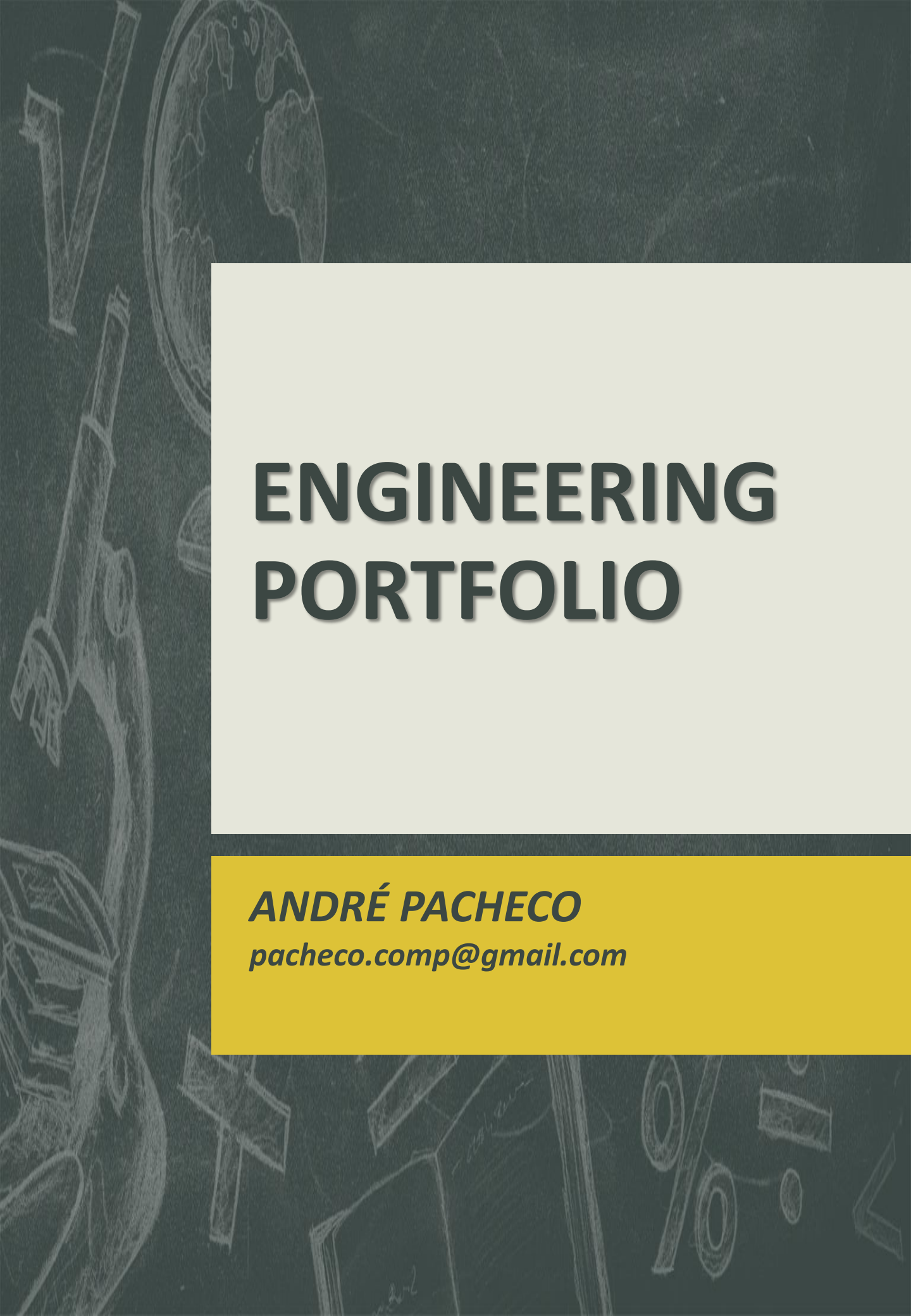

ENGINEERING PORTFOLIO

ANDRÉ PACHECO

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PROFILE

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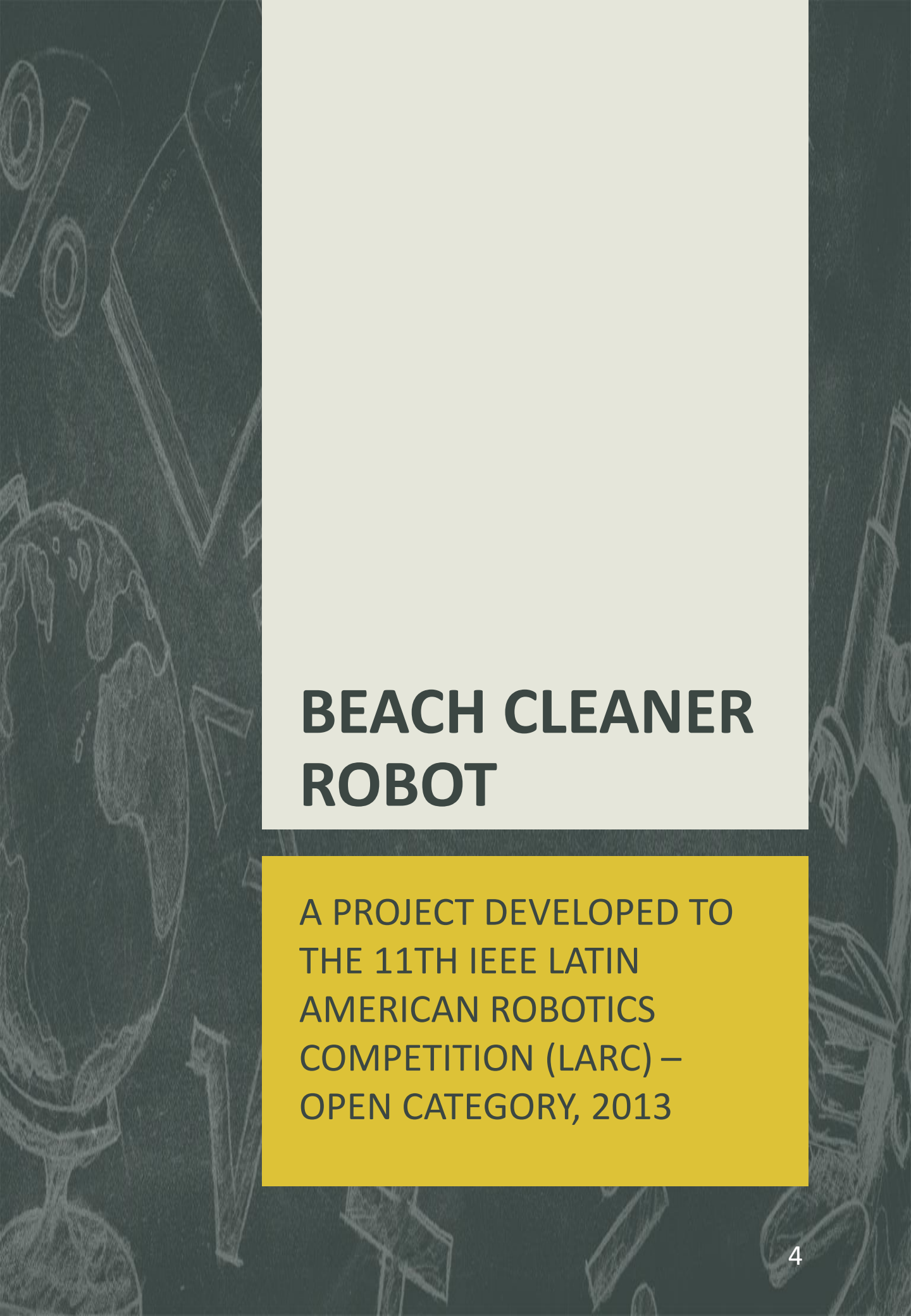
Website: http://www.pachecoandre.com.br

