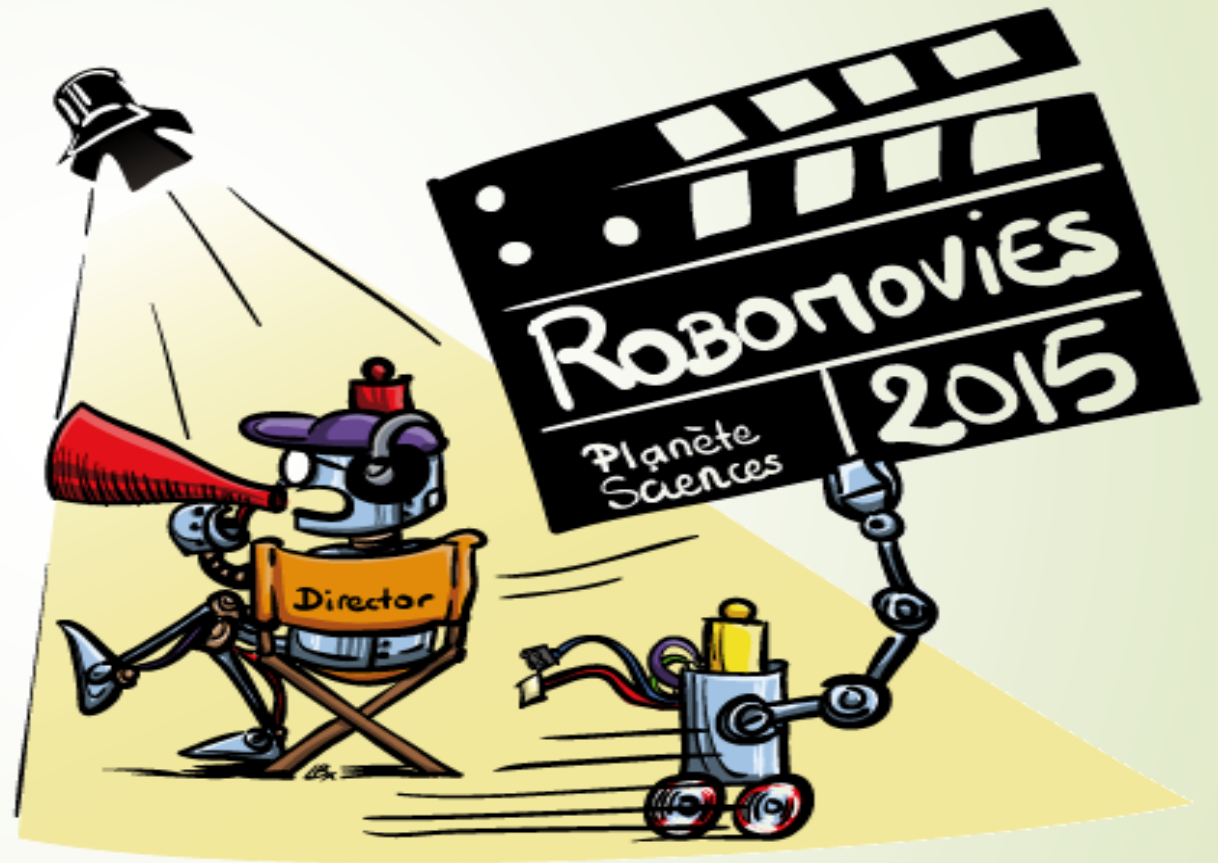


Group Scientific Project

National French Robotic Competition –
Secondary Robot





Introduction

- Motivation : participate in the competition
- Extend last year's effort
- Choice of this project
- Training on three parts
- Collaboration with another team
- Current state

Team members



Mechanical part: Alexis CLARIOND, Bruno
TAILLÉ

Electronic part: Chia-man HUNG, Marc
SZAFRANIEC

Programming part: Raymond LI, Yuxiang LI,
Etienne SIX

Competition rules 2015

- Qualification phase, Final phase
- Matches (90 seconds)
- Dimension
(non-deployed $\leq 70\text{cm}$,
deployed $\leq 90\text{ cm}$)

