'Assigned to: Nobody'.

As you advance through the course, you will be introduced to the real robot project. However, that is not all! After you complete the real robot project, you will have the chance to make a **live presentation** of your project. Why do you want to show and explain your project in a live session? Because at The Construct, we firmly believe this is the most efficient and challenging way to learn and improve your subject knowledge.



1.6 Get a certificate

Upon completion of the course, you will have the chance to earn a certificate proving your ROS2 Basics knowledge. To earn the certificate, complete the following tasks:

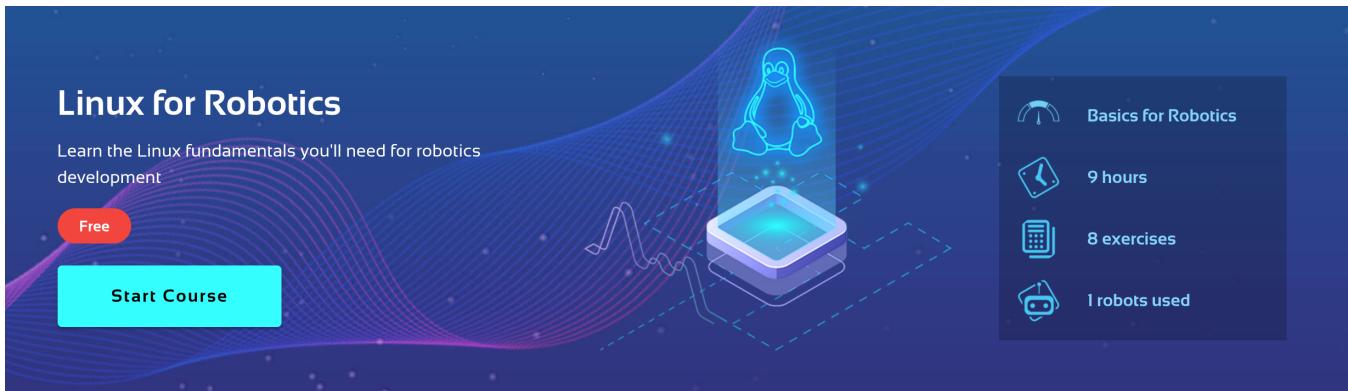
- Complete the live presentation of your project.



1.7 Minimum Requirements for the Course

You must know the following topics:

1. **Basic knowledge of Linux.** If you do not know Linux, take our free [**Linux For Robotics**](https://app.theconstructsim.com/#/Course/40) (<https://app.theconstructsim.com/#/Course/40>) course.



2. **Learn how to create programs in Python.** If you do not know Python, take our free [**Python3 For Robotics**](https://app.theconstructsim.com/#/Course/58) (<https://app.theconstructsim.com/#/Course/58>) course.



1.8 Special Thanks

- To our friends at Erle Robotics, who have shared their amazing ROS2 MARA Gazebo simulation with us, one of the first simulations fully available in ROS2.

Erle Robotics Official Page: <https://acutronicrobotics.com/> (<https://acutronicrobotics.com/>)

ROS2 MARA Simulation: <https://github.com/AcutronicRobotics/MARA>
(<https://github.com/AcutronicRobotics/MARA>)



Erle Robotics

an  company

- This course would also be impossible without the knowledge and work of the [ROS Community](#) (<http://www.ros.org/>), [OSRF](#) (<https://www.osrfoundation.org/>), and [Gazebo Team](#) (<http://gazebosim.org/>).



GAZEBO