Github: http://www.github.com/paaatcha

ABOUT ME

I'm Andre Pacheco, a PhD student in Computer Science at Federal University of Espírito Santo (UFES, Vitória – Brazil).

This portfolio aims to supplements my resume by presenting some selected projects I developed throughout my undergraduate time. I believe that one of the most important things in any undergraduate is to participate in hands-on projects. Therefore, as you will see, during this time I got involved with different kinds of projects with different levels of knowledge. For each project, I try to provide as much information as possible, such as source code and 3D models. However, feel free to email me if have any additional question.



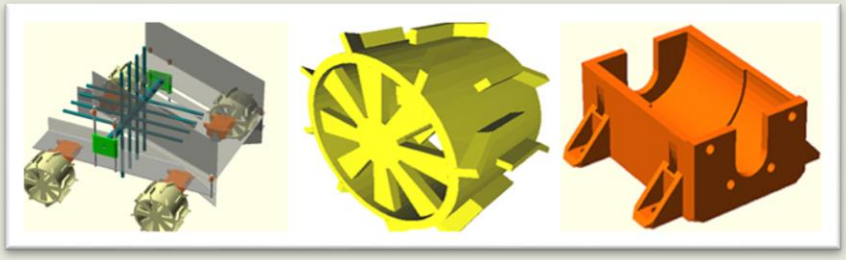
BEACH CLEANER ROBOT

A PROJECT DEVELOPED TO THE 11TH IEEE LATIN AMERICAN ROBOTICS COMPETITION (LARC) – OPEN CATEGORY, 2013

BEACH CLEANER ROBOT

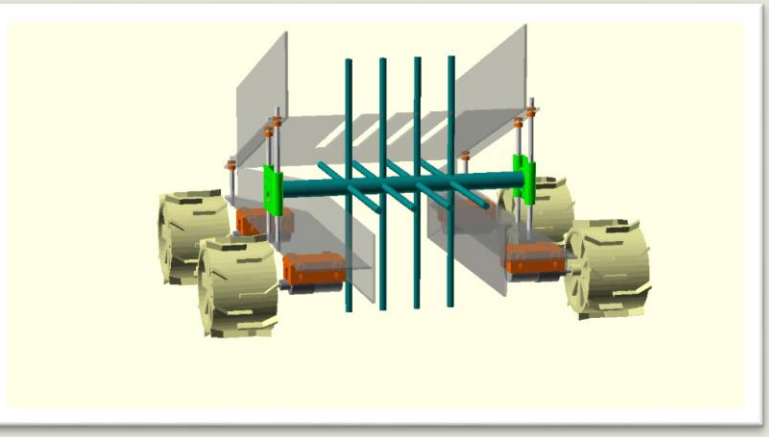
OVERVIEW

- This Project was developed to the 10th IEEE Latin American Robotics Competitions (LARC), for the OPEN category, in Arequipa, Peru, 2013.
- It consists of an autonomous robot developed to collect solid garbage in a scenario simulating a beach in a tiny touristic island.
- All robots parts were designed in a 3D software called OpenScad. Its physical structure is mainly composed of acrylic. Nonetheless, there are some parts printed in a 3D printer.



The robot 3D model

The simulated scenario

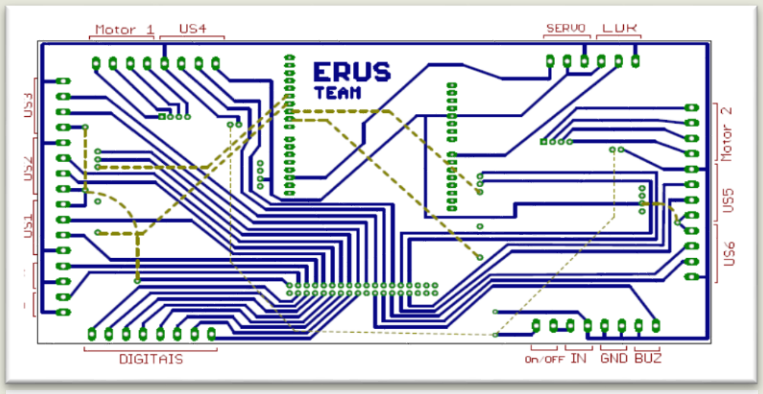


The robot 3D model

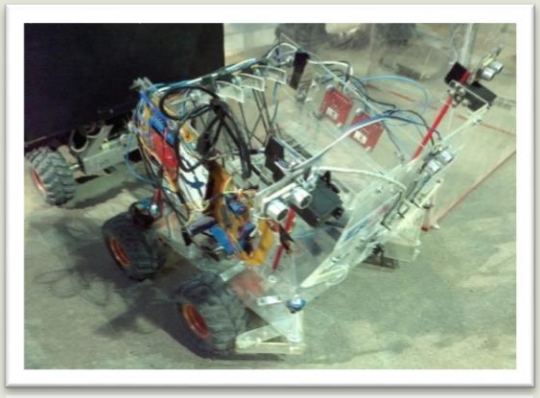
The robot's structure

BEACH CLEANER ROBOT

- Regarding the electronic part, the robot has an Android smartphone and an Arduino Mega ADK on board.
- The robot's computer vision is processed on Android using its own camera. Next, the Android communicates the Arduino that controls the motors, ultrasonic and touch sensors.
- It was used C, C++ and Java to develop the whole code for the robot.
- It was developed a circuit board in order to organize all sensors and motors circuits.



The circuit board model



The robot with all parts

- A curious situation happened before the competition. During the trip to Peru, the airplane company has lost our luggage with most robot structure parts. The robot needed to be rebuilt 1 day before the competition's begin.
- You may note in the image above that the robot is a little different than the project one. For example, the wheels were lost and it was needed to buy improvised ones in a local market.