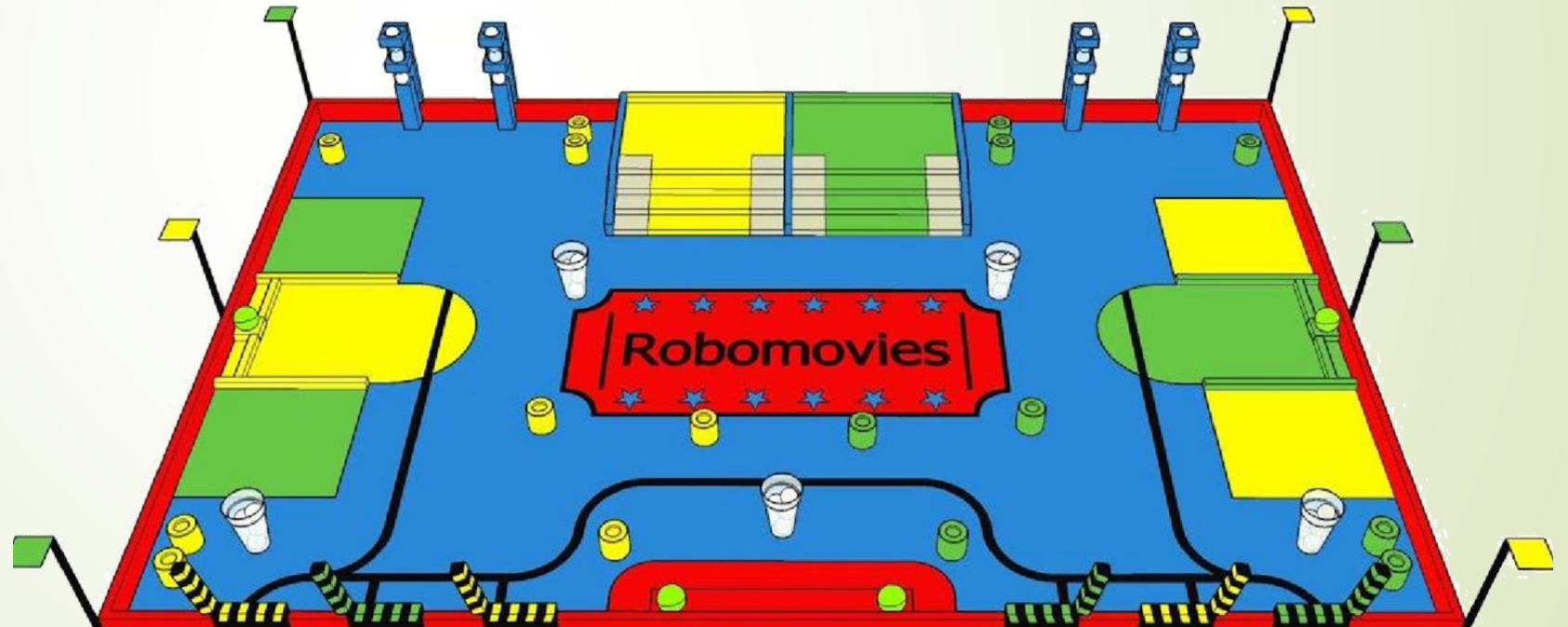


Competition rules 2015

- Climb stairs

Five tasks:

