UNIBOTS Team Description Paper
LARC SEK 2013

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***Abstract* – The following document describes the work done by the team Unibots for LARC – 2013 competition. It also has explanations and illustration about the construction and operation of these robots.**

I. INTRODUCTION

This document reports the strategies for building and programming the robots of the Standard Educational Kits (SEK) category of Latin American Robotics Competition (LARC 2013) that team Unibots used to solve the challenge.

The team Unibots is composed by students of Electric and Electronic Engineer from the National University of Engineering of Peru, members of the Department of Electrical and Electronic Engineering Research Institute [1].

This is the first competition of Unibots in LARC. The team has participated in other competition as: World Robotic Olympiad – WRO [2] 2012 and 2013, achieving the first place in both editions.

For the construction of the robot Lego Mindstorms NXT material were used. The programming language used is Labview [3] with the NXT Labview toolkit 2012 [4]. Additionally the Hitechnic Compass Sensor [5] is used in the robots.

The goal of IEEE SEK (Standard Education Kits) is to develop one or two robots that can throw orange table tennis balls to the other side of the arena, or drop blue table tennis balls in our side. Each ball has points.

II. DEVELOPMENT

A. Brainstorm

To solve the challenge, each team member proposes a different idea. One was to build two robots, the first one only will move the balls in a specific area of the arena, and then the other one will pick up all the balls and throw them to the other side of the arena. Another idea was to build one robot to pick up the balls and give them to a second robot which will throw the balls to the other side of the arena.

Finally the team decided that the best idea was build one robot that can pick up the ball and same robot can throw the balls to the other side. Until now is the strategy that the team is going to use in the competition

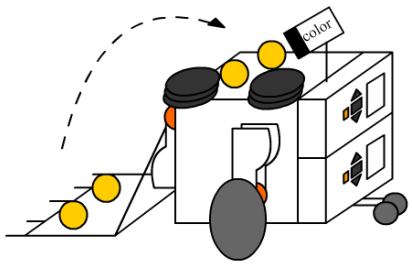

Fig. 1 - A diagram of how the team thought the robot will look like.

B. Robot structure

The robot built by the team members is composed of two NXT intelligent bricks that will communicate between each other to do specifics tasks. Those NXT bricks will allow to control:

- 2 Servo motors to move the robot around the field.
- 1 compass sensor to know in which direction the robot points.
- 1 Servo motor to move the claw that will pick up the balls.
- 2 Servo motors to throw the balls to the other side of the arena.
- 1 Light sensor to detect the crossed lines while moving on the field.
- 1 Color sensor to difference the blue balls from the orange ones.

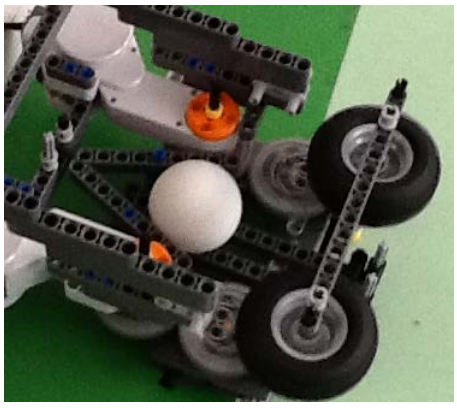

Fig. 2 - The mechanism used to throw the balls.

C. Collecting the balls

In order to do the collection process, we inspired in how a bulldozer works. To pick up the balls on the field we used a claw. The robot will collect the balls and will put them in the basket which is on the top of it.

After the robot picked up the balls, it will check its color with the RGB sensor. If the ball is orange the robot will launch it to the other side, but if the ball is blue the robot will turn and launch the ball to our side.

D. Throwing the balls

To launch the balls we used a mechanism which consists of using two wheels that will spin at a high speed. Using the friction generated when a ball comes in contact with the wheels is that the ball can fly a considerable distance.

E. Communication

Both NXT bricks used in the robot are communicating through a Bluetooth connection.

The first NXT controls 3 motor, the two that allow the robot move around the field and the one which lift up and down the claw.

The second NXT controls 2 motors and 1 sensor. The motors which will make spin the wheels and the RGB sensor to recognize the color of the ball.

III. CONCLUSION

This TDP presented describes the ideas and the designing process of the robot created by Unibots robotic team in order to participate in IEEE SEK category of LARC.

Building a robot to solve a specific non trivial problem is a challenge goal that gives us the opportunity to apply our engineering knowledge, proposing ideas and validating them in a real environment.

The Latin American Robotics Competition it represents for us a great opportunity to share knowledge, grow academically, make links with people that share our interest in robotics.

Some of the steps described before still need to be revised in order to improve the accuracy and performance of the robot. It is possible that until the day of competition some robot´s features can be changed.

REFERENCES

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