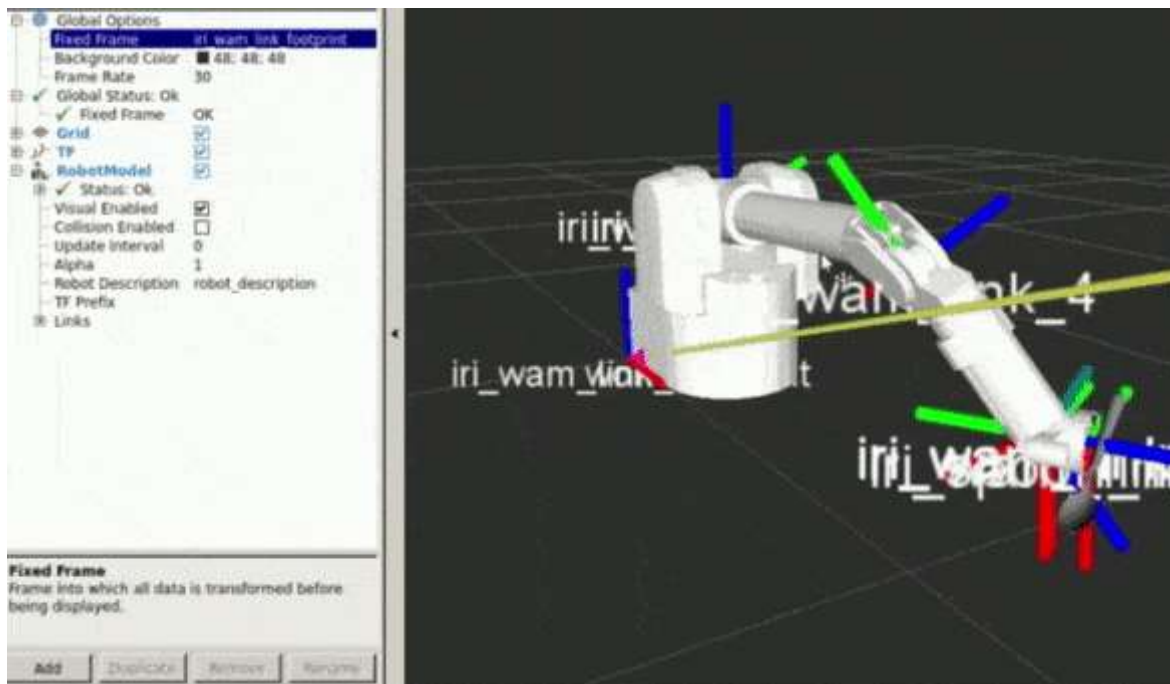# ROS Basics in 5 days (C++)

A Guide for ROS in 5 Days

ROS in 5 days, I cannot believe it!

You have probably heard of ROS and how long it takes to learn to all students. It is very likely that you are thinking that learning ROS in 5 days is not possible... so let me tell you the news:

It is possible to learn ROS fast if you have the proper method!

1   How is it possible?

We have created a learning method that allows you to get most of ROS in the minimum amount of time. Our method has 4 parts:

1. **DECONSTRUCTION**: we have identified the important parts of ROS that you must master in order to understand 80% of ROS programs. You will concentrate on learning these parts very deep.
2. **REMOVING**: we have removed many things that are not needed and just add noise to your learning.
3. **LEARNING**: we guide you step by step in a progressive manner through all those important parts, starting always from a robot that does things.
4. **PRACTICING**: we make you practice a lot on every step, always on a robot using our simulated robots.

- Want to learn more about this method? Read this book: The First 20 Hours: How to Learn Anything . . . Fast! (https://www.amazon.com/gp/product/1591846943/ref=as_li_tl? ie=UTF8&camp=1789&creative=9325&creativeASIN=1591846943&linkCode=as2&tag=theconsim-20&linkId=88feac086be2a46c28909cb9909a6860)
- Want to have scientific evidence of this method? Read this paper: Cognitive Skill Acquisition (https://pdfs.semanticscholar.org/6ce5/af5973ecec36eb9c699e7cae739743c8b4b5.pdf).

