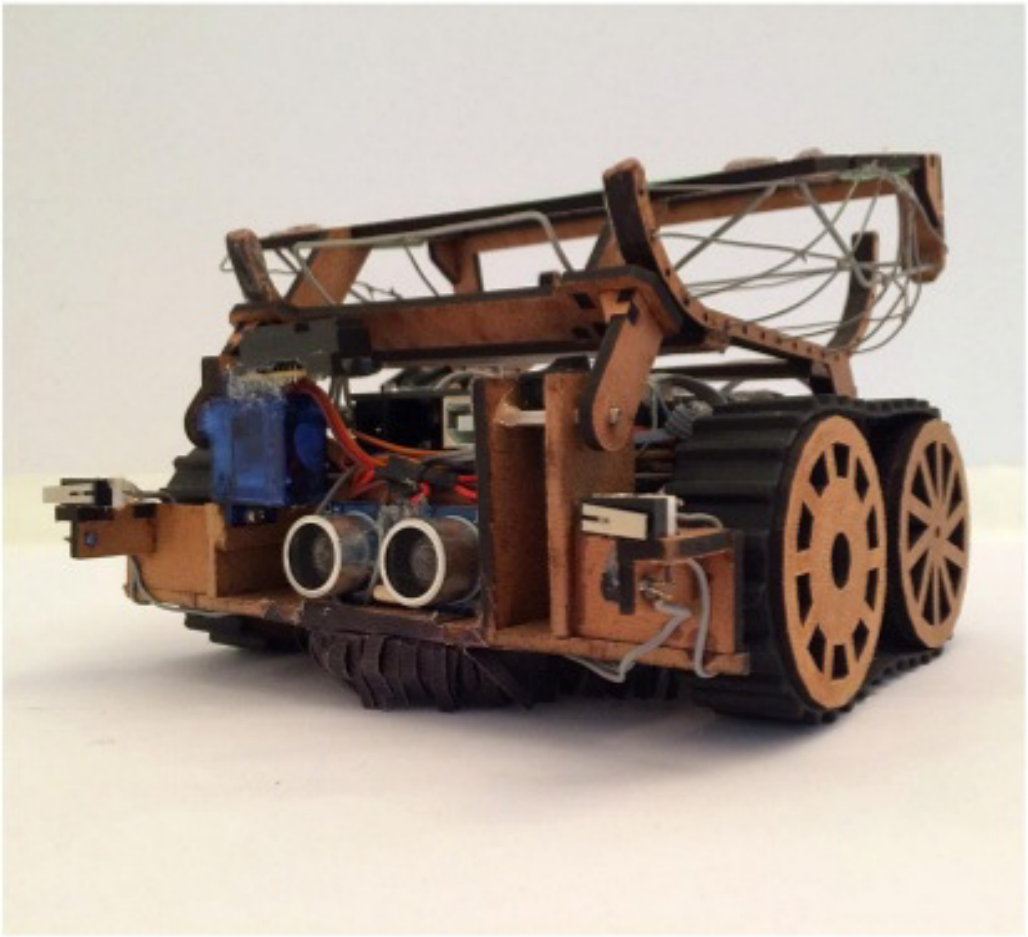

ROBOT SPECIFICATIONS

by Pedro Orii Antonacio

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I. Earlier Versions

