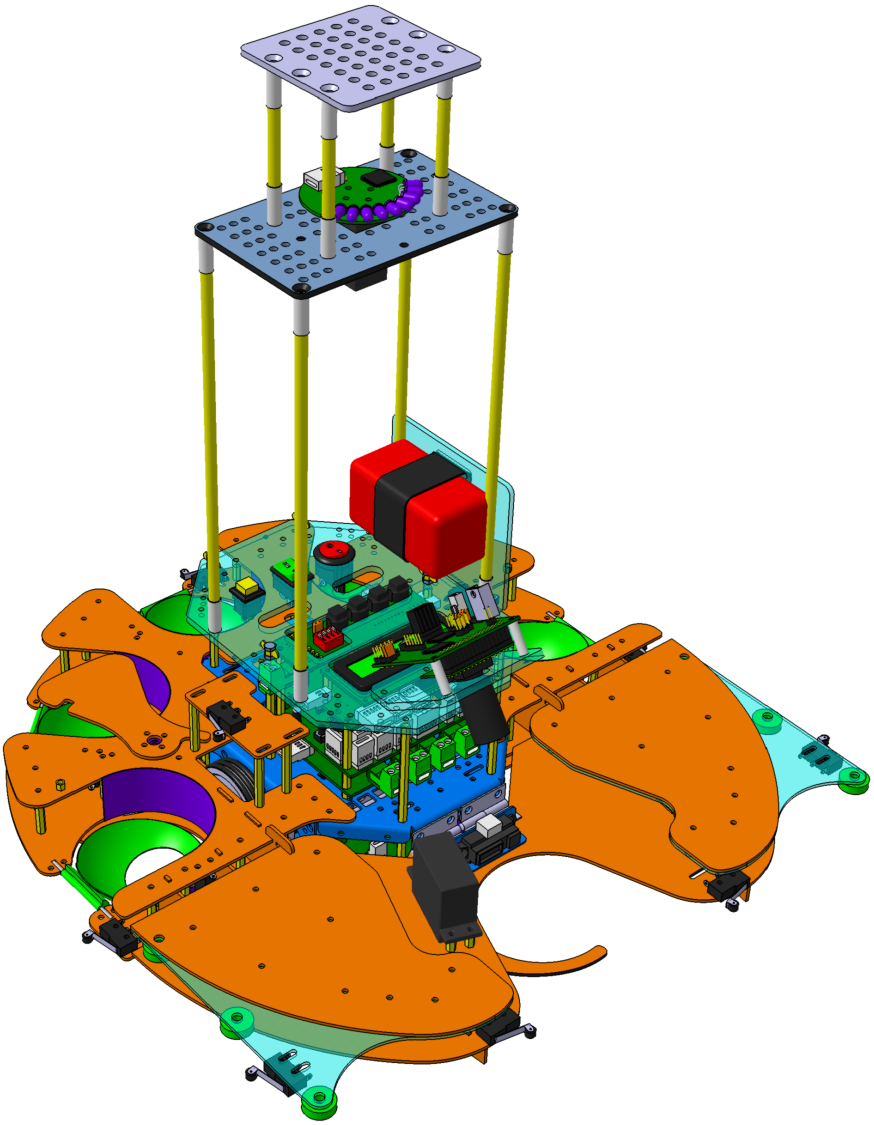
Eurobot 2008 Pilot Study
Robot *Topolino*



Team: ***ROBOCES CORCHOPÁN***
members

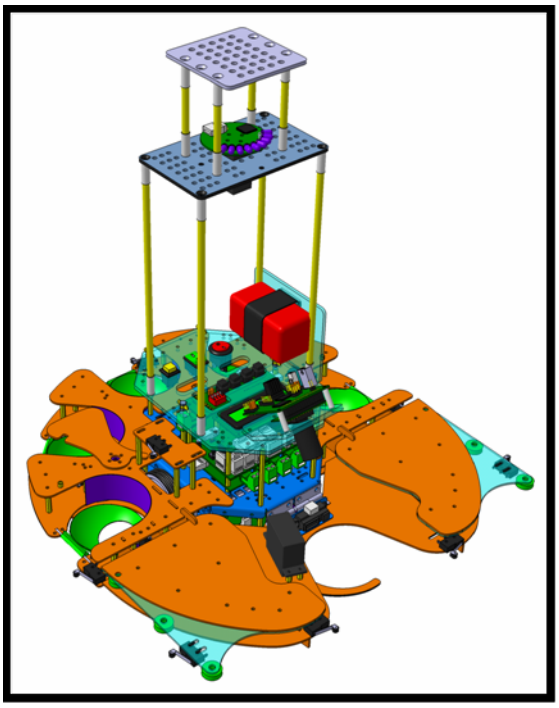
Javier Baliñas Santos - Diego Salazar Arcucci
Marcelo Salazar Arcucci - Mario Inglés Garcés
Sergio Arroyo Sierra