2   Which robots are you going to use along the course?

Along this course you are going to program several robots of several types. Hence, you will be applying the same concepts over and over again, with different configurations and styles of robots. Applying the same concepts on different robots will make the concepts stick into your head.

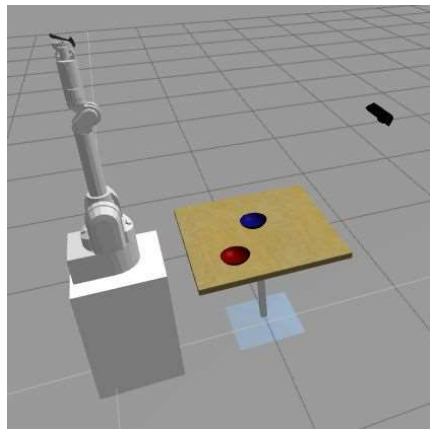The following robots will be used along the course:

Parrot Drone
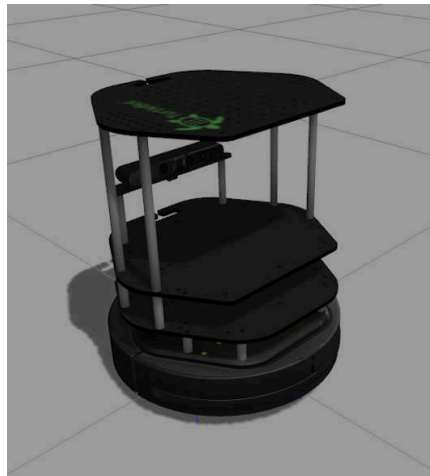
Kobuki

Husky

**BB-8**

Wam Arm

3   Main Objective of this course

1. The objective of this course is to give you the basic tools and knowledge to be able to understand and create any basic ROS related project. You will be able to **move robots, read their sensor data, make the robots perform intelligent tasks, see visual representations of complex data such as pointclouds and debug errors in the programs.**
2. The course will allow you to **understand packages that others have done**. So you can take ROS code made by others and understand what is happening and how to modify it for your own purposes.
3. This course can serve as an introduction to be able to understand the ROS documentation of complex ROS packages for object recognition, text to speech, navigation and all the other areas where has ROS developed code.

4   Learning ROS: attack in two ways

The course provides teaching lessons in **two different ways**:

1. **Learn ROS programming several robots**: This part consists of units that each one teaches you some topic of ROS. But you will learn creating and executing code while using different robots for it (the robots above).**Theory through hands on experience**.
2. **Apply what you learnt to a Robot Project**: Here you will apply what you have learnt in the previous units by attacking a **full project controlling a Turtlebot robot**. The objective is to make the Turtlebot robot get out of a maze using its sensors' data.
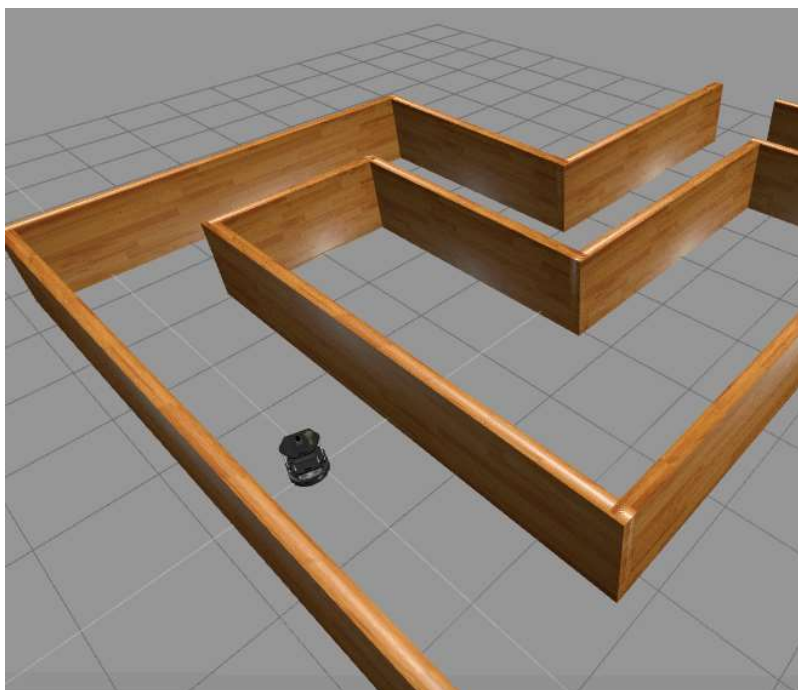
4.1 Learning ROS by programming several robots