- The spots
- The cups
- The claps
- The stairs
- The carpet





Mechanical part

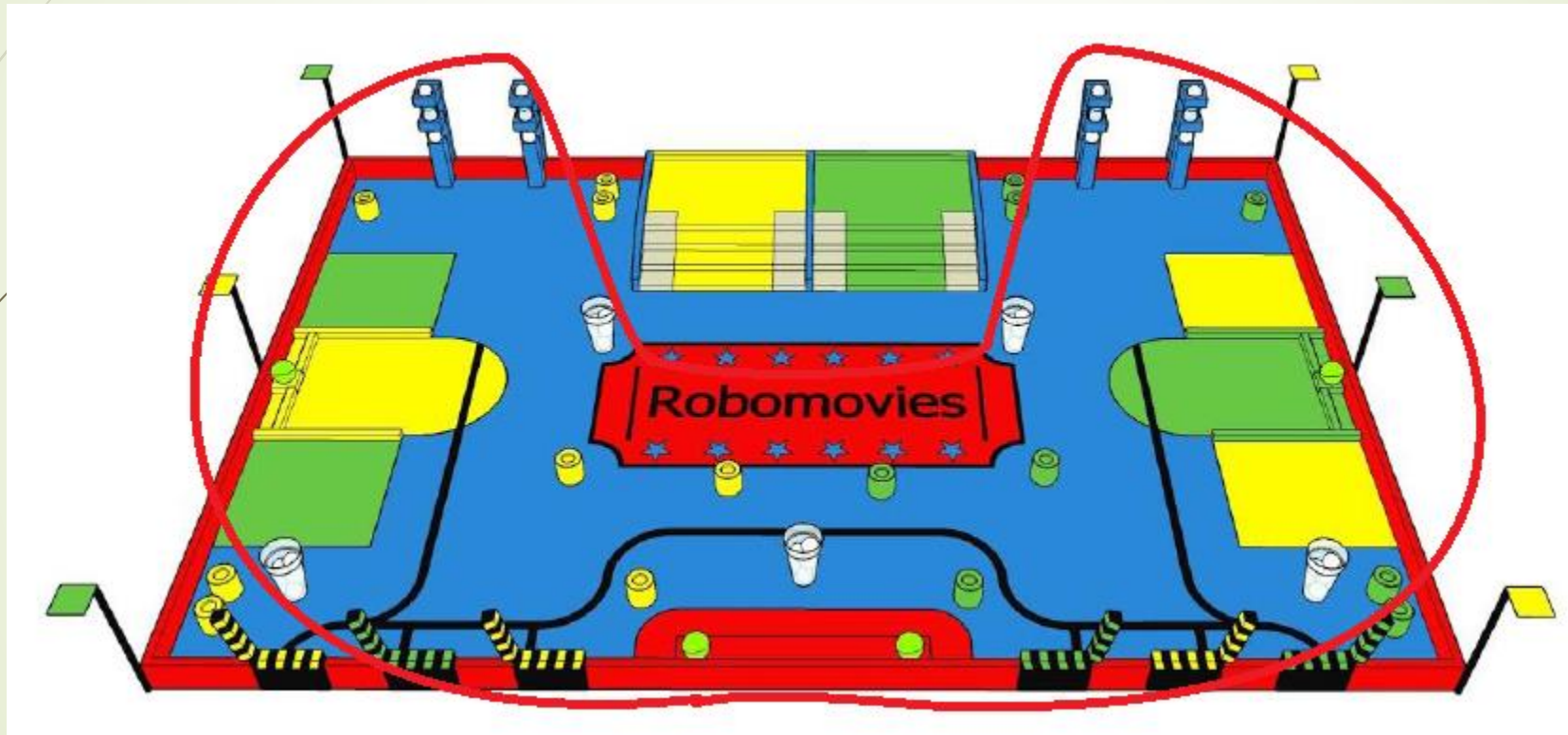
Rolling base and deployment system

Distribution of tasks

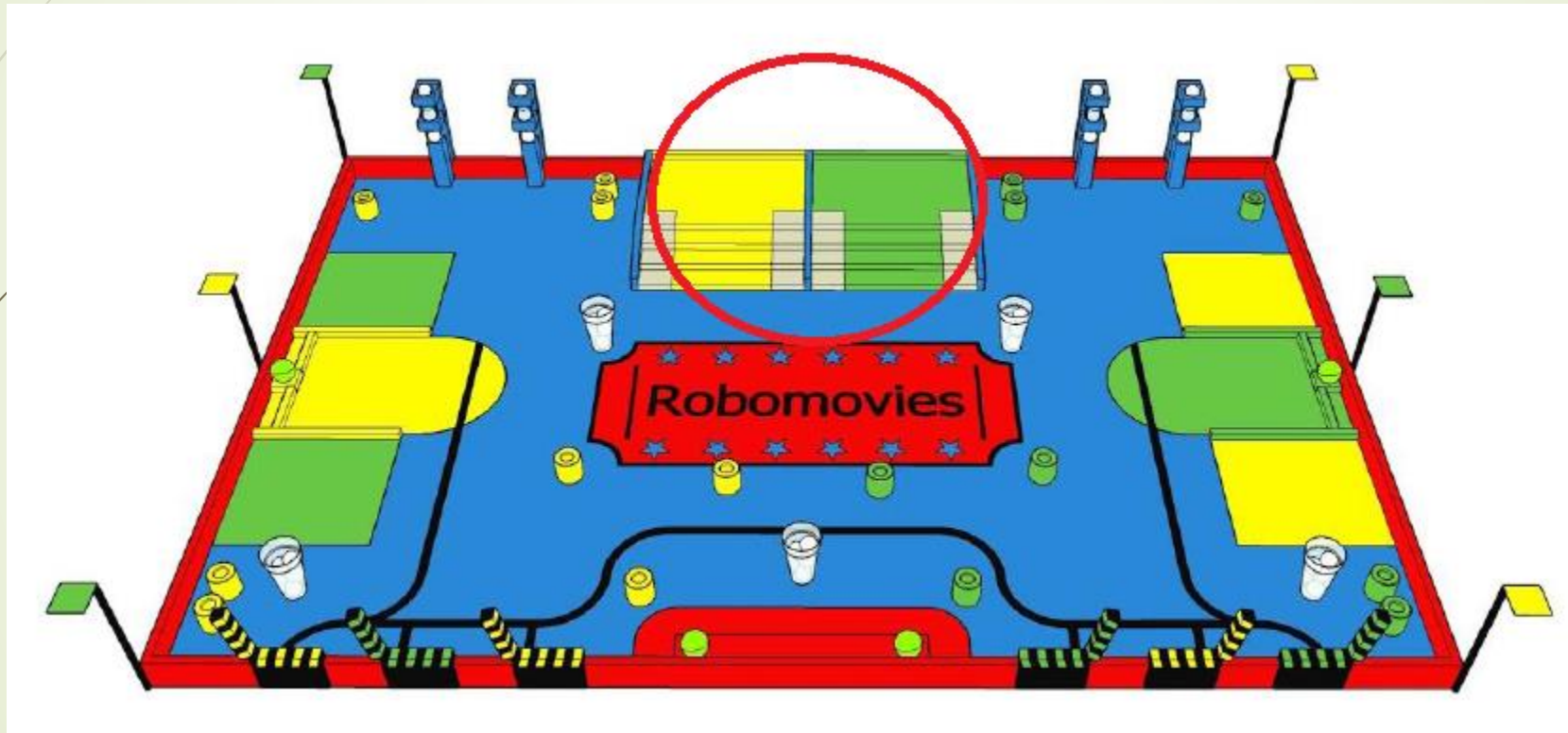
Two areas to be distinguished in the game area