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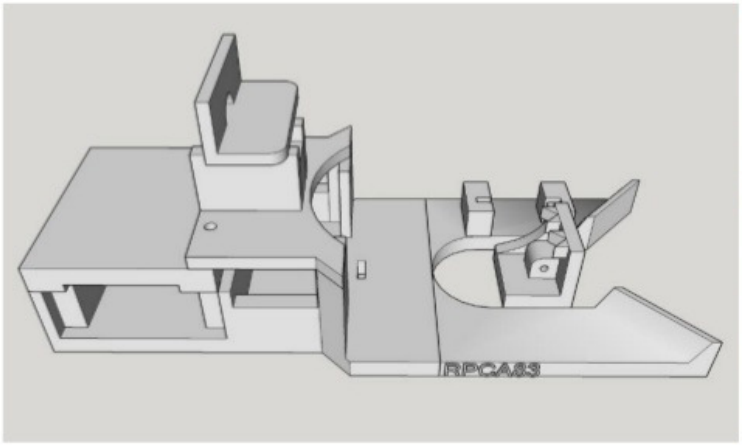
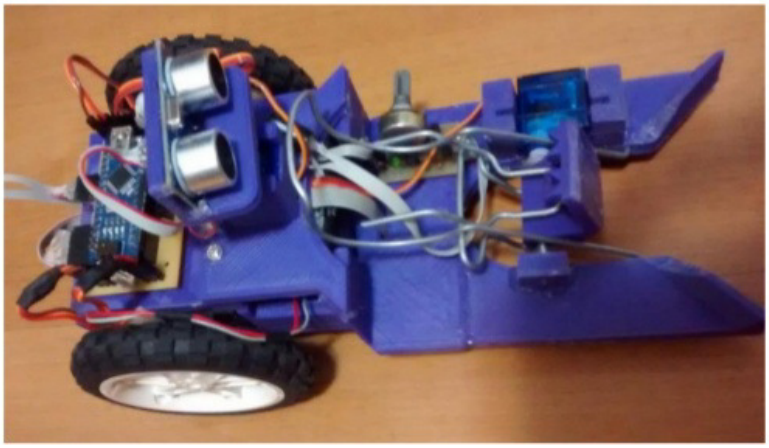
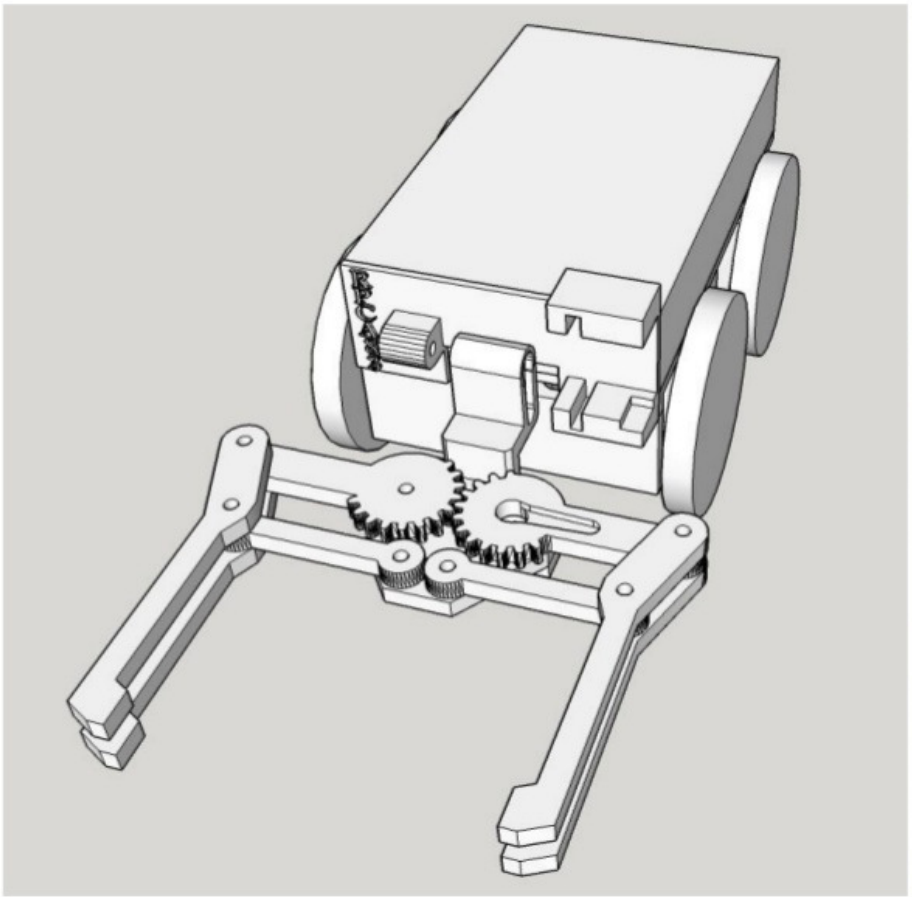
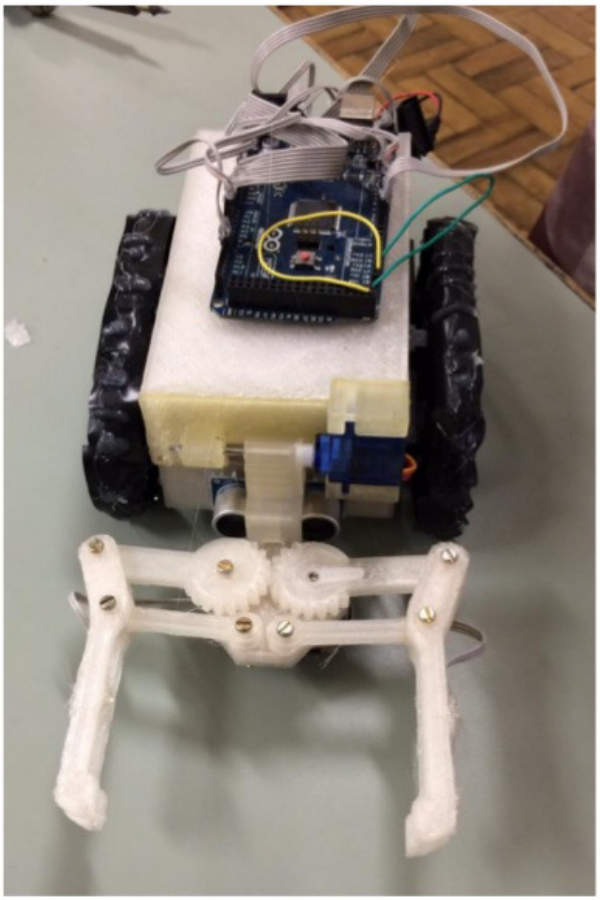