BEACH CLEANER ROBOT

MY CONTRIBUTIONS

- I led a team with 9 members to complete the project.
- The team was divided into three sub-teams: electronic, structure and programming team.
- Beyond to led the team, I acted by constructing the 3D model, coding the Arduino and some computer vision parts.

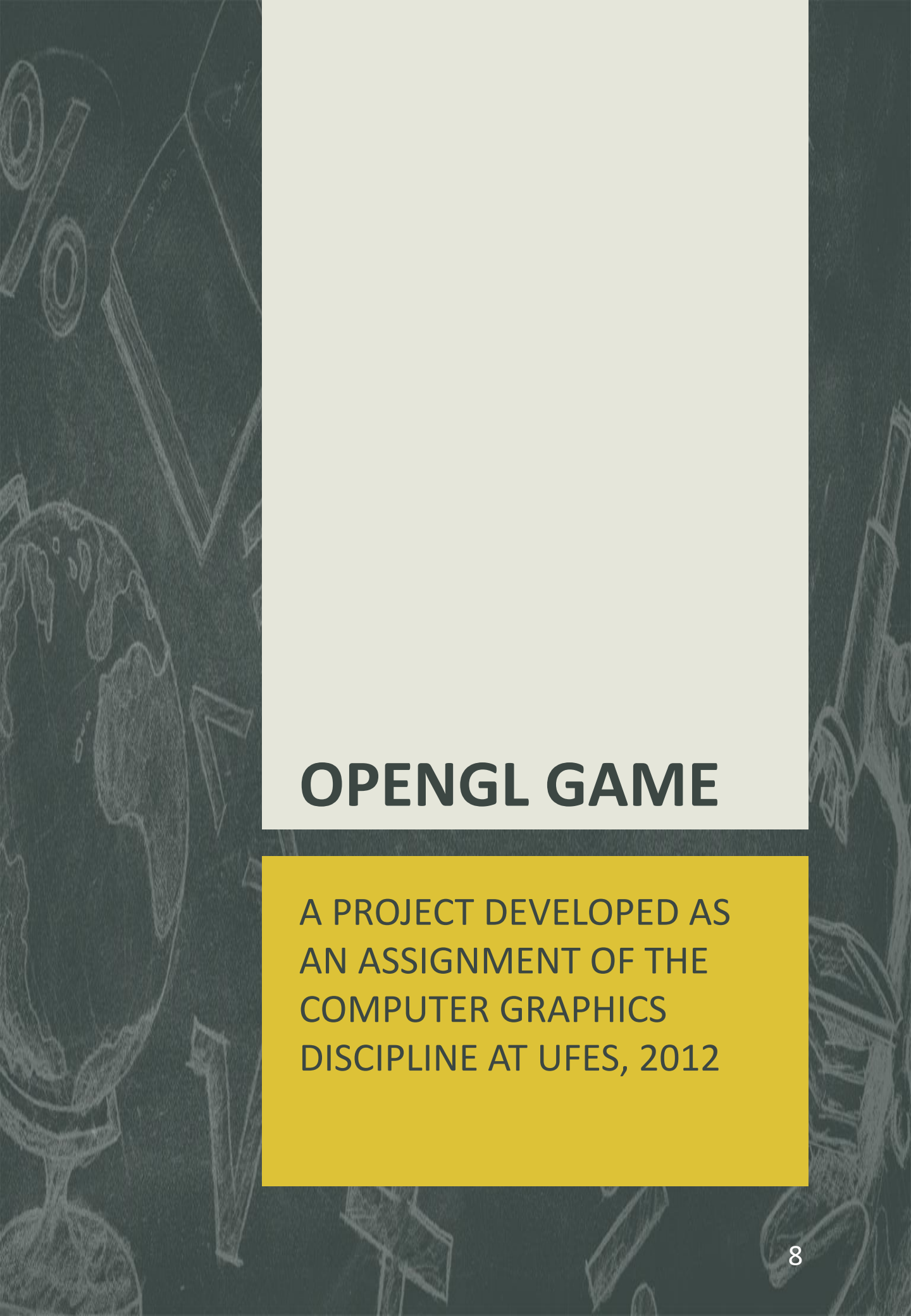
RESULTS

- The robot was able to solve the problem successfully.
- My team got the 2nd place out of 19 teams in the competition.
- The whole project is available on https://github.com/paaatcha/IEEE-OPEN

All teams at the end of the competition

You may see the robot performance in the following video:

https://youtu.be/20euAUzxxZE



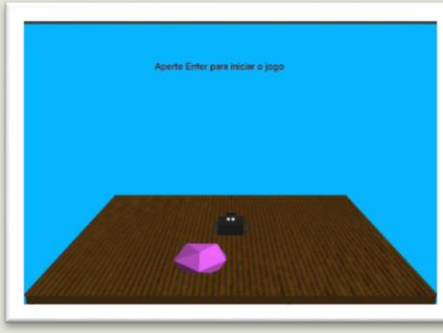
OPENGL GAME

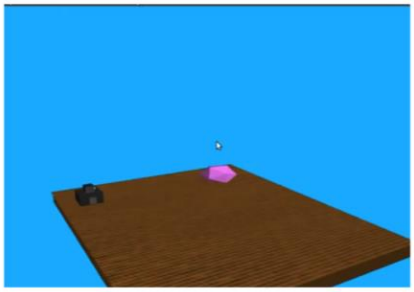
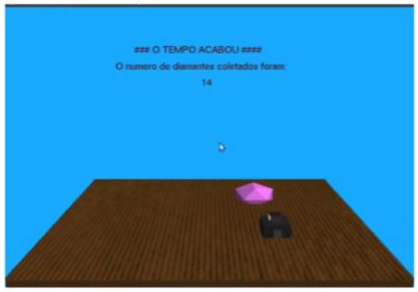
A PROJECT DEVELOPED AS AN ASSIGNMENT OF THE COMPUTER GRAPHICS DISCIPLINE AT UFES, 2012

OPENGL GAME

OVERVIEW

- This Project is a simple game developed to the computer graphics discipline at UFES in 2014.
- I developed the game in C/C++ using the OpenGL library.
- The game's goal is to very simple. A diamond will show up on the screen in different places. You need to collect as much as possible in 60 sec. In the end, the result is described on the screen.