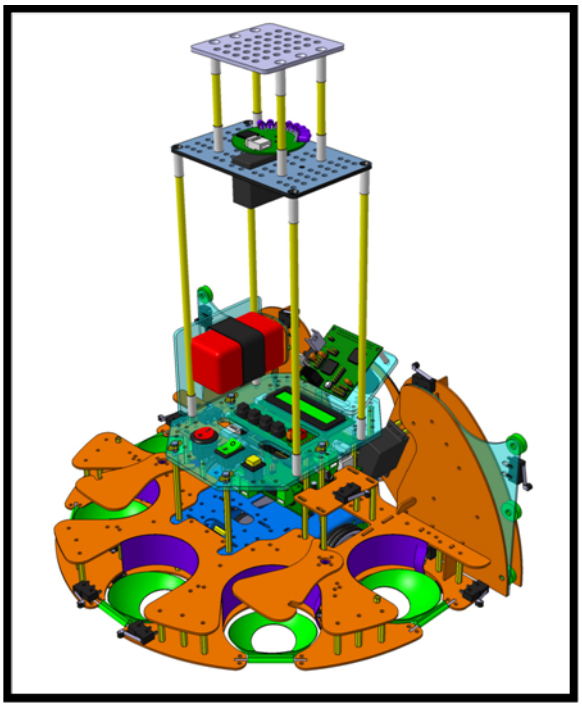
1 Abstract

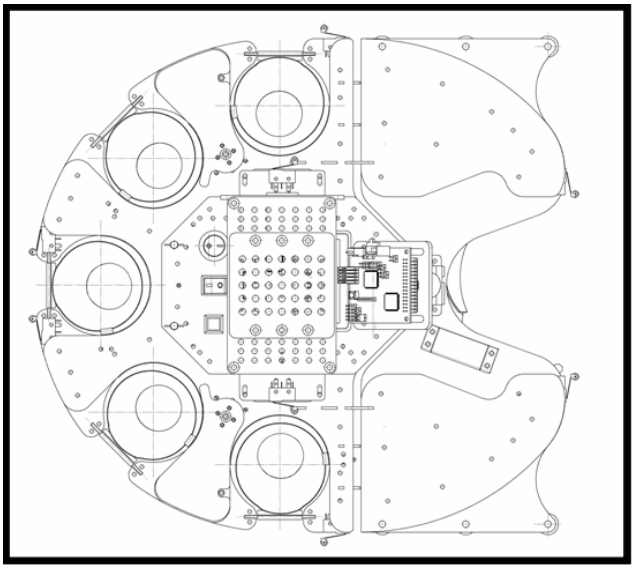
This document describes the robot Topolino, made by the team Roboces Corchopán in order to participate in the proof Mission to Mars in Eurobot 2008. The team is composed by five students of Electronics Engineering, that have participated during several years in this competition.