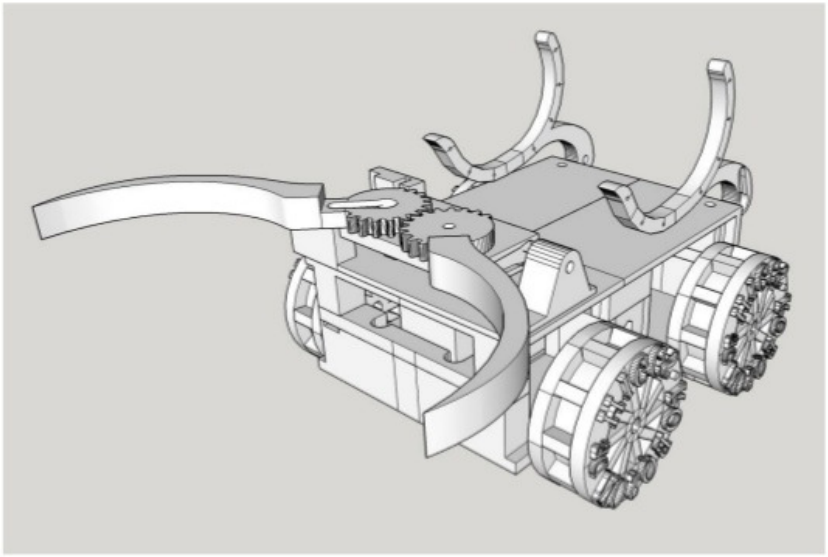


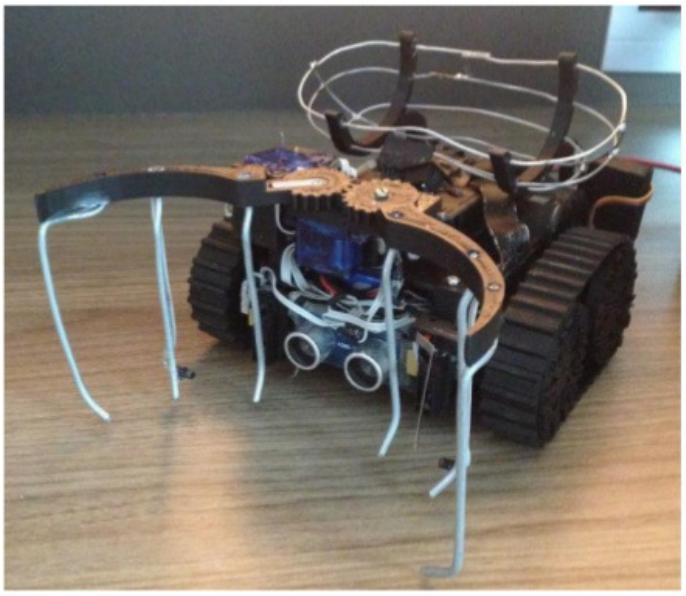
I.II. Second Version (June – August 2015)





I.III. Third Version (August – November 2015)

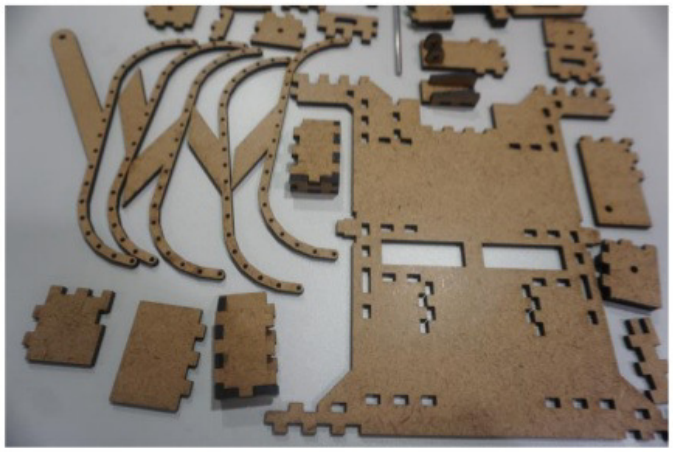


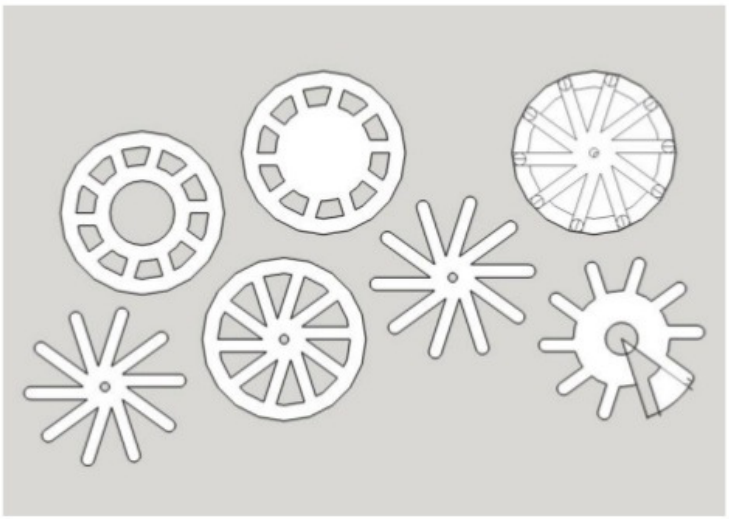


II. The Fourth and Final Version (December 2015 – October 2016)

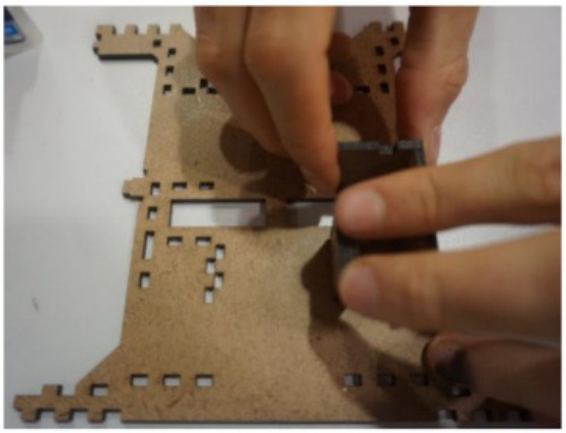
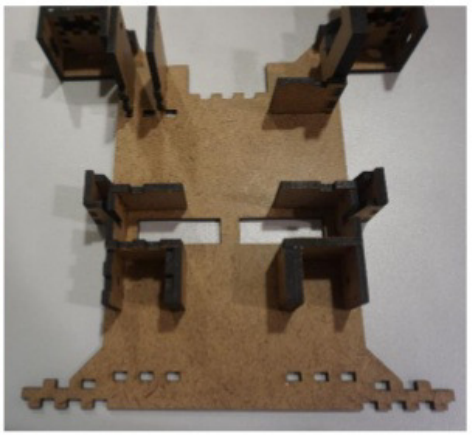
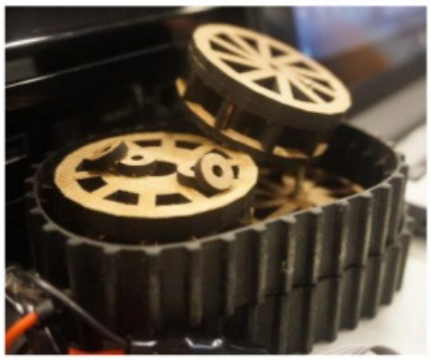
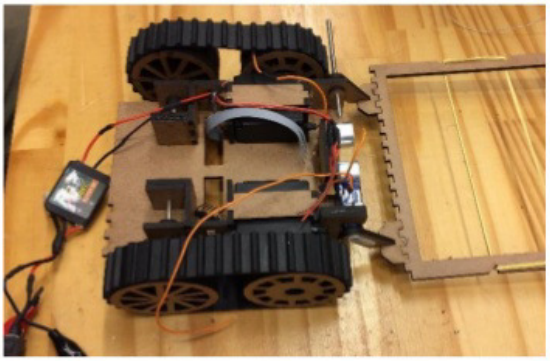
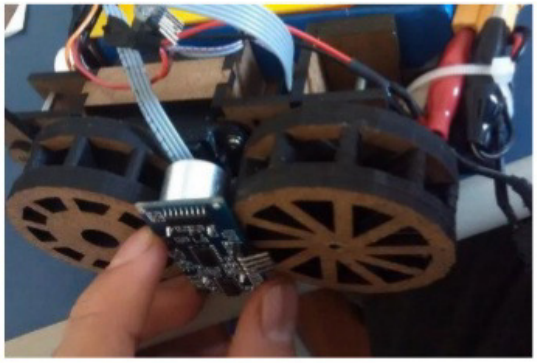
II.I. Structure Pieces

