Educational Robotics Summer Camp at IPB: Internal RoboSTEAM Erasmus+ Report

José Gonçalves[1 2 3]

[1]Polytechnic Institute of Bragança, Portugal
[2]Robotics and Intelligent Systems Research Group, INESC-TEC, Portugal
[3]Research Center in Digitalization and Intelligent Robotics, Portugal

RoboSTEAM Project Meeting, Karlsruhe, 30-9-2019

Co-funded by the Erasmus+ Programme of the European Union

Introduction

- The referred experiment was part of a summer camp, that took place at the Polytechnic Institute of Bragança Portugal, being its technological aspects related with mobile robotics.
- Other than the technological aspects, the students participated in many different cultural and social activities, having the opportunity to know the city of Bragança and also to know different persons, mainly students, professors, researchers and laboratory technicians.

Introduction

- The applied approach in the summer camp was a challenge based learning methodology, being involved in the experiment 3 professors, 4 monitors, working with a group of 16 secondary school students.
- The described experiment was planned as an activity of the RoboSTEAM - Integrating STEAM and Computational Thinking development by using robotics and physical devices ERASMUS+ Project.

Summer Camp

Figure: Participants of the Summer Camp

Summer Camp

- The Polytechnic Institute of Bragança (IPB), which is a Portuguese Public Superior Education Institution, promotes and supports, every year, summer camps, in order to promote science and the Institution among potential new students, from technical and secondary schools.
- The Portuguese Foundation for Science and Technology (FCT) and the ERASMUS+ Spanish agency, also supported the 2019 summer camp edition.

Summer Camp

Figure: IPB Laboratory of Control, Automation and Robotics

Challenges Description

- Over the years, increasing fossil fuels as a source of energy for vehicles has generated a major impact on the environment.
- In this sense, a possible solution to solve this problem in controlled environments can be the use of mobile robots.
- By this way, each group took care of researching and developing a solution through Nano-challenges and Mini-Challenges.