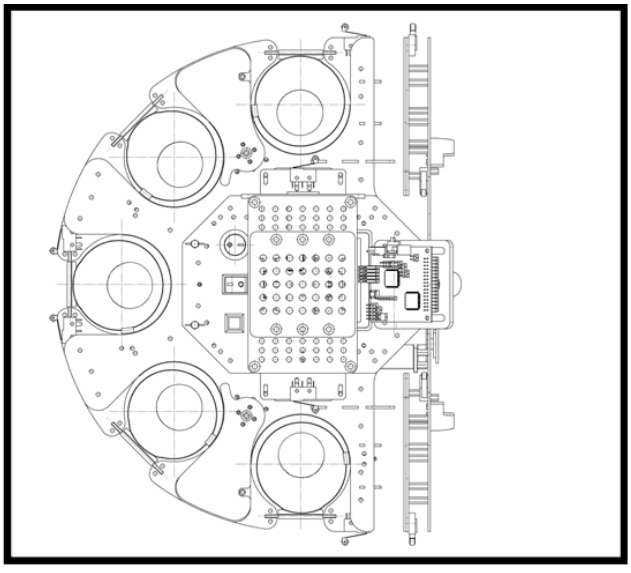
2 General description

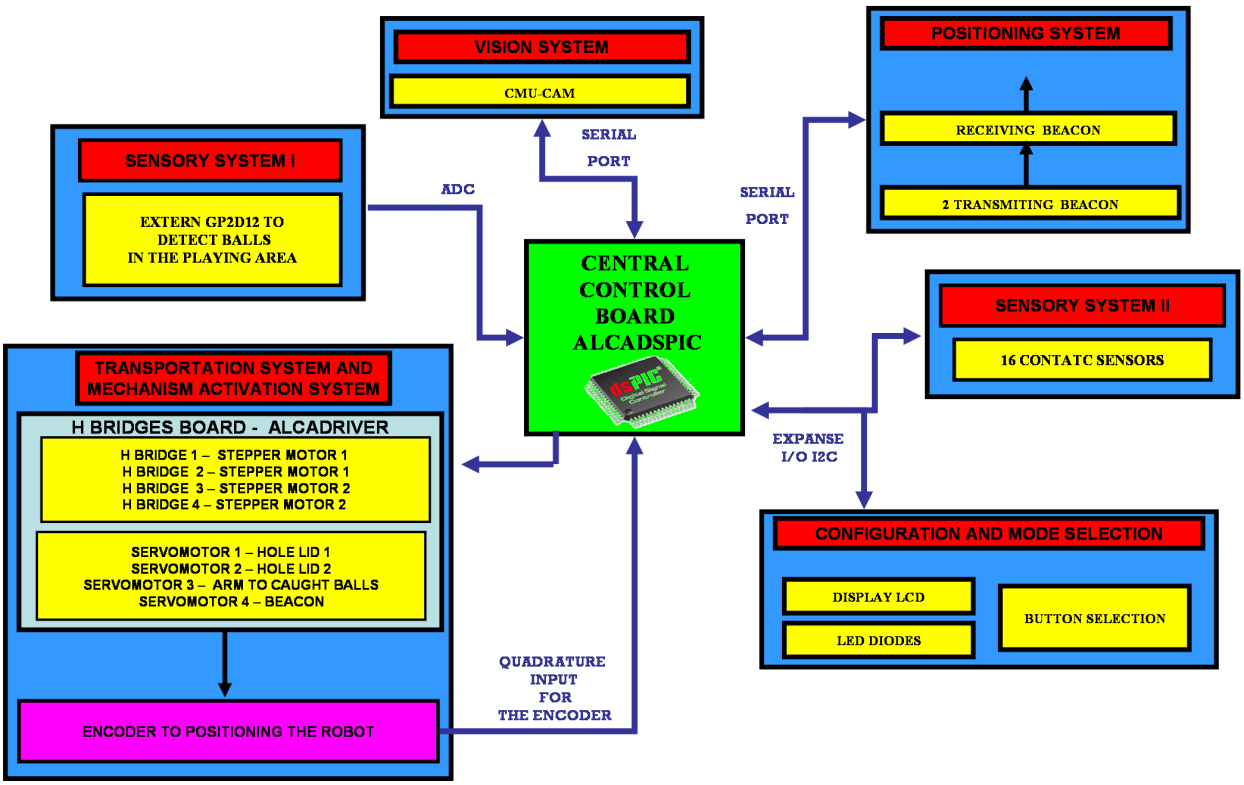
The general purpose of the robot is to generate the combination WHITE-COLOUR-WHITE-COLOUR-WHITE in order to get the maximum punctuation in the limit of 5 balls into the robot. Its measurement are: 1160 mm start perimeter, 1385 mm deployed perimeter, 350 mm height (without beacon support) and 430 mm height (with beacon support). See some pictures of the robot below.