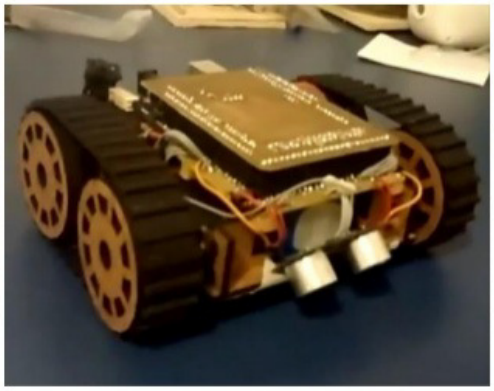
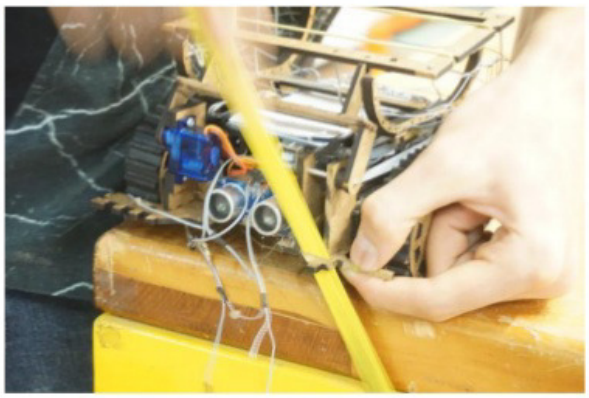
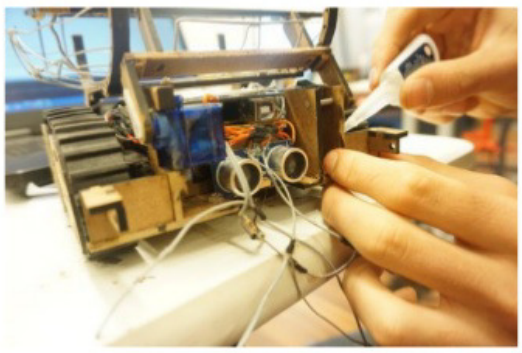
Designed in SketchUp, exported to SVG files and opened in Inkscape to generate the PDF file for the laser cutter. They were cut from 3mm MDF boards.