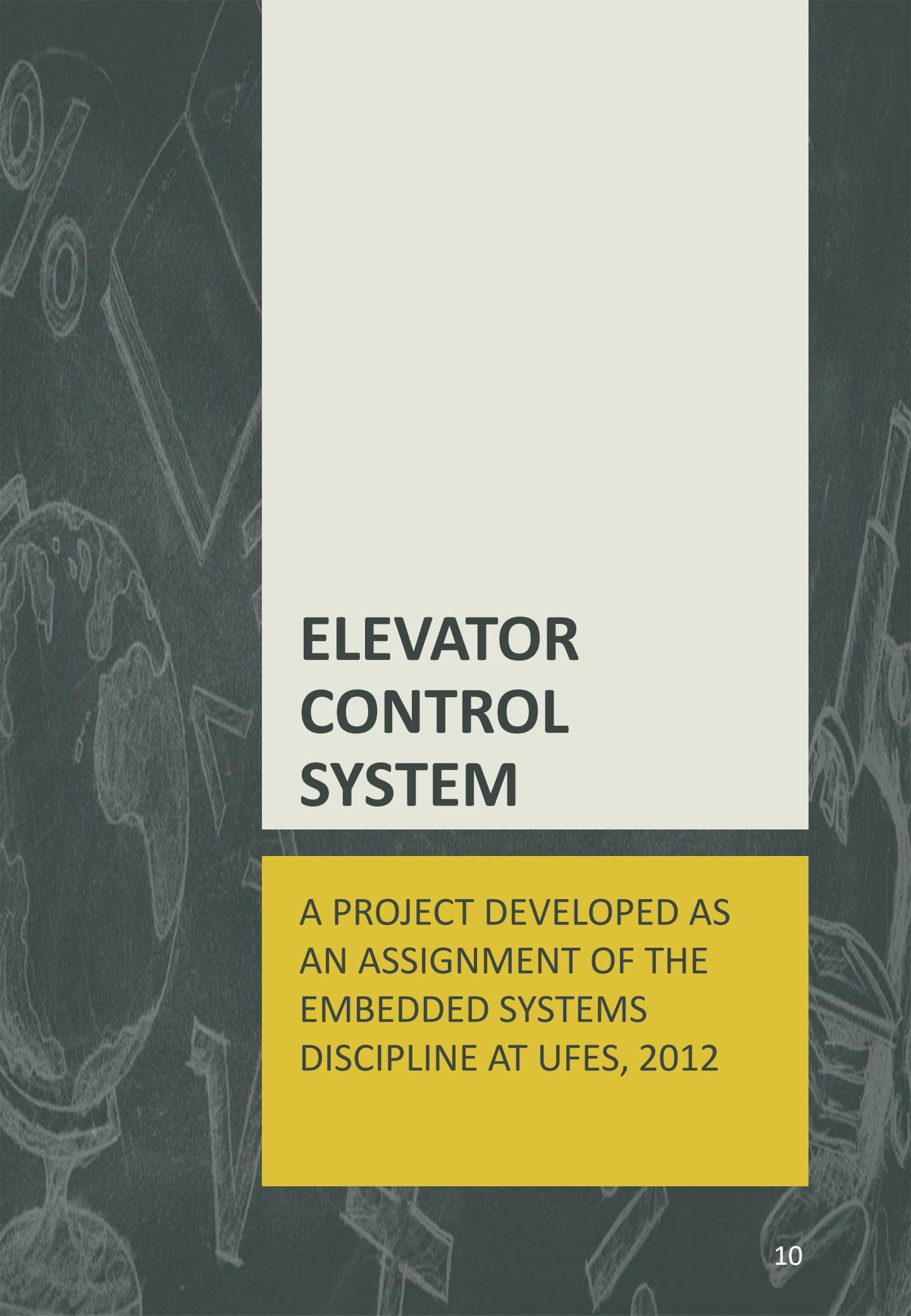



The game's screen throughout the time

- You may check the "gameplay" in the following vídeo:

  https://youtu.be/8TXSDrwVn2U

- The code is also available on https://github.com/paaatcha/jogo-opengl



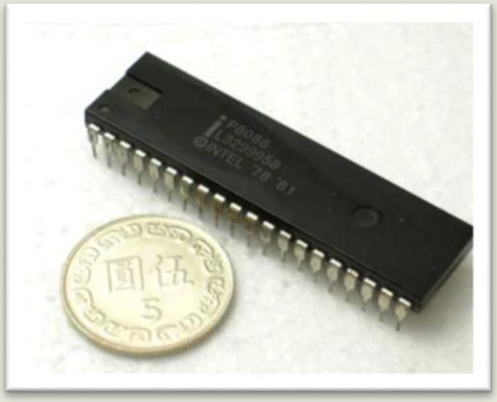
ELEVATOR CONTROL SYSTEM

A PROJECT DEVELOPED AS AN ASSIGNMENT OF THE EMBEDDED SYSTEMS DISCIPLINE AT UFES, 2012

ELEVATOR CONTROL SYSTEM

OVERVIEW

- This project consists of a code to control a elevator developed as an assignment to the embedded systems discipline at UFES.
- The elevator was controlled by an Intel 8088 controller. Therefore, the language used in this project was Assembly.