- Spots, pop-corn and claps



- Stairs and carpet



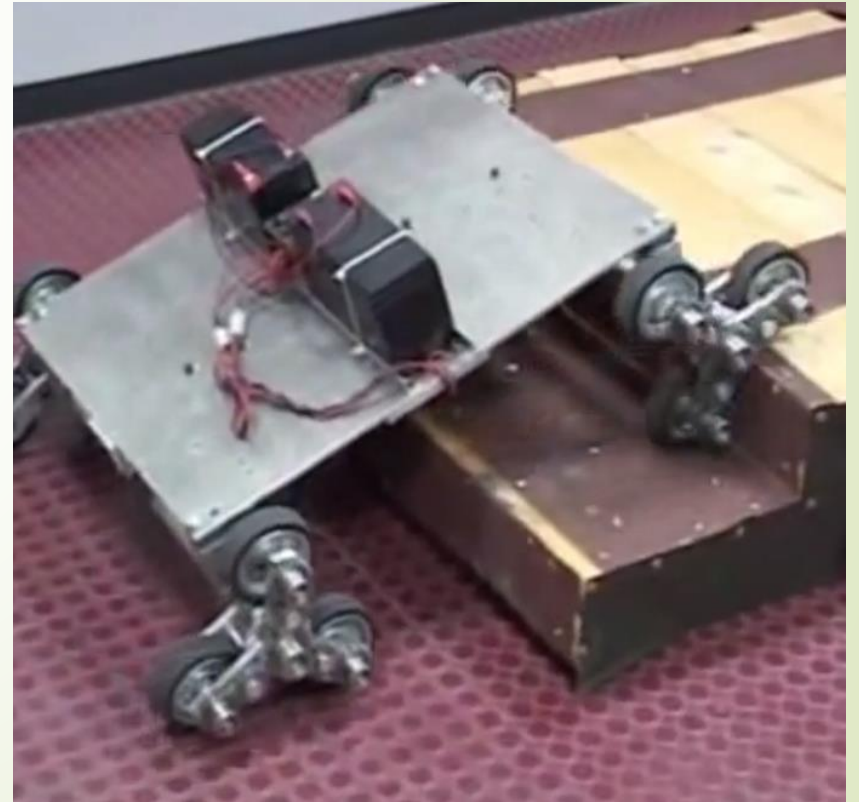
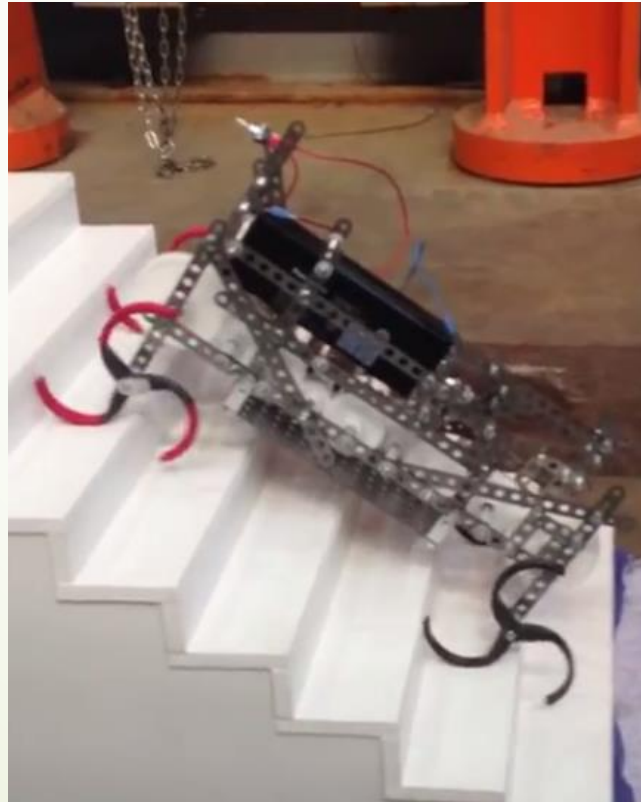
Robot design and 1st prototype

Short specifications

- Climb stairs
- Avoid obstacles (robot or object)
- Lay down the carpet (optional)
- Respect the constraints imposed by the game:
 - perimeter (70cm) and deployed perimeter (90cm)
- Platform at 45 cm from the ground (to place the beacon of the opposing team)

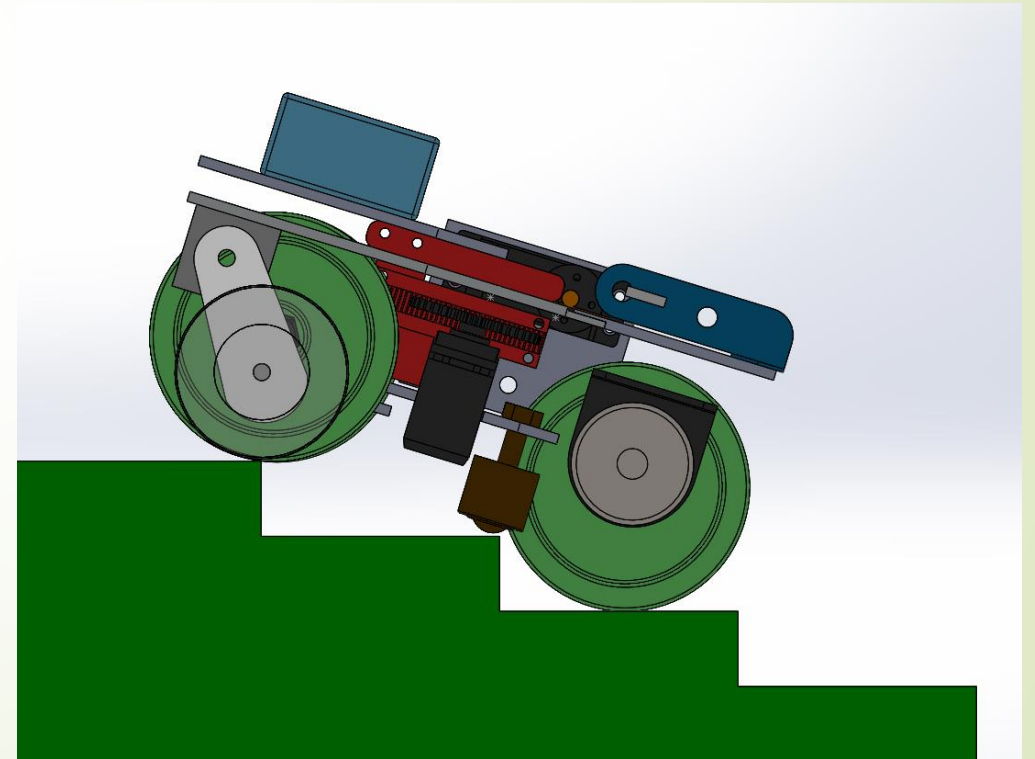
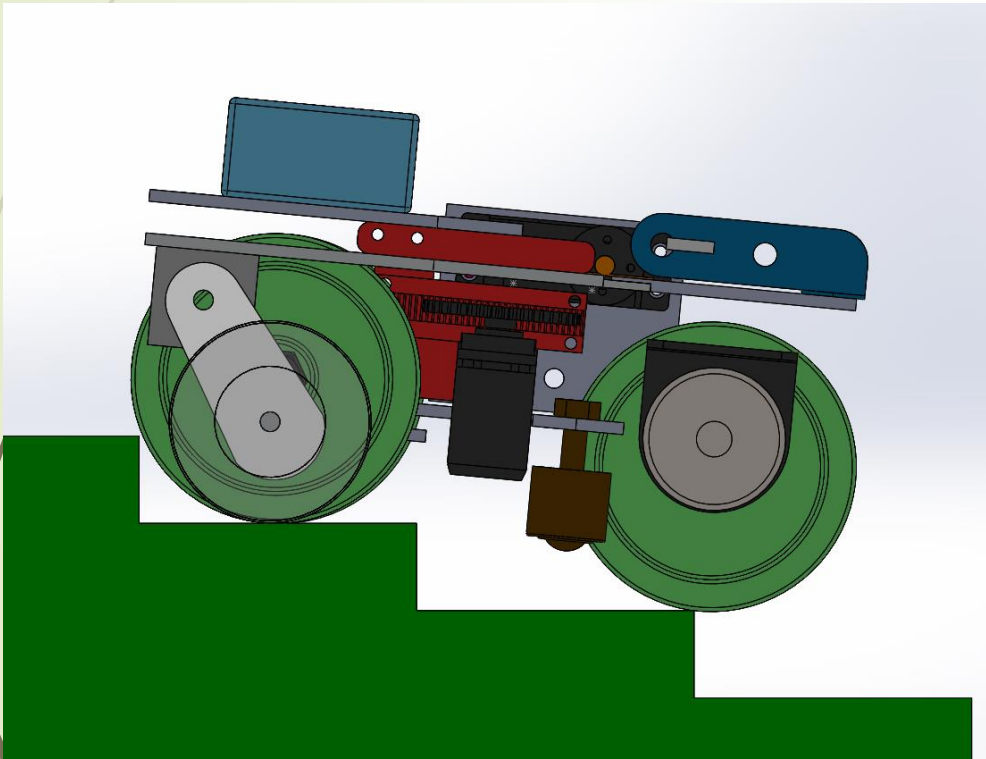
Robot design and 1st prototype