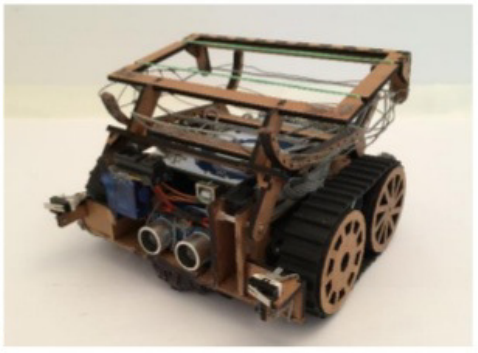




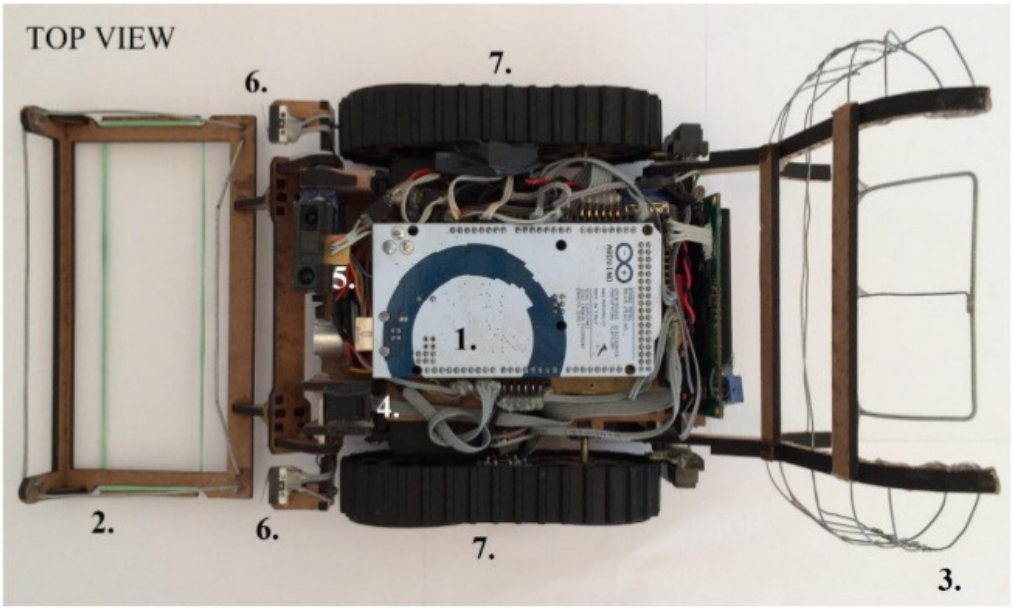
II.II. The Assembly

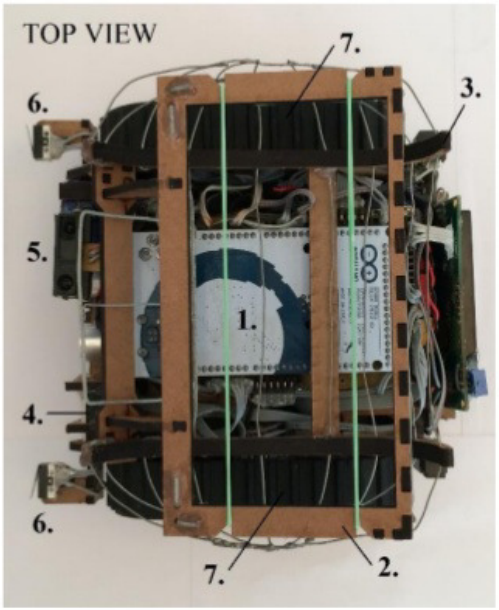







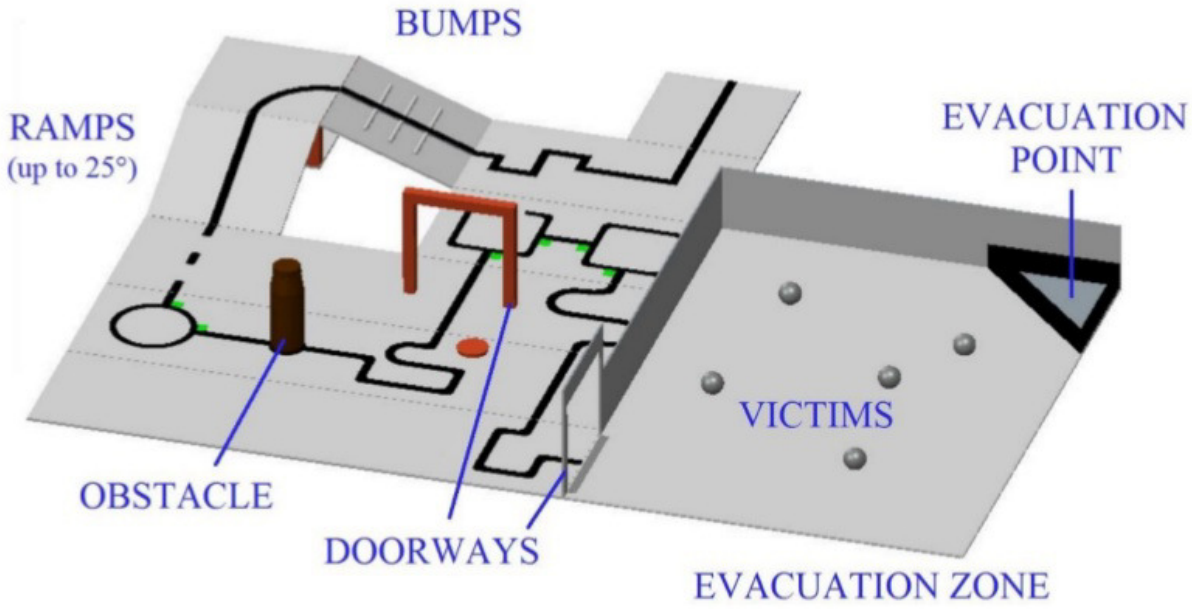


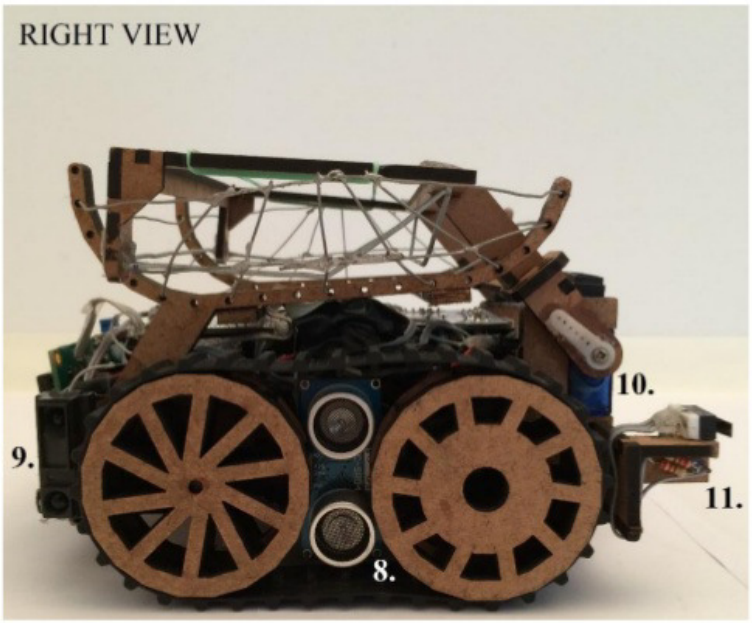
II.III. Robot Components

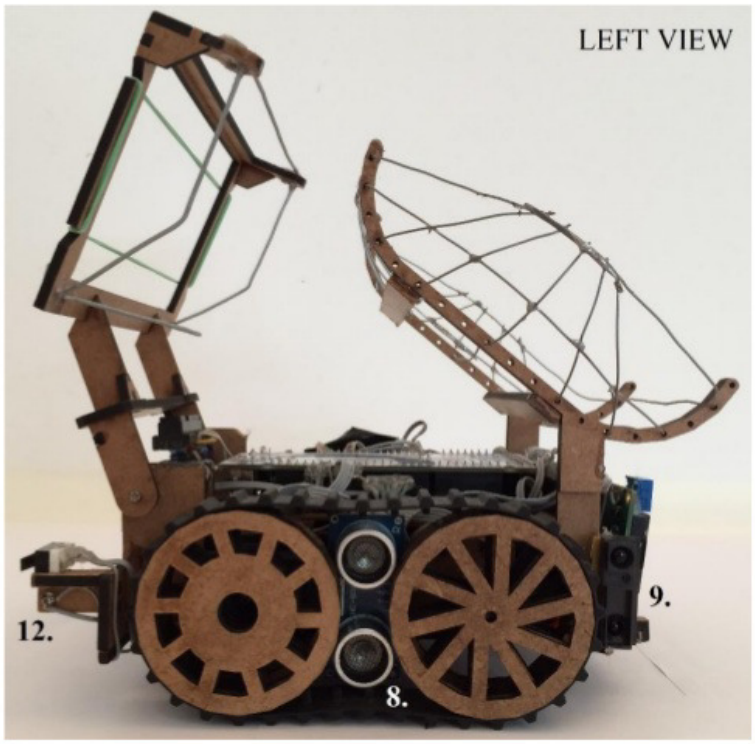




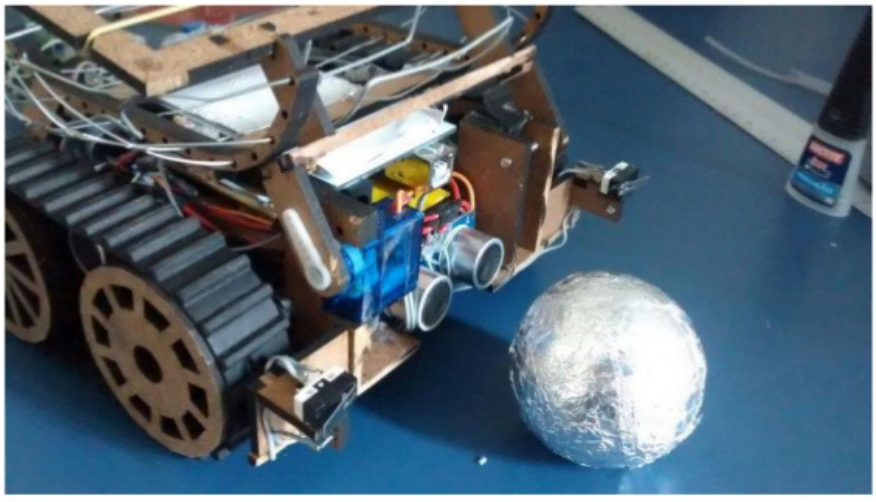
1. Arduino Mega 2560 R3 microcontroller board – controls the robot, programmed using the Arduino IDE;
2. Victim Grabber – captures the victims;
3. Victim Basket – stores the captured victims;
4. Rocker Switch – turns the robot on or off;
5. Top Infrared Proximity Sensor (Sharp GP2Y0A21YK) – identifies doorways;
6. Microswitches (2) – identify walls and the Evacuation Point while in the Evacuation Zone;
7. Tracks from LEGO Mindstorm Kit – better than wheels to overcome bumps and debris and to climb ramps.