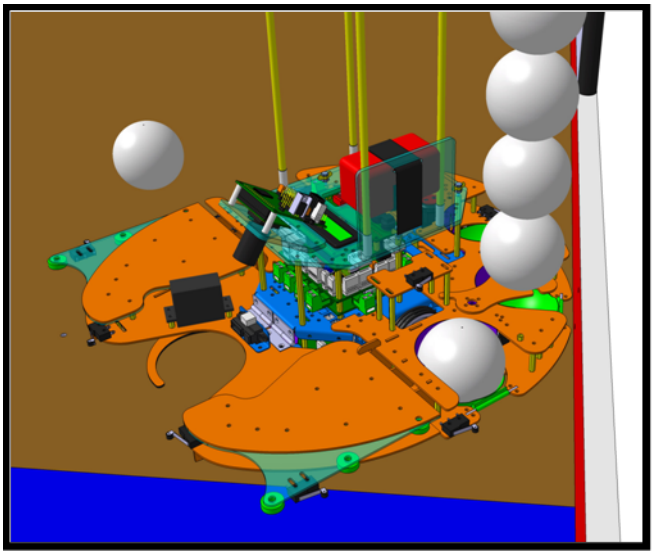


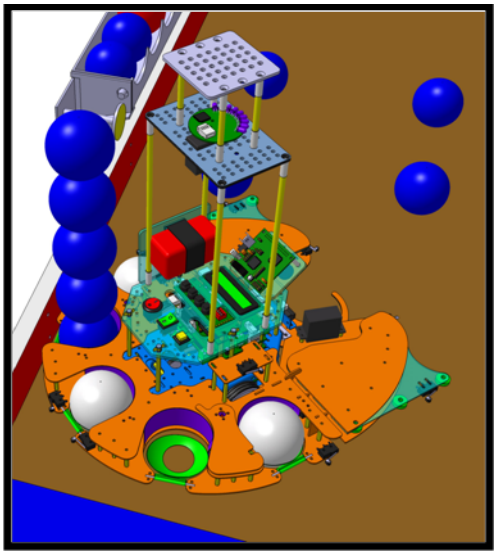


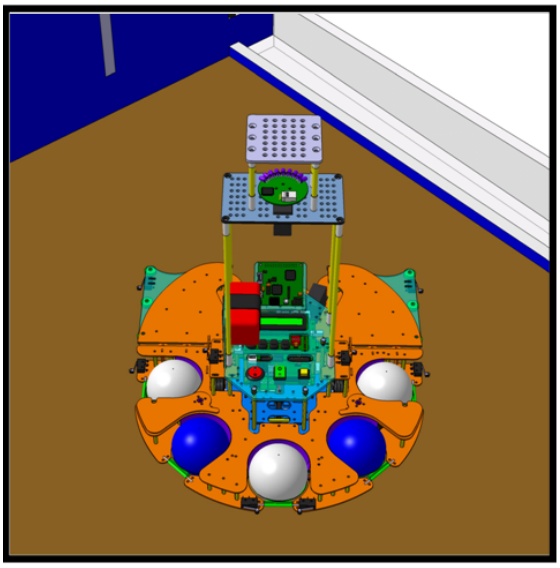


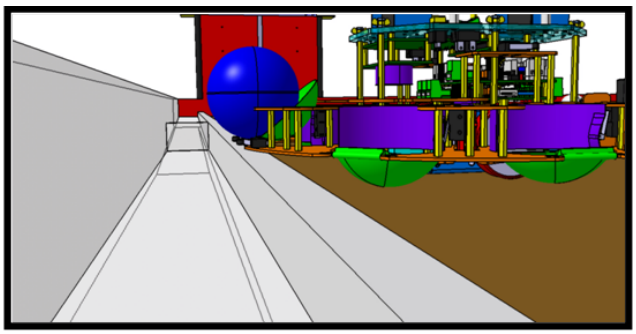
The robot will consider two different strategies: The first one main purpose consist in caught balls from the vertical dispenser (white and color), generate the combination (WHITE-COLOUR-WHITE-COLOUR-WHITE), put them in the standard container in order to score 13 points (10 points + 3 bonus points), and finally if we have enough time we can go and caught more balls from the another white vertical dispenser, if this dispenser is empty the robot can use the second strategy.

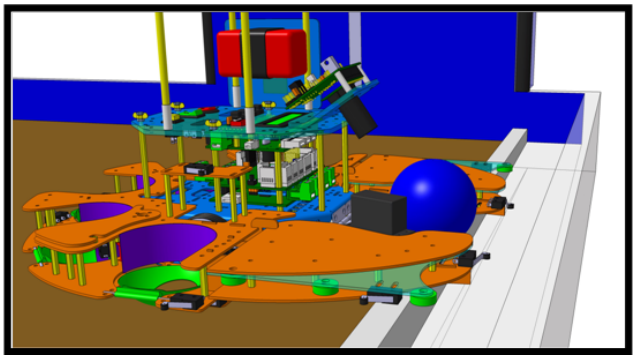
The second one is more simply than the first one, it consist in caughting balls once at a time, by means of an sensor (Sharp Gp2d12). Once it caught one it's time to verify it's color (white or color) (with a CMU-CAM)if it's our color we put it in the standard container getting 1 or 2 points.If the ball color is the opponent's color we release that ball.