How to climb stairs:



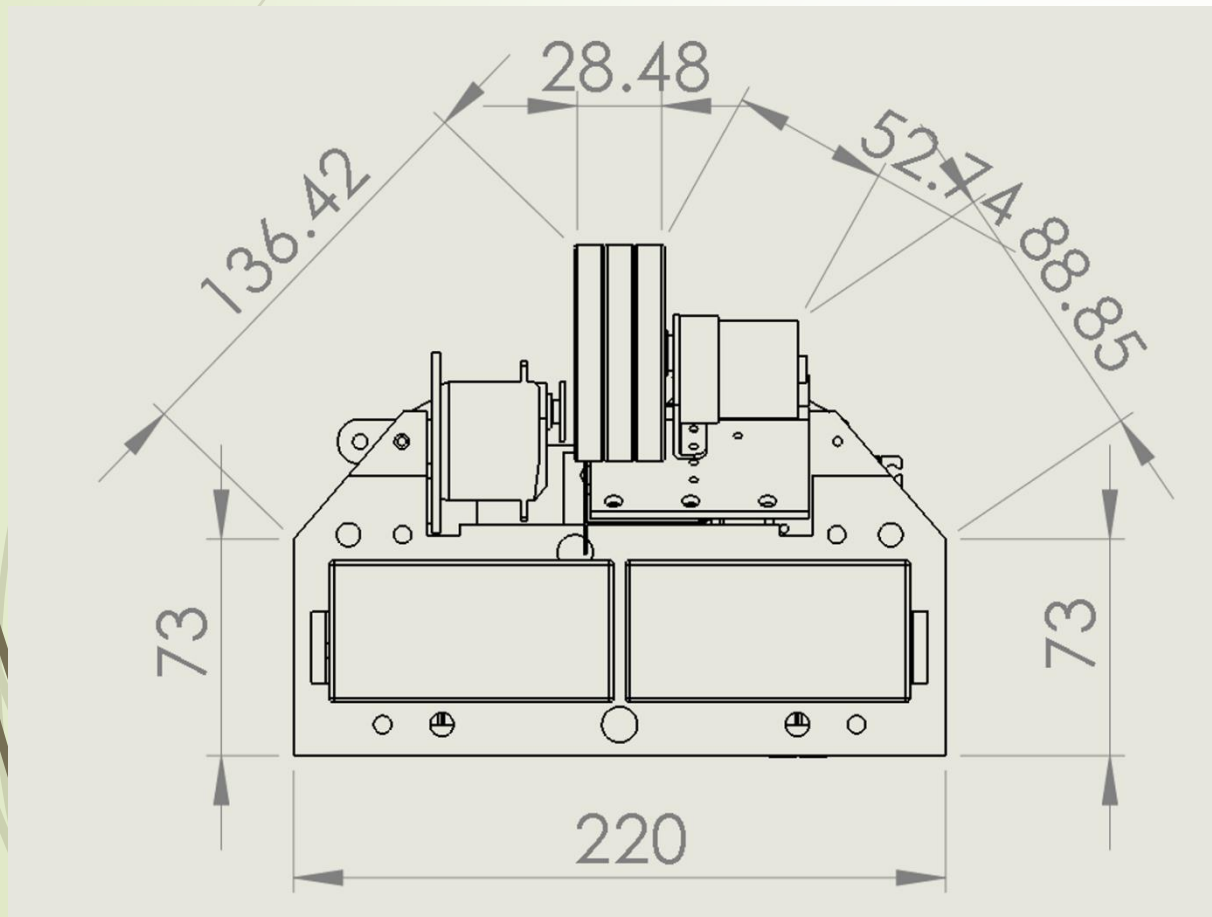
Robot design and 1st prototype

Ensure that at least one wheel is on the flat part of a step at all times:



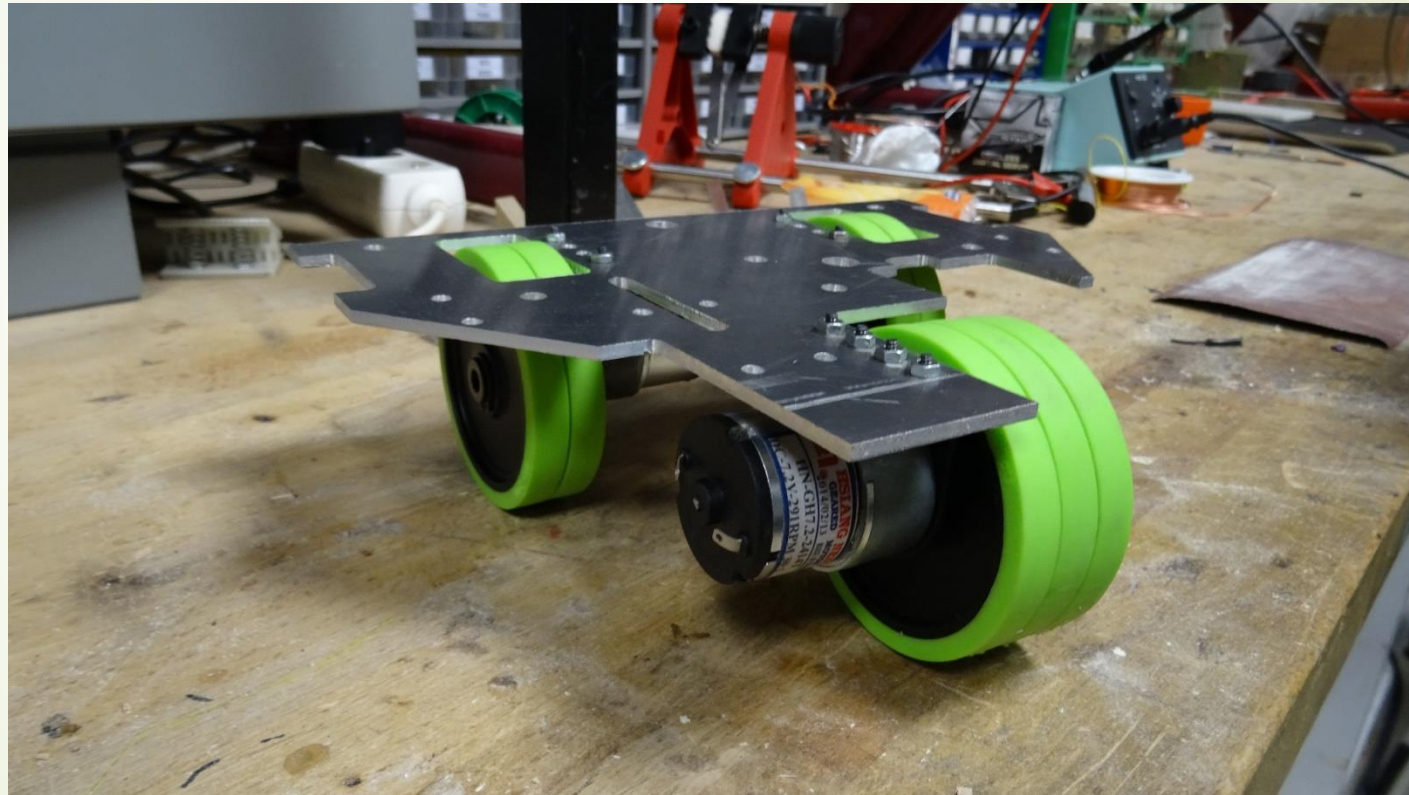
Robot design and 1st prototype

Compliance with the perimeter constraint:

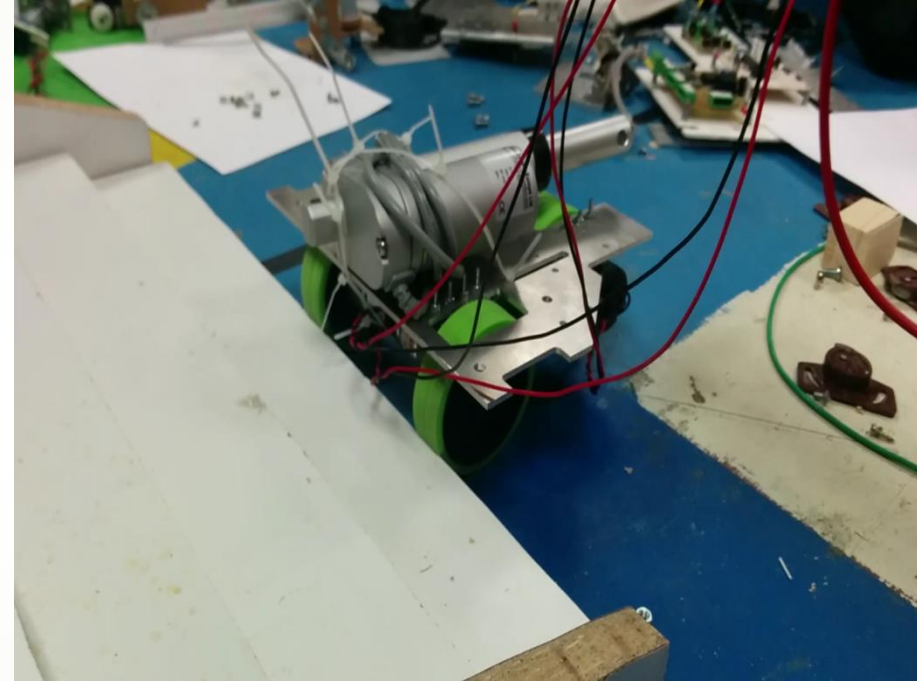
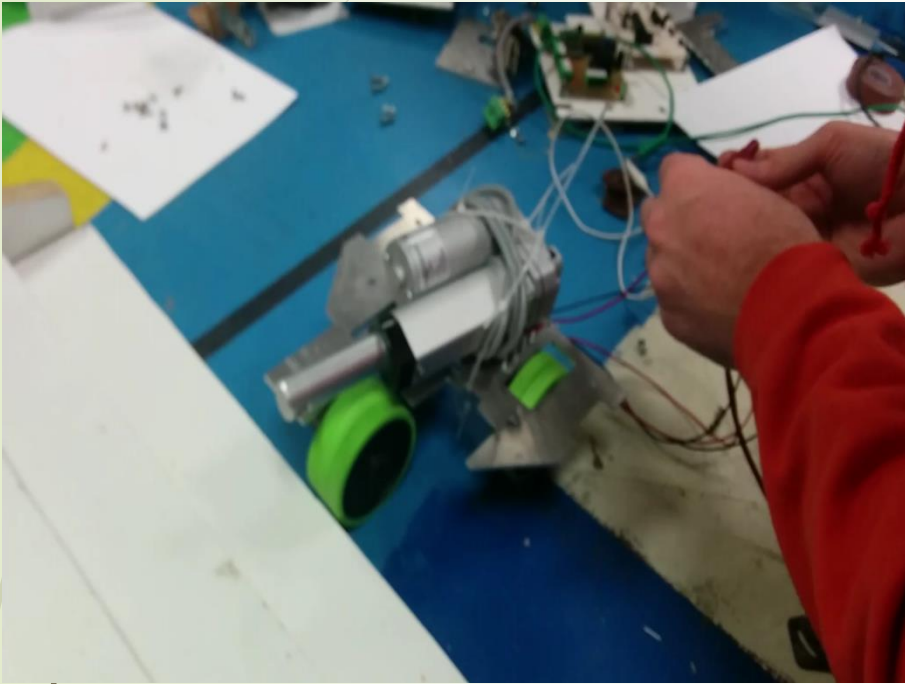