The Intel 8088 controller

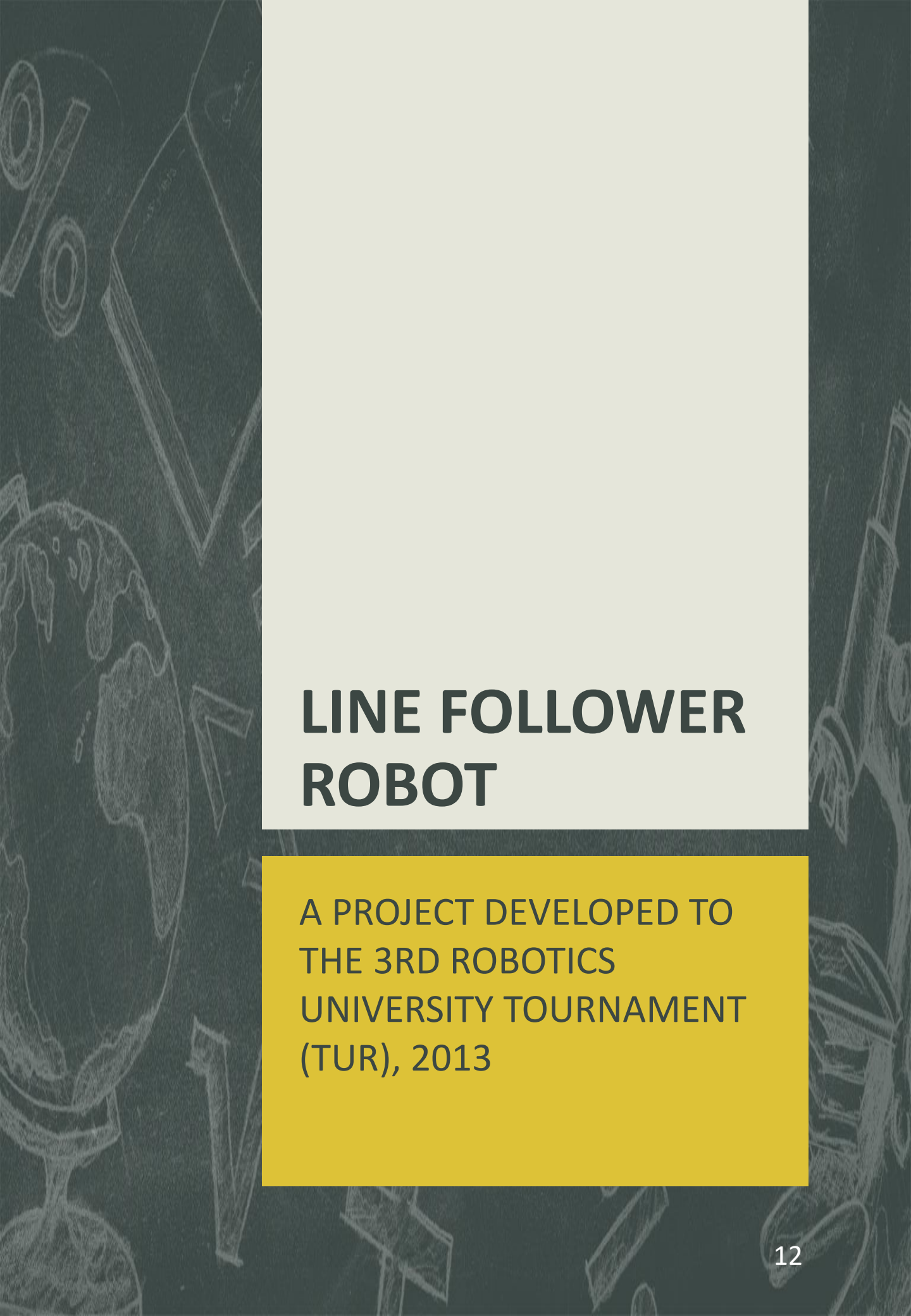
The elevator

MY CONTRIBUTION

- The code was made in partnership with another student. It's important to note that we didn't make the elevator, only the code.
- The system needed to have a graphic interface. This was my main contribution to the code (yes, it was in assembly).

RESULTS

- The developed code worked properly in the elevator controller.
- The whole code is available on https://github.com/paaatcha/elevador



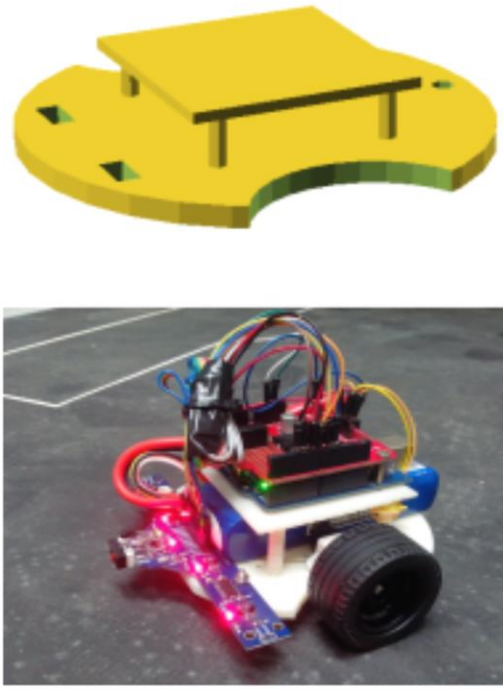
LINE FOLLOWER ROBOT

A PROJECT DEVELOPED TO THE 3RD ROBOTICS UNIVERSITY TOURNAMENT (TUR), 2013

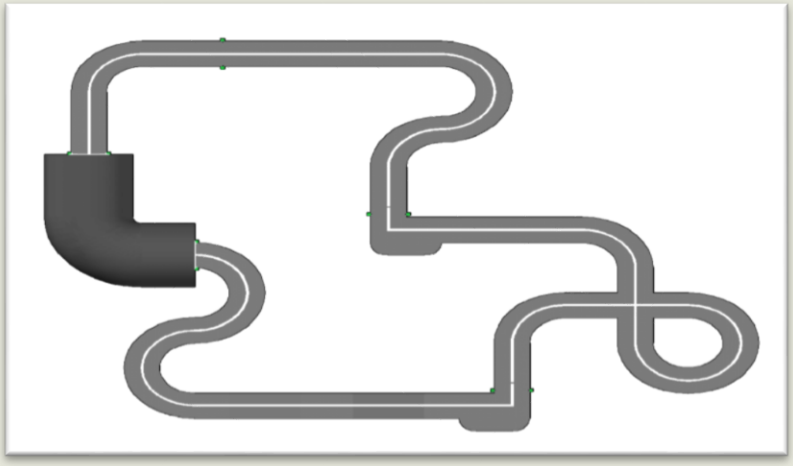
LINE FOLLOWER ROBOT

OVERVIEW

- This Project was developed to the 3rd Robotics University Tournament (TUR), Uberlândia, Brazil, 2013.
- It consists of an autonomous robot developed to compete in a robot race. The racetrack has a line, which the robot must follow, and some other challenges such as slopes, dark places, and crossroads.
- The robot structure was projected on OpenScad and printed in a 3D printer. In order to follow the line, the robot's software used a PID controller based on 10 light sensors in a developed printed circuit board. All code was produced in C++ in an embedded Arduino UNO.



The developed robot



The robot 3D model

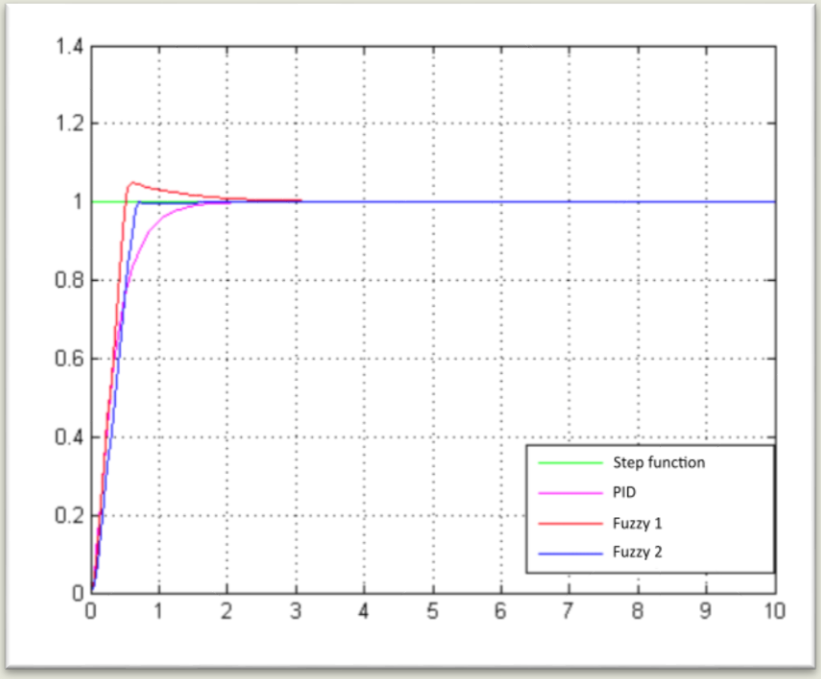
You may see the robot racing in the racetrack in the following video:

https://youtu.be/shFr-67LWB4

LINE FOLLOWER ROBOT

MY CONTRIBUTIONS

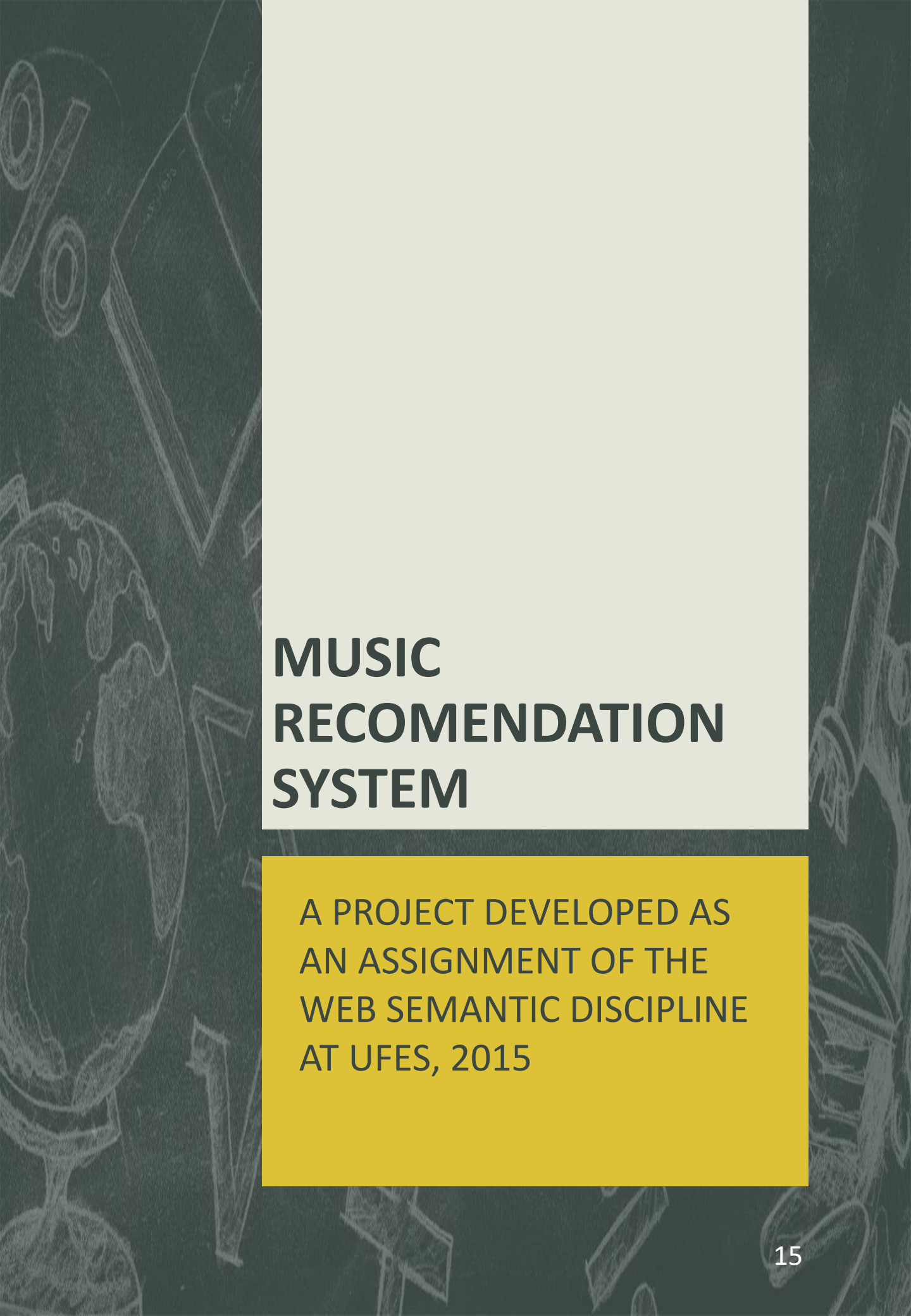
- I led a team with 3 members to complete the project.
- I designed the 3D model and the PID controller.
- In addition, this project became my undergraduate thesis. In brief, this is what I've made:
  - Modeling the whole system on MATLAB
  - Optimizing the PID with the differential evolution algorithm
  - Developing a Fuzzy controller
  - Comparing both controllers



The controllers' comparison for the step function

RESULTS

- The robot was able to perform the whole racetrack in a competitive way.
- My team got the 5th place out of 29 teams in the competition.
- The whole code is available on https://github.com/paaatcha/TUR