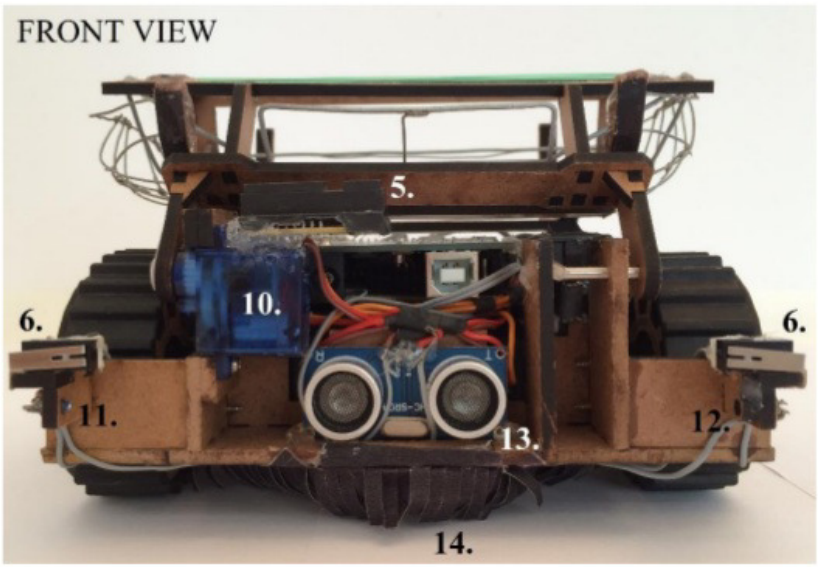


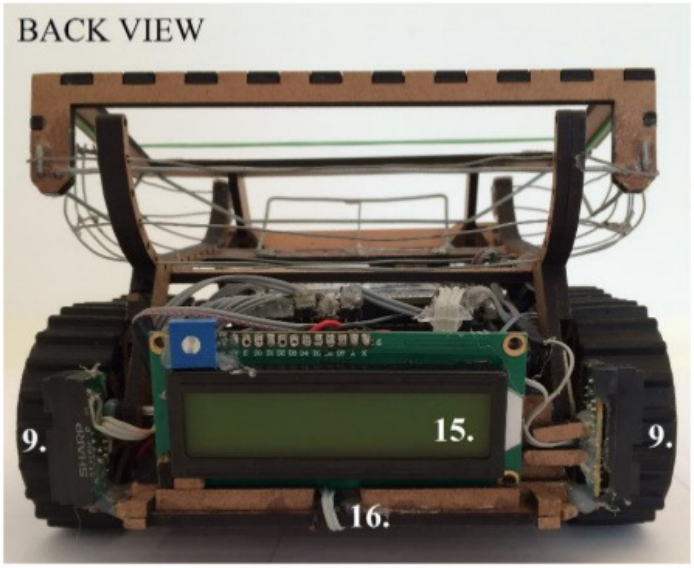




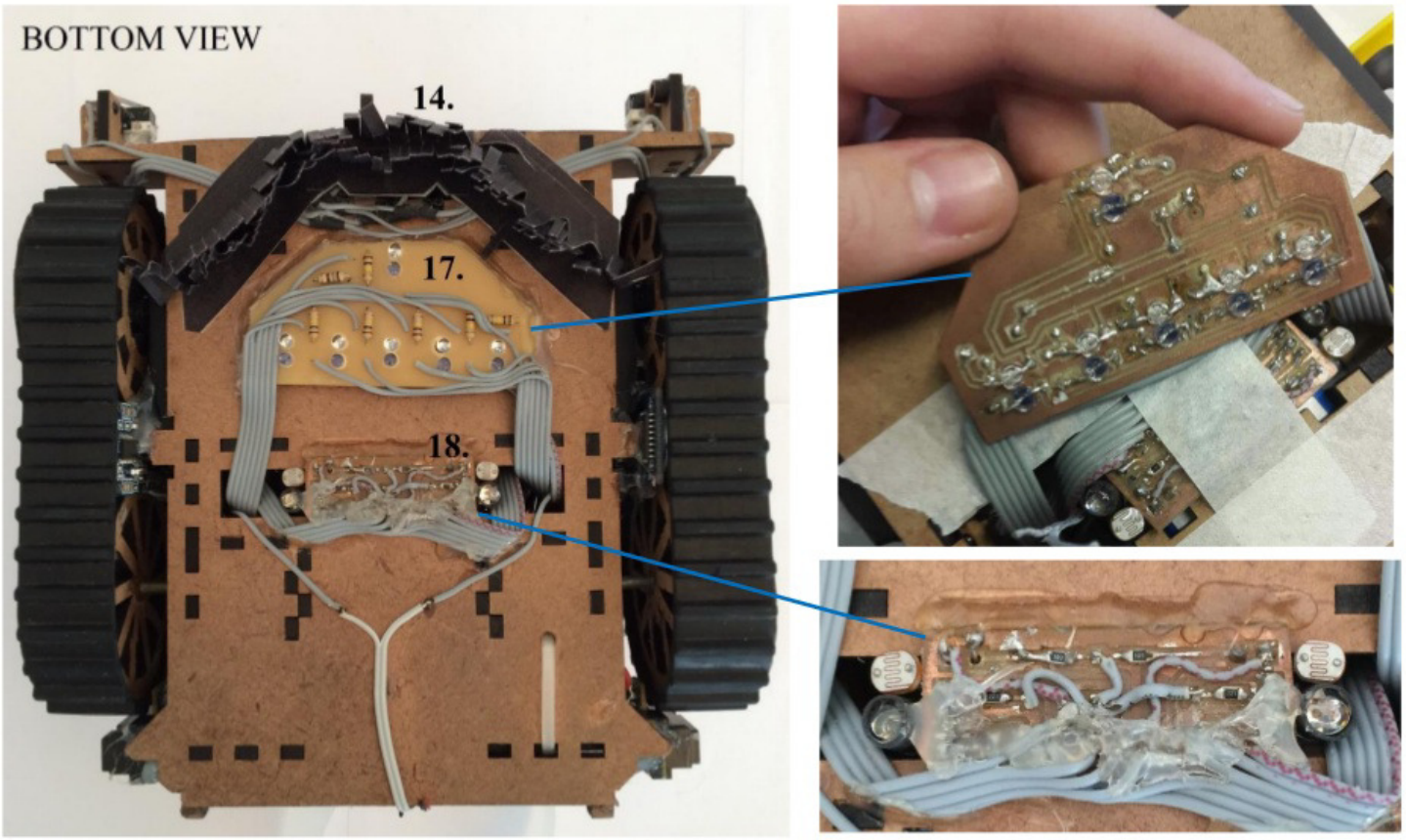
8. Side Ultrasonic Sensors (2) (HC-SR04) – track obstacles while circumventing them and identify walls and victims in the Evacuation Zone;
9. Side Infrared Proximity Sensors (2) (Sharp GP2Y0A21YK) – Also track obstacles while circumventing them and identify victims in the Evacuation Zone (Proofreading);
10. Frontal RC Servo Motor – lowers and lifts the Victim Grabber;
11. Frontal Transmitting IR LED – permanently on;
12. Frontal Receiving IR LED – when reached, the victim interrupts the IR signal from the transmitting LED, causing the value read from the receiving LED to drop. This value drop starts the capturing procedure: the Frontal Servo lowers the Victim Grabber to capture the victim and then brings the Grabber back with the victim.