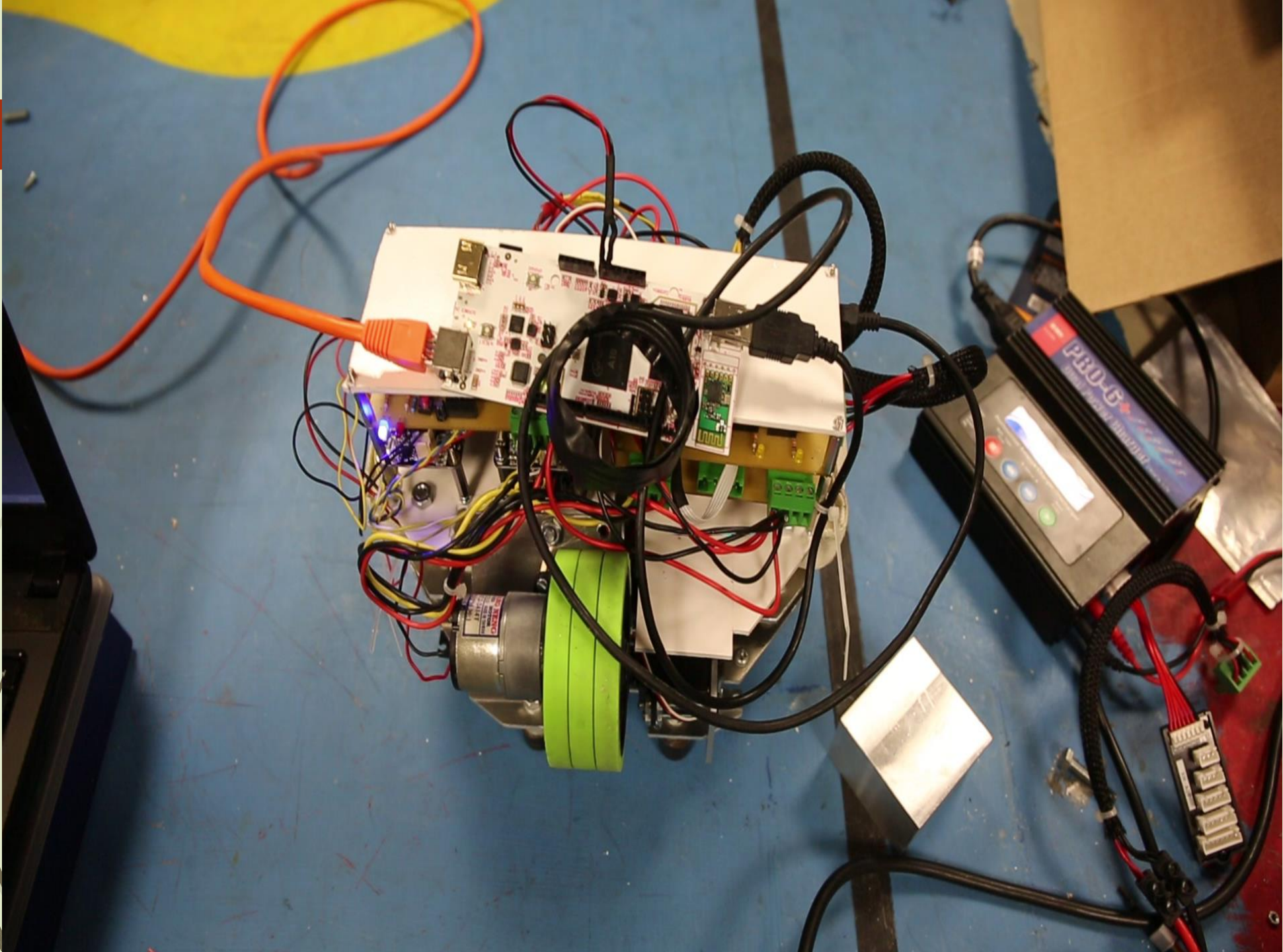
$$73+220+73+88.85+52.74+28.48+136.42 \\ = 672.49\text{mm}$$