MUSIC RECOMENDATION SYSTEM

A PROJECT DEVELOPED AS AN ASSIGNMENT OF THE WEB SEMANTIC DISCIPLINE AT UFES, 2015

MUSIC RECOMENDATION SYSTEM

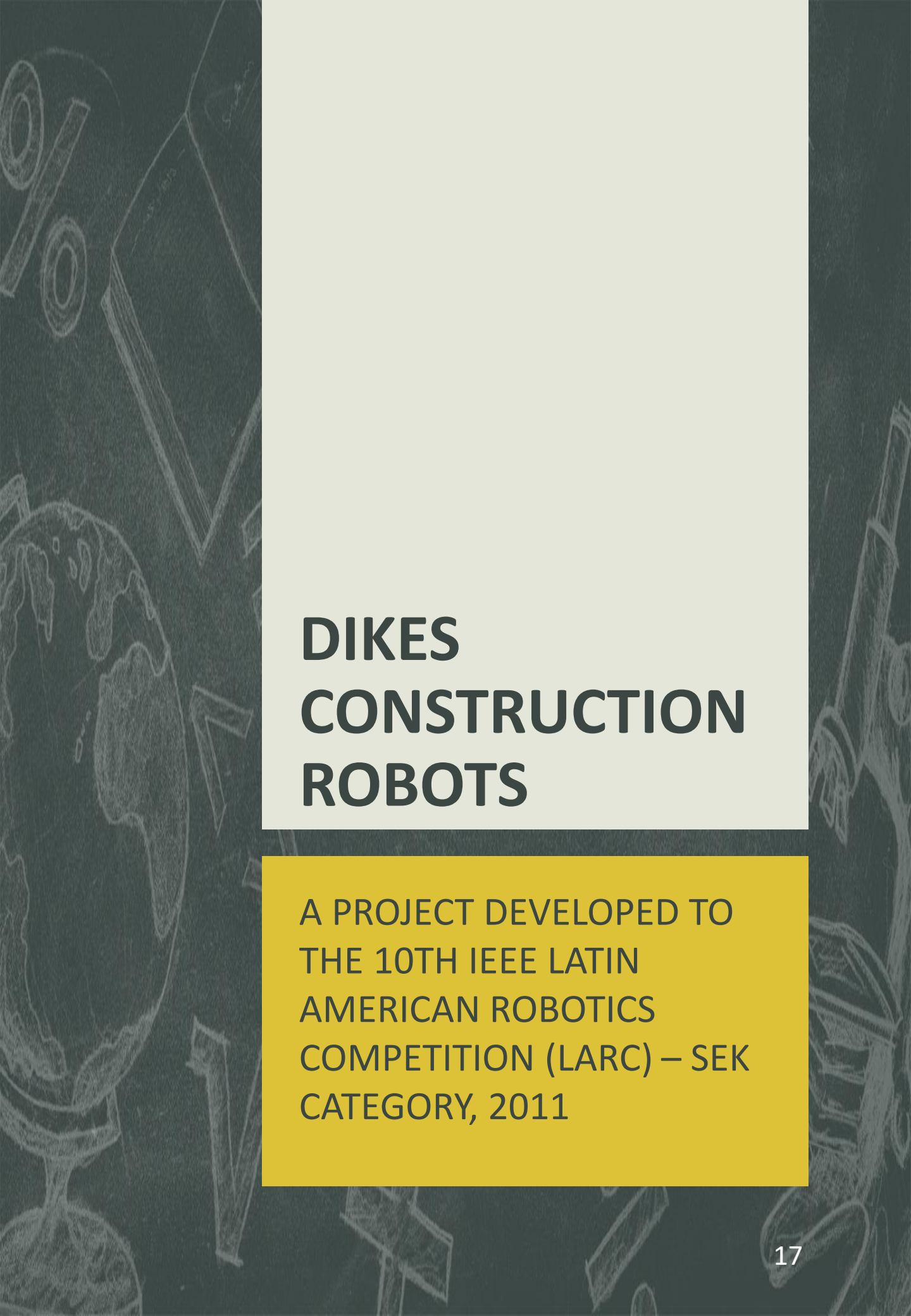
OVERVIEW

- This project is a fictitious music recommendation system developed as an assignment of the web semantic discipline at UFES in 2015.
- The system works over a web service. The user needs to sign up and provide some information regarding the musical taste. Next, the system will recommend some bands and music according to the given information.
- The system consumes data from the Wikipedia in order to provide music and band recommendations.

The login screen in the system

- The system was coded using the Java EE platform. Nonetheless, a plenty of frameworks were used, among them:
  - JSF, Primefaces, Facelets, Hibernate, JPA, MySQL
- To consume data from web, I used SPARQL with apache JENA.

- The whole code is available on https://github.com/paaatcha/PoorSpoty
- In addition, since it was very hard to find JENA's tutorial on the internet, I developed some tutorials on youtube. You can check them on https://youtu.be/X9xMTP5Ep9o



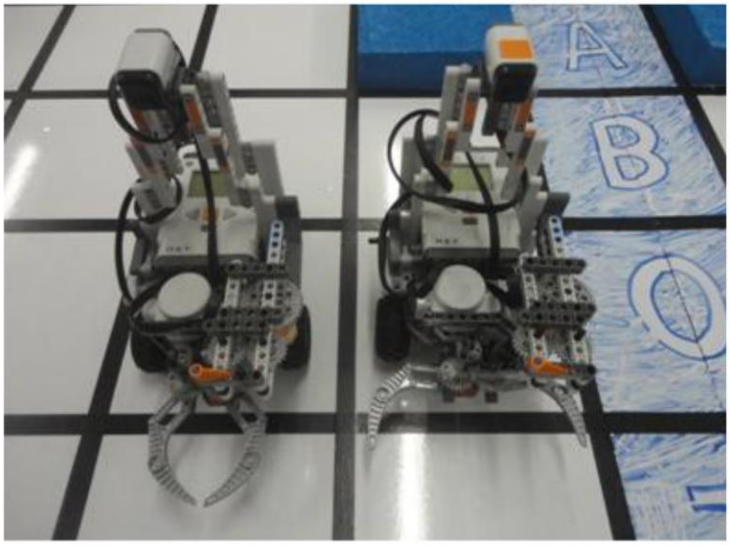
DIKES CONSTRUCTION ROBOTS

A PROJECT DEVELOPED TO THE 10TH IEEE LATIN AMERICAN ROBOTICS COMPETITION (LARC) – SEK CATEGORY, 2011

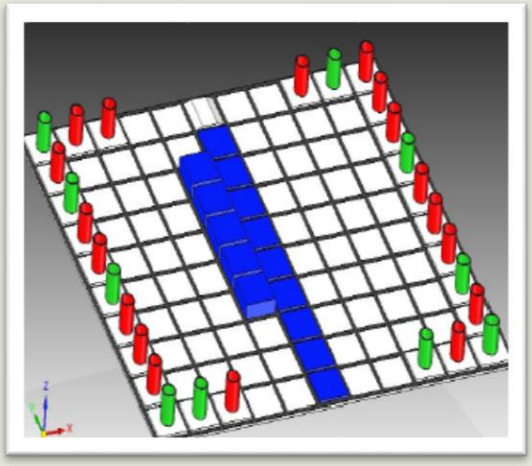
DIKES CONSTRUCTION ROBOTS

OVERVIEW

- This Project was developed to the 10th IEEE Latin American Robotics Competitions (LARC), for the Standard Educational Kits (SEK) category, in Bogotá, Colômbia, 2011.
- It consists of two autonomous robots working in cooperation in order to construct a dike wrapping river in a simulated arena.
- It was used the Lego Mindstorms Robotic kit to develop the robots. Both robots were programmed using the language C.
- The robots are used a compass, light and touch sensors. Moreover, they communicate through a bluetooth connection.



The two developed robots



The simulated arena

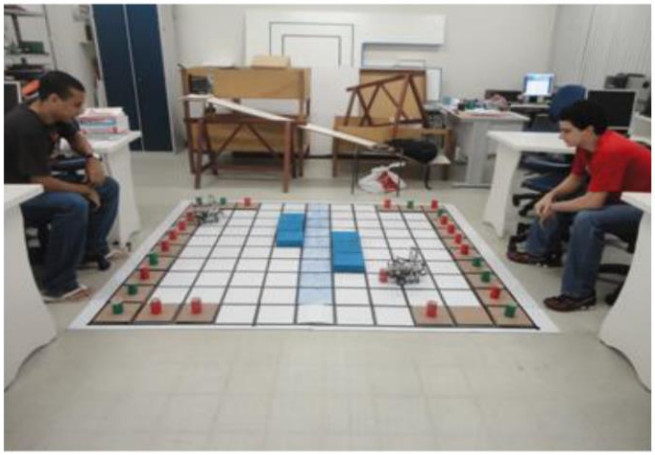
DIKES CONSTRUCTION ROBOTS

MY CONTRIBUTIONS

- I was a member of team with 4 students.
- Building the robot using the gears, engines, and hardware available for the kit.
- Designing a solution to solve the problem and coding it for both robots.