To develop the first strategy we manage with a special mechanic design for this year, and we only have to pass under the white vertical dispenser with 2 holes filled, so we get the combination WHITE-HOLE-WHITE-HOLE-WHITE. Next we have to open filled holes, pass under the color vertical dispenser, and get the combination WHITE-COLOUR-WHITE-COLOUR-WHITE, finally we have to put all the balls into the standard container, for it we use a sort of "soup spoon" to get easier putting the balls into the container in the correct sequence.

3 Technical description

It will be unnecessary to add new parts or components in the robot. Our structure is built in Aluminum (laser cut), milled PCB and methacrylate

Two stepper motors (frame 17) moves our robot, at a maximum speed of 1m/s, but probably we go slower because we don't want any crash that get destroy any part.

The movement control is aimed in vectors (the direction of the vector means the direction of the robot movement, the angle means the angle of the movement refer to the start position, and the module of the vector means the velocity of the movement).

In terms of power supply, the robot use batteries of lithium-polymer of 11,1v 2400 mA and 7,4v 2400mA, the robot has an autonomy of 30 minutes, although we have 4 more batteries like this to get more function time. The recharging time is about 4 hours.

it have two ways to get balls, the first one is caughting the balls from the vertical dispenser (2 colored, and 3 white). For it we have a special structure and two servomotors that can cover two holes, when it's time to put the balls on the standard container we seized the border of the standard container and a sort of "soup spoon" to through balls into the container. The second one is made by a distance sensor at the height of the balls, one arm is drove by a servomotor (with this arm we can caught the balls that we found on the table match. To see it's color we use a CMU-CAM witch is situated over the balls.

The robot can hold 6 balls, but in order to fit to the rules limitation (five balls) we close the arm (by software), so the robot only can hold five balls).

The positioning system includes 3 modules, the first one uses 2 transmitter beacons and one receiver beacon (communicated by infrared into deferents frequencies) for the detection of the opponent's robot and the standard container. The second one uses one encoder with a wheel against the floor, this module is only valid when the robot goes straight. The third one is based on a gyroscope, with this module we can measure

the angle movement.

The robot detects the vertical dispenser by means of contact sensors and odometry, the balls are detected by means of a distance sensor (Sharp GP2D12) and it's color is detected by a CMU-CAM. The standard container is detected by a beacon, the odometry, and a contact sensors located under the robot. Finally the opponent's robot is detected by a beacon (angle and distance).

The robot intelligence is being possible thanks to the micro controller dsPIC30f6010 of Microchip. Its intelligence is divided in two layers, the low level is programed using state machines, this layer manage of write in the actuators and read to the sensors. The high level is programed using Petri nets, this layer is in charge of the global intelligence of the robot (take decisions, movements, etc). Both layers are communicated by means of global variables, the high level write or read in this variables and the low level write in the actuators or read the sensors for example. All this programming has been written in C language.

The only strategy we thought about is to get the balls combination of colors W-C-W-C-W

For the moment we not use any laser device.

4 Organization

4.1 Activities distribution

- Javier is in charge of the software
- Diego and Mario are in charge of the mechanics
- Sergio person for electronics
- Marcelo is in charge of the logistics

4.2 Schedule planned

The planification is very simple, it's divided in seven activities blocks:

- 15 November: limit date for the mechanics assembly.
- 10 January: limit date for the electronics and wire assembly.
- 20 April: limit date for software to be ready.
- 20 April - 8 May: testing.
- 08 May: Spanish national Qualification of Eurobot
- 08 May - 21 May: final touch (if we had classify).
- 21 May - 25 May: Eurobot at Germany (if we had classify).

4.3 Equipment available

Most of the material we work with is us material(tools, raw material, components, circuit boards, etc), the other material is bring by PROTOMAGA S.L. who drill us most parts of the structure, and by the University of Alcalá who bring us the CMU-CAM, the batteries and the batteries chargers. In terms of working space, the University of Alcalá bring us laboratories, oscilloscopes, power supplies, etc.

A Questionnaire Eurobot 2008

Questionnaire

Name of the team:.....

ROBOCES CORCHOPÁN

1.Is it the first participation to the contest for the team ?

Yes (No)

2.Did some of the team members take part in the contest before?

(Yes) No

3.Do you wish the visit of a Eurobot volunteer to help/assist during the year?

Yes (No)

4.Provisional budget of the project: 500€ for the robot

600€ for the travel

5.What are your partnerships? (financial, material,...)

PROTOMAGA S.L. built us some parts of our robot
ALCALÁ UNIVERSITY give us some material to work.