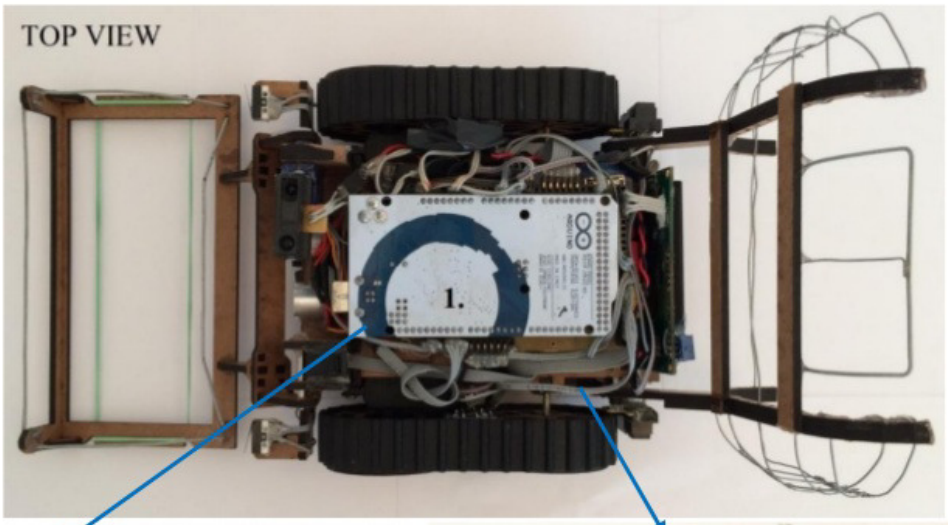


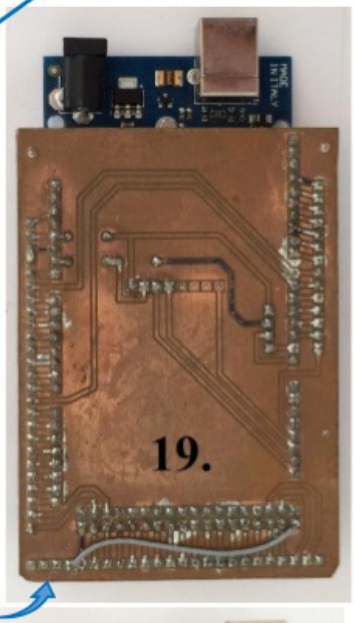


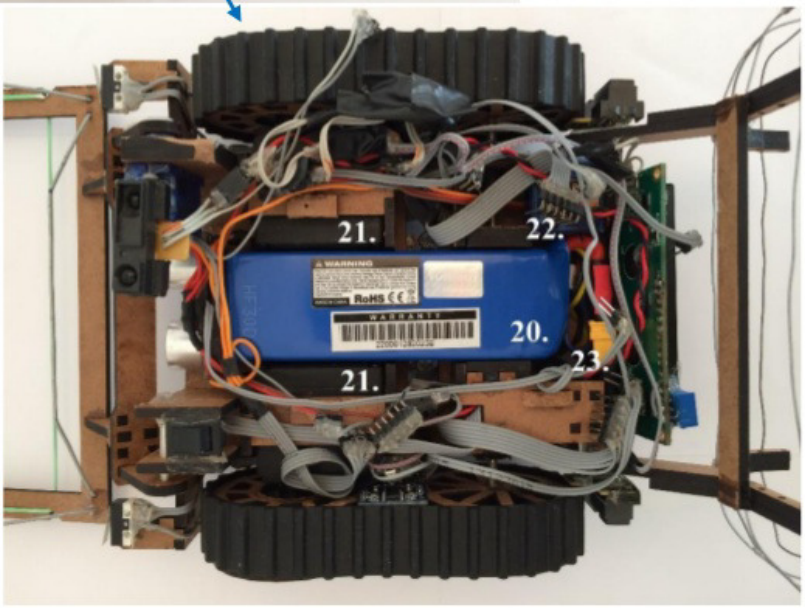
13. Frontal Ultrasonic Sensor – identifies obstacles. Also, whenever something presses the frontal microswitches, the Ultrasonic Sensor verifies whether it is a wall or the Evacuation Point (the ultrasonic pulse takes longer to return from the Evacuation Point than from a wall);
14. Paper Broom – protects the bottom sensors from debris and external light interference;
15. LCD Display – shows in real time the battery level, sensors' values or code comments. Turning on the robot while pressing the Pushbutton Switch (16.) would open a Menu on the LCD, where one could choose what to display by pressing the frontal microswitches;
16. Pushbutton Switch – indicates when the robot reaches a wall when reversing in the Evacuation zone.

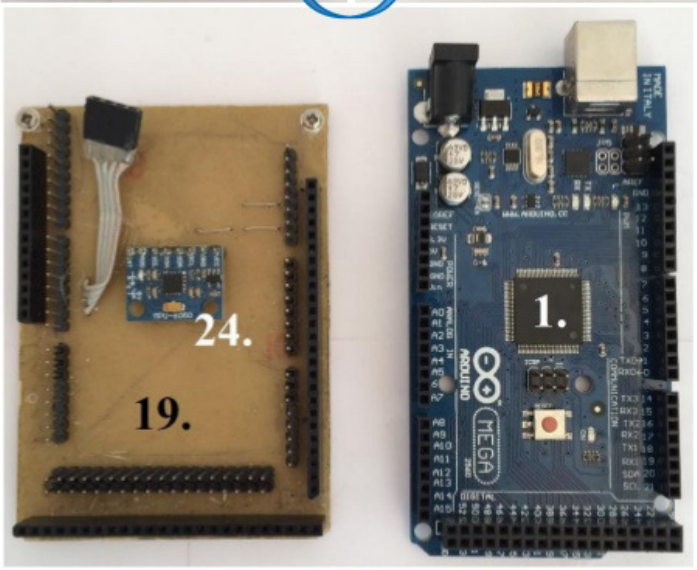


17. IR Sensors Array (6 Transmitting IR LEDs and 6 Receiving IR LEDs Manufactured PCB) – reads the black line on the floor;
18. RGB Sensors (2 RGB LEDs and 2 LDRs Manufactured PCB) – identify green marks.









19. Manufactured Shield for the Arduino – organizes the Arduino pins and holds the gyroscope (24.);
20. 2200mAh Li-Po Battery 3 Cell 11.1V (Turnigy) – powers the robot;
21. 360° Servos (2) (hacked for continuous rotation) – move the robot;
22. Back RC Servo Motor – lowers and lift the Victim Basket;
23. 12V to 5V DC Converter – lowers the voltage for the Arduino and the other plugged components;
24. Gyroscope – makes precise turns and identify ramps.