**RoboLocode in real life**

***Learning Scenario***

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**SUMMARY**

What if you could recreate RoboLocode in real life with real robots? Here is a hands-on activity!

This learning scenario bridges the virtual world with the real world by taking advantage of the LEGO Education SPIKE Prime Set to recreate the RoboLocode game.

This is a great opportunity to involve learners into a fun, challenging and stimulating activity.

**KEY ELEMENTS**

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| OVERVIEW | |
| Subjects | ICT  Programming  Robotics  Computational thinking |
| What is going to be done | Recreate the RoboLocode game experience in real life.  Demonstrate how the knowledge learned in the app can be transferred to a real situation using the LEGO Education SPIKE Prime Set. |
| Target public | Secondary education students (15 to 18 years old). |
| Preparation time | 30 min |
| Teaching time | 2 sessions / 90 min, each |
| Where you can download this lesson  (and more). | RoboLocode Teaching Materials:  <https://teducativas.madeira.gov.pt/roboloco>  LEGO Spike Programming Interface: <https://education.lego.com/en-us/downloads/spike-app/software> |
| What you’ll need | Colored tape |
| Resources used | [*https://education.lego.com/en-us/product-resources/spike-prime/downloads/building-instructions*](https://education.lego.com/en-us/product-resources/spike-prime/downloads/building-instructions) |

**LESSON INTRODUCTION**

By the end of this lesson students should have built their own custom robot and have a basic robot capable of knocking their opponents off the track and being able to finish the race.

**LESSON PLAN**

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| Introduction (15 min) |
| Explain to your class the following challenge: to recreate the RoboLocode experience of racing in a well-defined track, trying to be the first to get to the finish while simultaneously dodging and knocking over your opponents.  The challenge will involve the creation of the track, robot and of course programming the robot. |
| Building the base robot (55 min) |
| During this part of the lesson the students should build their base robot, for ideas the instructions that come with the LEGO Education Spike Set should provide enough inspiration for their creations. Students should be informed that only two motors are required for the base functionality (racing) of the robot, and the third motor should be reserved for helping doge and knock the opponents.  At this time sensors are not required yet and as we are only interested in obtaining the dimensions of the robot, that will drive the creation of the track. At the end of this stage, a robot capable of racing should have been built. |
| Creating the track (20 min) |
| With all the robots built their total dimensions can now be used to create the track that will be used. For building the track, coloured tape is advisable, and the track should use it in a consistent way, for instance the outside perimeter should a black colour, the interior individual tracks should use a solid primary colour. It’s also advisable, to build, as a first challenge, a drag race style track, as it simplifies the driving code. The coloured tape can be directly applied to the floor of the classroom or to other surfaces like paper. The race track should have 2 to 4 lanes. |
| The first race (20 min) |
| For the first race, the only required functionality is making the robot get to the finish line. At this point, if the racetrack has curves, then the colour sensor should be used to help guide the robots in the track. The robot should be programmed using the python environment, but if this proves difficult for the students the other environments can also be used in alternative |
| Upgrading the robot (40 min) |
| With a base robot able to race against other opponents, it’s time to upgrade the robot with new capabilities. Add the third motor to the robot, as well as the remaining sensors, the ultrasonic distance sensor and the force sensor. The motor can be used either in an offensive mode, for instance to push opponents, or as a defensive one, like for rotating the distance sensor, so the robot can find the opponents and dodge them.  At the end of this activity the robot should be able to continue to race and also have at least one new functionality that helps either dodge opponents or hinder them. |
| Upgrading the track and adapting the robot (30 min) |
| As a final activity the track should be upgraded, adding obstacles or curves to it.  These new features should increase the challenge by making the current code of the robots obsolete and thus the robots should be updated for the new conditions of the racetrack |

**ASSESSMENT**

To evaluate the lesson, a final quiz should be used.

The quiz should be focused on the process and not on the final result, for instance, how did the students tackle the challenge of ensuring that the robot kept himself on the track. For instance, what offensive or defensive modules did the students add and how did they work?

**STUDENT FEEDBACK**

In the final “meeting” after the final race every team member should participate.

This meeting should be held similarly to what professional racing teams do, meaning that there should exist clearly demarcated moments to discuss the robot, the race track, etc., in these moments problems as well as possible solutions for occurred should be discussed.

As a final topic, what can be improved should be the main topic.

**TEACHER’S REMARKS**

*Add here your comments and evaluation* ***AFTER*** *the implementation of this lesson, if any.*

**ANNEX (IF NEEDED)**