Nano Challenge based on a physical devices apply

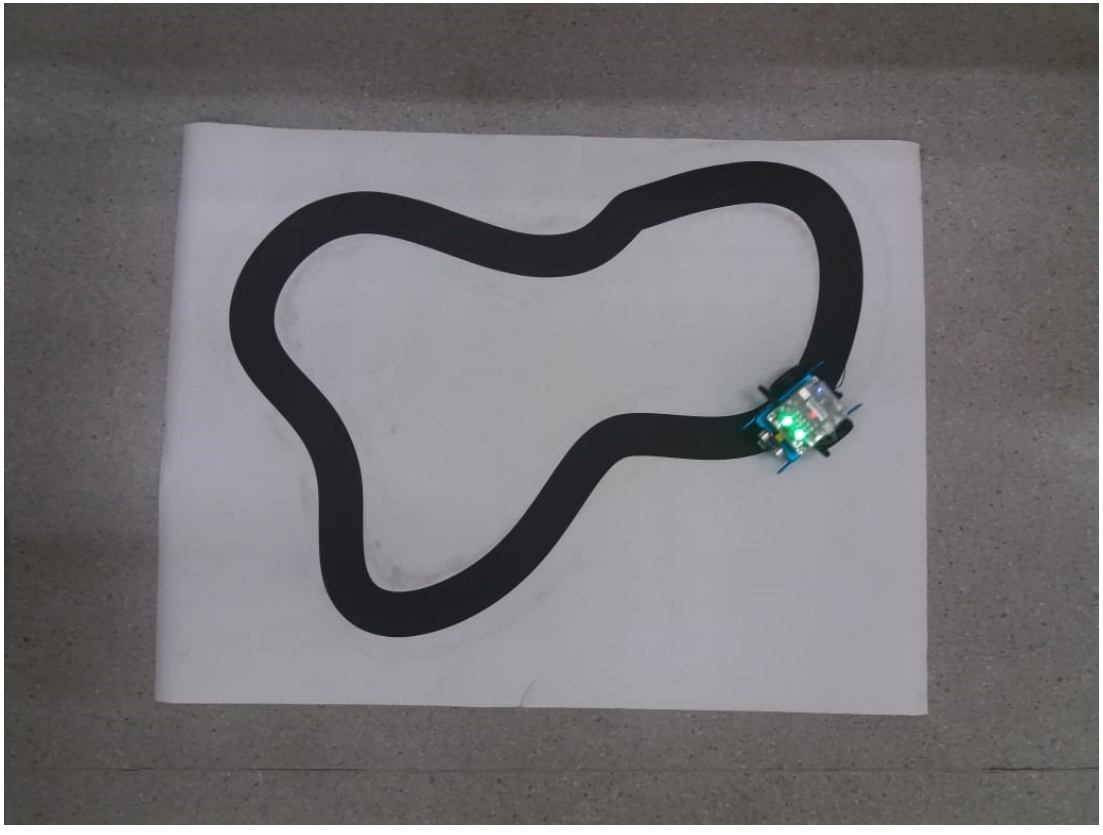

Figure: Line Following with Mbot

Nano Challenge based on a physical devices apply

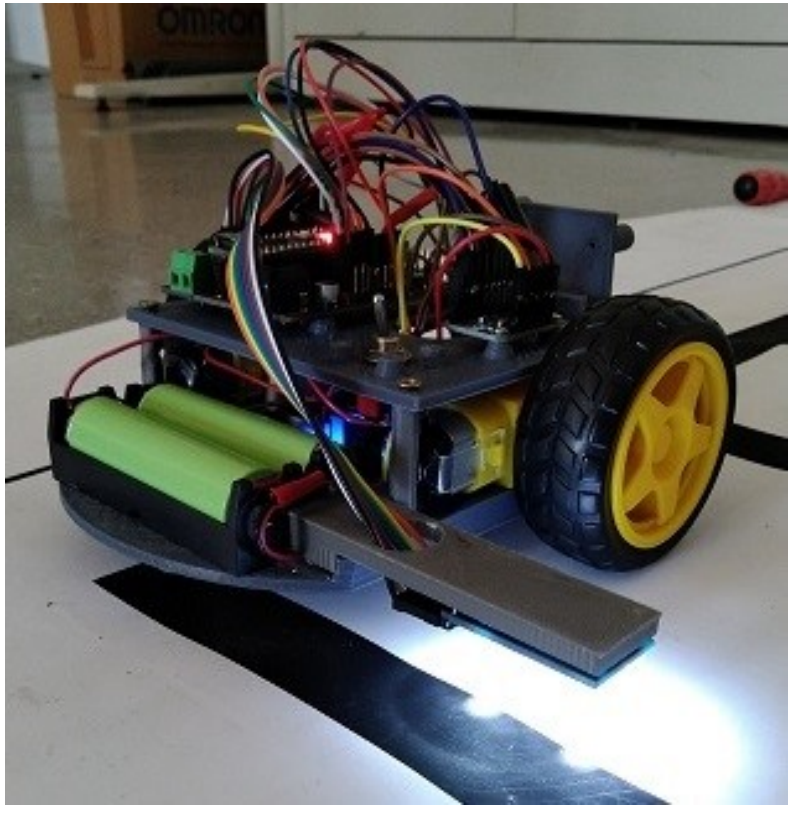

Figure: Line following with a 3d printed mobile robot based on Arduino

Nano Challenge based on a physical devices apply

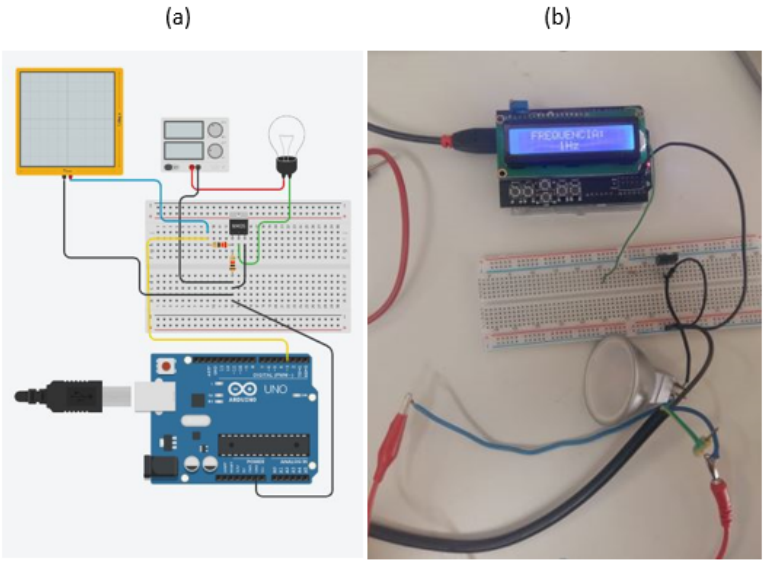

Figure: Stroboscope Prototyping and Programming

Evaluation

- Time employed to solve the challenge.
- Degree of success of prototyping, calibrating and programming a mobile robot.
- Time required to complete the robot navigation through an scenario.
- Number of mobile robots used.
- Number of people involved in the challenge (students, experts, parents, etc.)

Conclusions

From the experiment it was possible to obtain several conclusions:

- Students are easily engaged with technology and programming;
- The use of challenges gives them more freedom to address their tasks and the possibility to involve not only their peers, but teachers, experts, parents, etc;
- The use of challenges provides students of a wider perspective of problems, that it is not only solving problems or projects;

Conclusions

- It is not necessary a deep knowledge on programming or robotics to complete Nano-Challenges;
- Students perception about STEAM improves after the experiments.

Taking this into account, it is clear that Challenge Based Learning approaches works properly in controlled environments and the use of Robotics and Physical devices can be positive to develop skills related to those demanded by the digital society.

Questions?