Construction of SOLCYTEC_1 robot for the IEEE Open competition LARC 2010

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Abstract— ***This article shows a brief description of the parameters that the SOLCYTEC_1 robot will need, to compete on the IEEE Open category showing the solutions and designs made***
Key Words: Robotics, Omnidirectional Robots, Sensors

I. INTRODUCTION

Robotics is currently present in daily lives where almost all products that come into our hands have manipulated or modified by a robot, is a fact that robotics provide us with the processes of life and very day goes further thanks to continued development in which new technologies such as engineering studies are focused on things like, optimize resources, generate consistent production, and spend less energy production. [1]

It is for this main reason that these skills go beyond the mere fact of competition, because they transcend the target and product development changes from being a fun competition to a competition where knowledge is generated and research is oriented to the industry [2]

II. VARIABLES AND PARAMETERS

The main task of the robot is the recollection, selection and discharge of color cubes, the robot must be autonomous in all aspects, and will be able to look for the course, place the cubes, select them, and place them in a predefine order in the delivery zone.

First the robot must find the course, for that he will try to find the edges of the game zone, later he will look for the first pile of cubes and will took a few of them with a griper where the color sensors are, this sensors will tell the robot where to place the cubes in a movil tray, this action will be repeated until all the colors of the cubes are loaded in the tray, then the robot will go to the delivery zone and will place the cubes in the correct order

III. OMNIDIRECTIONAL ROBOTS

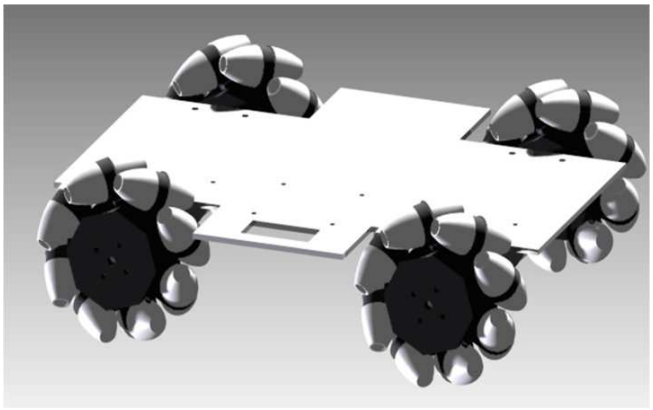
In between the robots with wheels categories, it has been developed different variants according to the use and ambient. For instance it has been used the similar configurations to the conventional four wheels of an automobile. These wheels offer two grades of liberty and they don't allow lateral displacements so the possible trajectories to develop by them are limited in reduced spaces particularly or with obstacles where the driving to avoid collisions uses to be complex.

The omnidirectional robots have advantages compared with the non omnidirectional. They are defined as those which have mobility in any direction, from an arbitrary point in a plane and it doesn't have to rotate before it starts to move. Under this condition the omnidirectionality is due to the disposition of the wheels to offer to the robot three liberty grades in a plane [3-4]

IV. MECHANICAL DEVELOPMENTS

The mechanical development consists of a gripper, a mobile tray, a chassis and the most important that we want to emphasize in this paper are the *mecanum wheels*. It was required high torque motors to be able to move the robot's weight, so it was choose four motors of 181 Kgf.cm and 236 rpm which make the robot movement very fast, generating problems with the alignment and the movement in short distances, mainly produced by the momentum of the robot, this is the reason why it was required to control the speed of the motors with a PWM output and a low traction wheels (mecanum); this wheels are omnidirectional allowing us to control the movement in any direction without altering the reference plane of the robot, these wheels were made with two roller bearings placed at 45º and manufactured in white *Polytech* with a low friction index to allow slipping on the surface. The figure 1 shows the mecanum wheels implemented on the robot, figure 2 shows the mechanical design of the robot.

Figure 1. Mechanical Design



Authors

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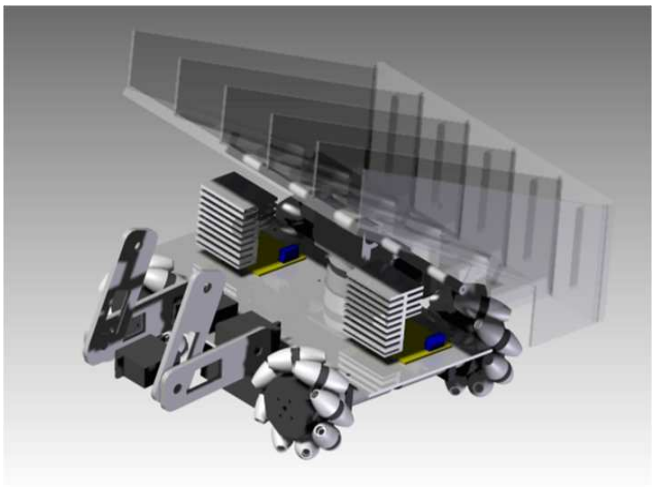

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V. ELECTRONICAL DEVELOPMENT

The robot works with a main processor that get's the sensors values and takes decisions to move the actuators based on those information (figure 3), the most important of that information that we wanted to emphasize is the color sensor that is based on a Taos Inc TCS3210, it was mainly choose because his low cost, and the small area of the sensor (5mm of length x 7mm de width), this sensor sends the RGB component of the colour to a specialised microcontroller that will send the colour to the main processor.

The power stage, is an array of H drivers (l298, l293), that move the geared motors and the stepper motors, with PWM control for speed control, it also controls all the PWM for the servo motors control. The battery for the power stage used is a 7.2 Ah to 12 v, to provide enough power to all the motors, all the electronic design was made to avoid noise from the power stage.

Figure 3. General Scheme of the electronic coupling

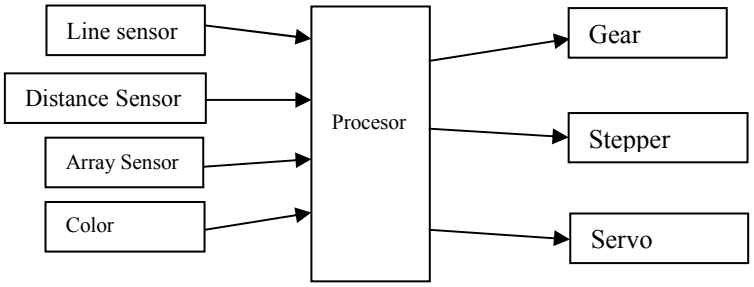

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Figure 4. Color sensor used on the desing

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