

# ERUZ Libre

## Team Description Paper

A. Contreras, E. Piñeiro, A. Sandrea, J. Tello

**Abstract**—This paper describes big part of the work done to solve the challenge planted this year for the OPEN category in LARC 2008. The work is based on constructing a robot with low budget components, starting from zero in almost all, to get to our goal and make it work. Been this the first time that a project like this is goes to an international competition in our University, we hope to make an interesting place in the competition.

### I. INTRODUCTION

**A**HEAD in this document will be described the work done to build a robot for LARC OPEN competition, following the rules published for this year, to accomplish the tasks of detection and deactivation of two bombs, with an autonomous robot.

### II. TEAM DESCRIPTION

All members of the team are students of electrical engineering formed integrally without any specialty but all interested in electronics and robotics. Most of the things applied in the construction of the robot were learned by self instruction, always trying to learn more everyday experimenting with new things.

### III. ROBOT DESCRIPTION

YANDA it's the name of our robot, it was born from 50% reused parts, assembly very carefully to accomplish the challenge of LARC 2008. Later is described the main structures of our robot like the mechanics, electrics and program.

### IV. MECHANICAL STRUCTURE

The mechanical structure is based on a differential traction in the rear part of the robot, with two ball caster in the front.

Manuscript received October 18, 2008. This work was supported in part by General Distribuidora S.A.

A. Contreras is with Universidad Del Zulia, Maracaibo, Venezuela (phone: +58414-686-4867; e-mail: andryc19@gmail.com ).

E. Piñeiro is with Universidad Del Zulia, Maracaibo, Venezuela (phone: +58426-560-9736; e-mail: eric86ieee@hotmail.com).

A. Sandrea is with Universidad Del Zulia, Maracaibo, Venezuela (phone: +58414-; e-mail: albert21san@gmail.com ).

J. Tello is with Universidad Del Zulia, Maracaibo, Venezuela (phone: +58416-762-9156; e-mail: josimar.tello@gmail.com ).

The traction it's given by two planetary gear boxes with a torque enough to carry YANDA to the top of the hill of the arena.

One of the main parts of the robot is de claw designed to spin the bomb if it's necessary, to disarm it faster. It also has a hook that can move horizontally to pull the wires of the bomb.

The materials for the mechanical structure were taken almost in total from old remote control cars, CD readers, and from acrylic peaces found in the trash.

### V. ELECTRICAL STRUCTURE

The electrical structure counts with in first by a microcontroller DSPIC 30F4011, adapted with all the interfaces needed to handle the DC motors, servomotors and sensors.

The construction of the PCBs was made from the start using transfer paper techniques, succeeding after several failures, but following all the instructions found in the web.

Between the sensors used by the robot, there are four distance sensor to detect the bombs and the walls of the arena, all of them are infrared stabilized, furthermore, it counts with an originally made inclination sensor and a very important color sensor based on color LEDS which we research about and improve the design.

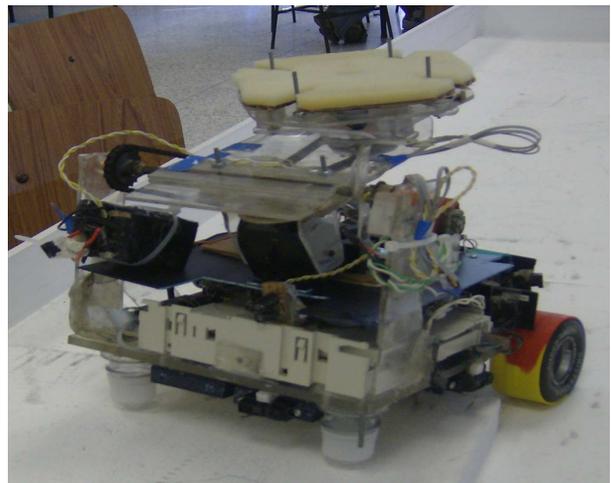


Fig. 1. Yanda Our Robot.. At the IV Venezuelan Robotics Contest.

## VI. FIRMWARE

The program for the microcontroller was made on C, using MPLAB. All the routines are made by the team especially for this robot; different functions were elaborated for each task.

We used a debugger to take the real values of the variables and to calibrate the different modules designed, for example the color sensor with different tones of light.

To detect the bombs the robot uses a search algorithm designed by the team adapted to the arena, it was made thinking on the shortest ways to locate the bombs and giving the robot the possibility to know fast its own position and were to look first for the bomb.

## VII. CONCLUSION

The team ERUZ LIBRE constructed a robot for low budget, prepared to accomplish the goal of the challenge this year. The circuits were designed and constructed by the team, which also programmed the robot to do the task planted. During the construction it suffered different changes and improvement, at these moments the team discovered and apply personal knowledge in electronics, mechanics and others in order to reach our goals.