We will teach you the main ROS concepts that are the core of ROS. These are the most important concepts that you have to master. Once you master them, the rest of ROS can follow easily.

Along the units of this course, you will learn:

- Unit 1: How **ROS Basic Structure** works.
- Units 2 and 3: What are **ROS Topics** and how to use them.
- Units 4 and 5: What are **ROS Services** and how to use them.
- Units 7 and 8: What are **ROS Actions** and how to use them.
- Unit 9: How to use **ROS Debugging Tools** for finding errors in your programs (especially Rviz).

Each Unit is meant to be done in around **one session of about 4-5 hours**. We will use C++ language to teach you and to program the robots.

4.2 Apply what you learnt to a Real Robot Project

As you master the different concepts of ROS, you will have to apply everything you learn during the course in a complete robot project. And I'm not talking about any kind of robot project, but a project based on a **real robot** which is located in our facilities in Barcelona.

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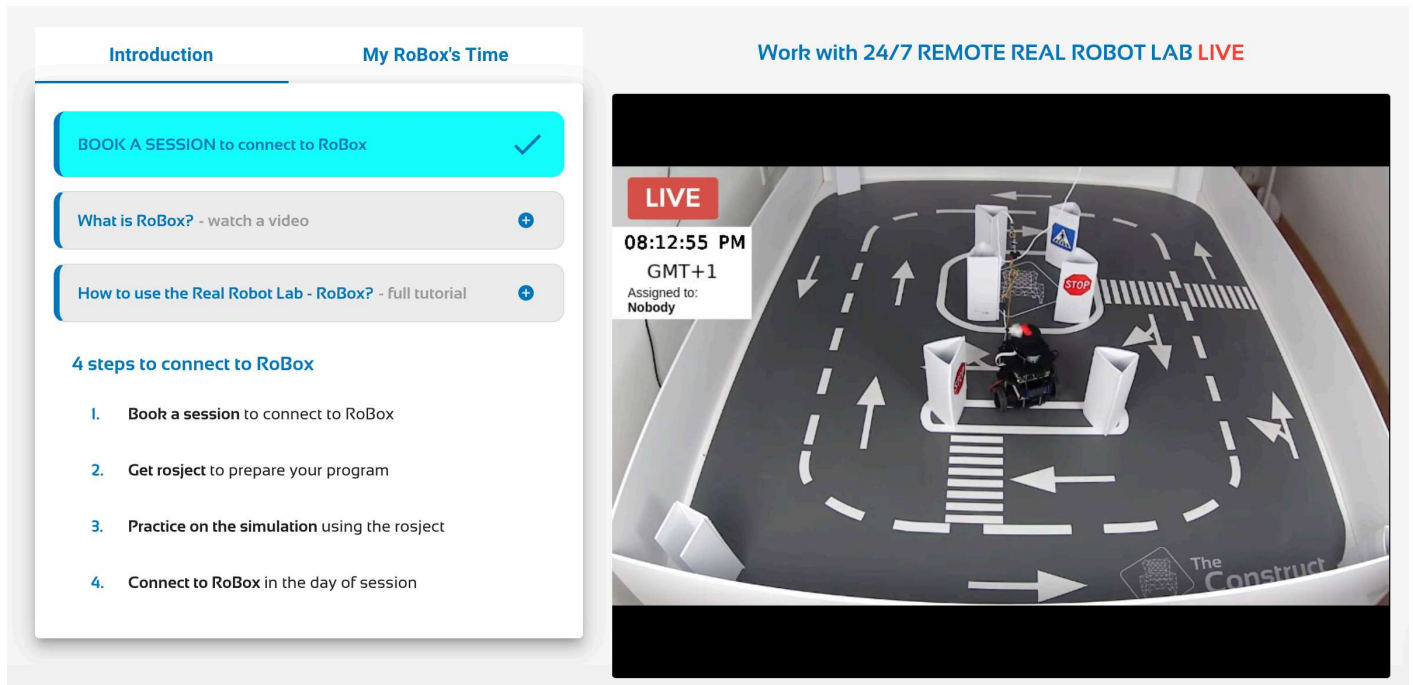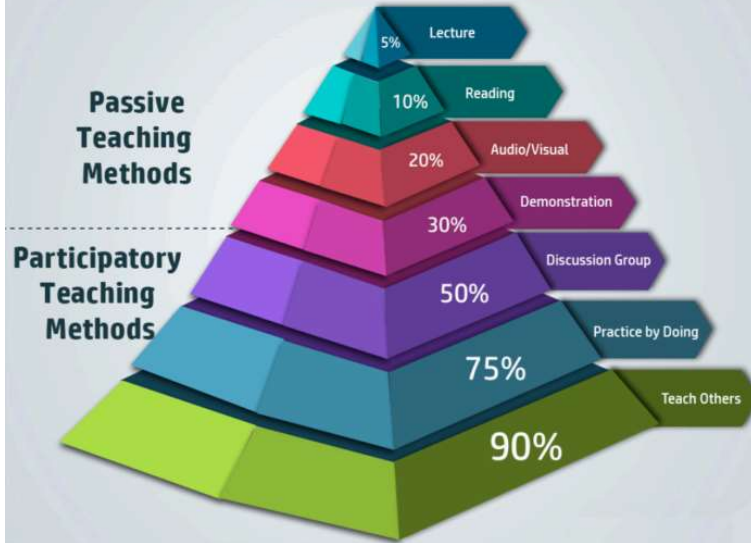