RESULTS

- The robots solved the problem successfully.
- My team got the 1st place out of 22 teams in the competition.
- The whole code is available on https://github.com/paaatcha/IEEE-SEK/tree/master/larc2011

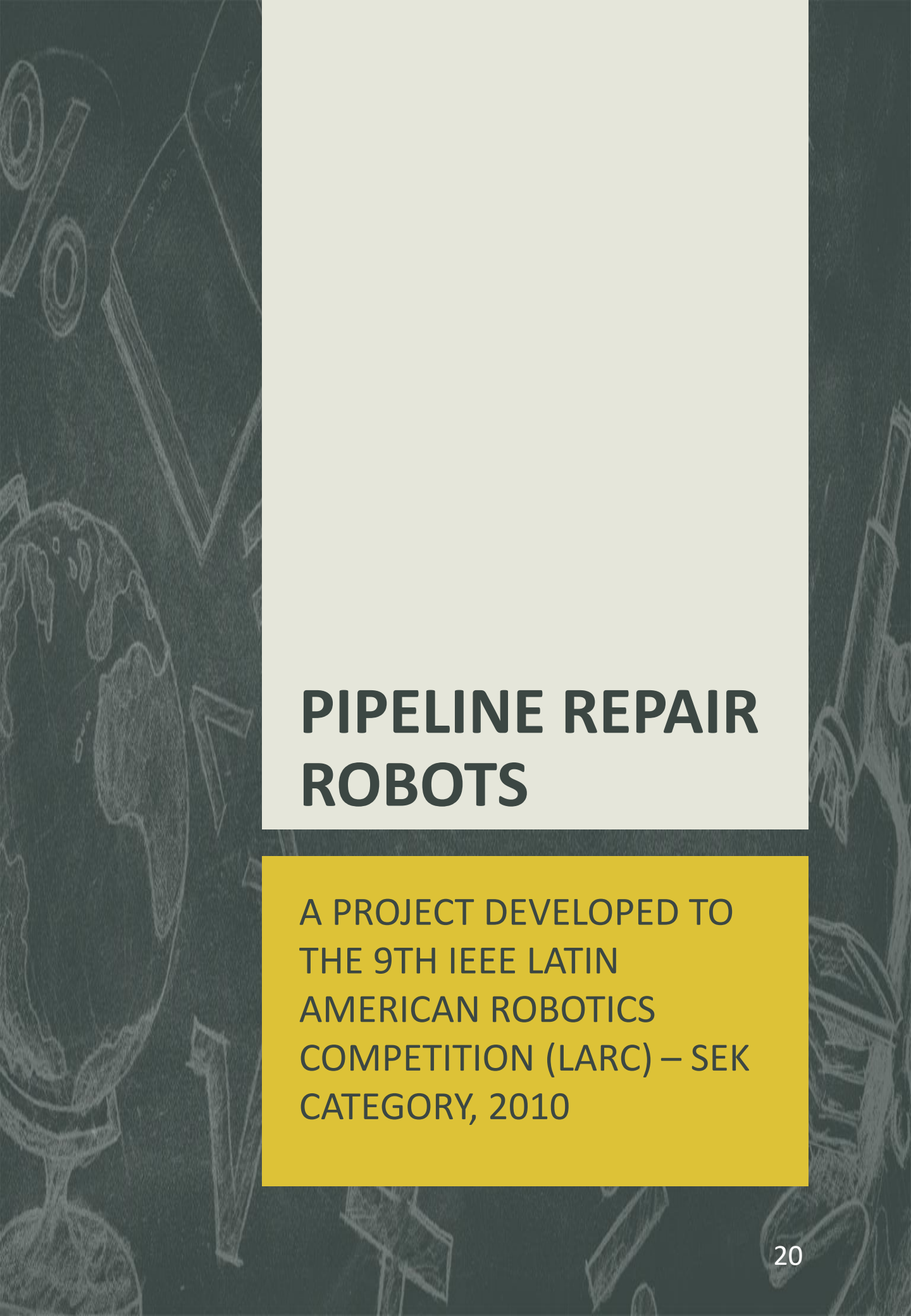


The team training in simulated the arena

You can check some videos of our robots solving the challenge:

https://youtu.be/shFr-67LWB4

https://youtu.be/iHoc7e9tWWQ



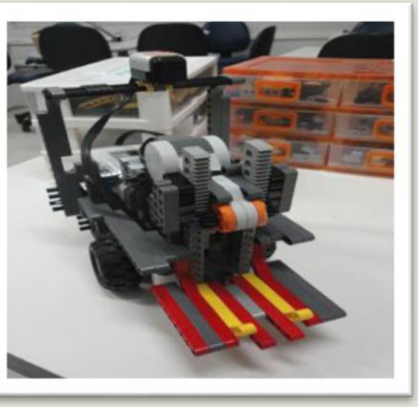
PIPELINE REPAIR ROBOTS

A PROJECT DEVELOPED TO THE 9TH IEEE LATIN AMERICAN ROBOTICS COMPETITION (LARC) – SEK CATEGORY, 2010

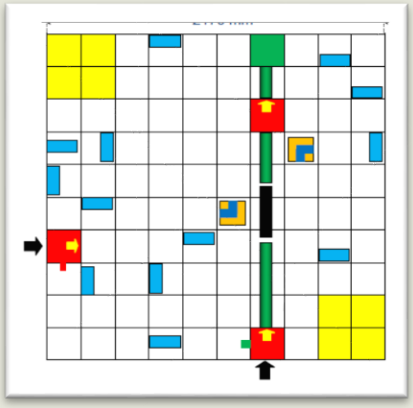
PIPELINE REPAIR ROBOTS

OVERVIEW

- This Project was developed to the 9th IEEE Latin American Robotics Competitions (LARC), for the Standard Educational Kits (SEK) category, in São Paulo, Brazil, 2010.
- It consists of two autonomous robots working in cooperation in order to repair a pipeline leaking in a simulated arena.
- It was used the Lego Mindstorms Robotic kit to develop the robots. Both robots were programmed using the language C.
- The robots are used a compass, light and touch sensors. Moreover, they communicate through a bluetooth connection.



The two developed robots



The simulated arena

PIPELINE REPAIR ROBOTS

MY CONTRIBUTIONS

- I was a member of team with 4 students.
- Building the robot using the gears, engines, and hardware available for the kit.
- Designing a solution to solve the problem and coding it for both robots.

RESULTS

- The robots solved the problem successfully.
- My team got the 1st place out of 31 teams in the competition.
- The whole code is available on https://github.com/paaatcha/IEEE-SEK/tree/master/larc2010

The team training in the simulated arena

You can check some videos of our robots solving the challenge:

https://youtu.be/pK7MJCqqg3g

https://youtu.be/rJRZedw-z6Y