You will get introduced into the real robot project as you advance through the different units of the course.

But that's not all! After you complete the real robot project, you will have the chance to do a **live presentation** of your project. And why do we want you to show and explain your project in a live session? Because at The Construct, we strongly believe that this is the most efficient and challenging way of learning and proving your knowledge on a subjet.

THE LEARNING PYRAMID

KNOWLEDGE RETENTION RATES

Passive Teaching Methods

Participatory Teaching Methods

5% — Lecture
10% — Reading
20% — Audio/Visual
30% — Demonstration
50% — Discussion Group
75% — Practice by Doing
90% — Teach Others

5   Get a certificate

Upon completion of the course, you will be get the chance to earn a certificate proving your knowledge on ROS Basics. In order to earn the certificate, you will have to successfully complete the following tasks:

- Pass all the course Quizzes.
- Successfully complete the live presentation of your project.

6   ROS Distribution

Finally, it is important to mention that this course uses the **ROS Noetic** distribution. And why have we decided to use this distribution? Well, have a look at the below data, exctracted from the ROS Wiki site (http://wiki.ros.org/Distributions (http://wiki.ros.org/Distributions)):

3. List of Distributions

Distro	Release date	Poster	*Tuturtle*, turtle in tutorial	EOL date
ROS Noetic Ninjemys (**Recommended**)	May 23rd, 2020			May, 2025 (Focal EOL)
ROS Melodic Morenia	May 23rd, 2018			May, 2023 (Bionic EOL)
ROS Lunar Loggerhead	May 23rd, 2017			May, 2019
ROS Kinetic Kame	May 23rd, 2016			April, 2021 (Xenial EOL)

As you can see, **ROS Noetic** is the latest *supported* and *recommended* distribution released. Therefore, it is also the recommended distribution to use.

7 Special Thanks

- This course wouldn't have been possible 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