Robot design and 1st prototype



First test





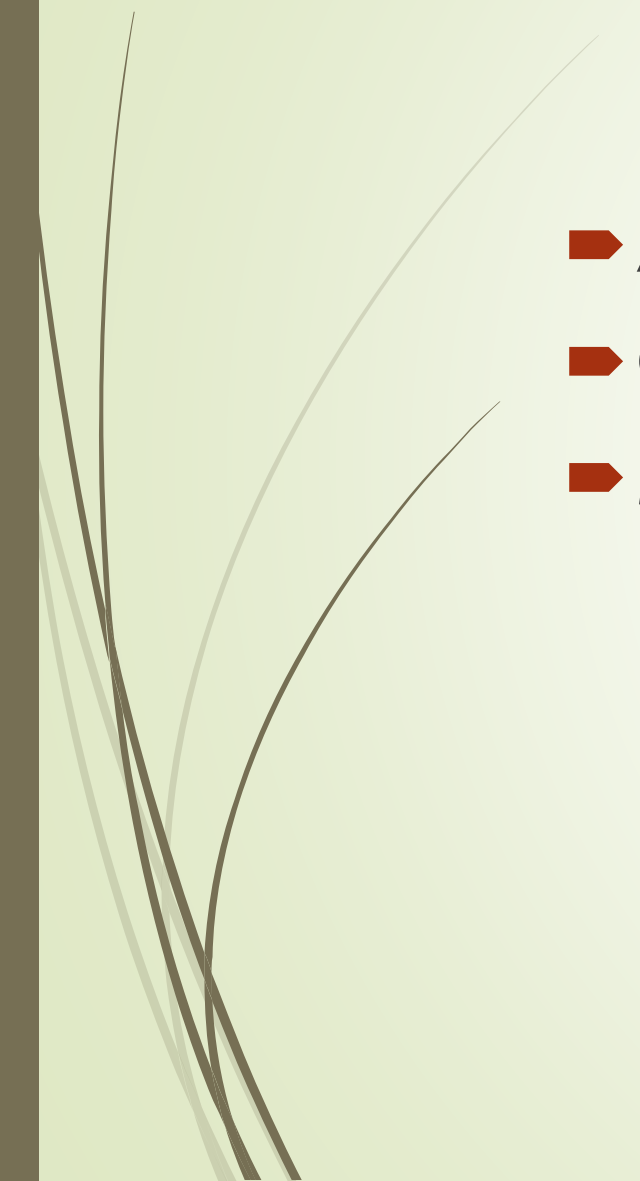


Electronic part

Manufacturing of circuit boards

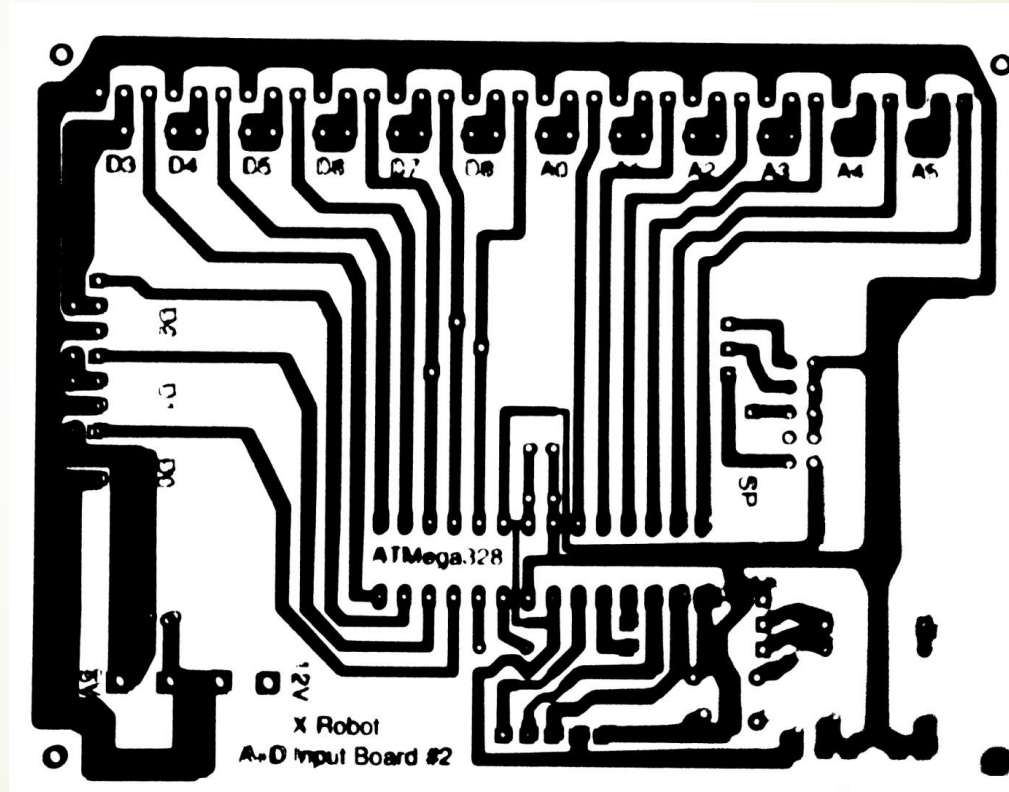


Outline

- Approach
 - Global structure
 - Mistakes and solutions
- 

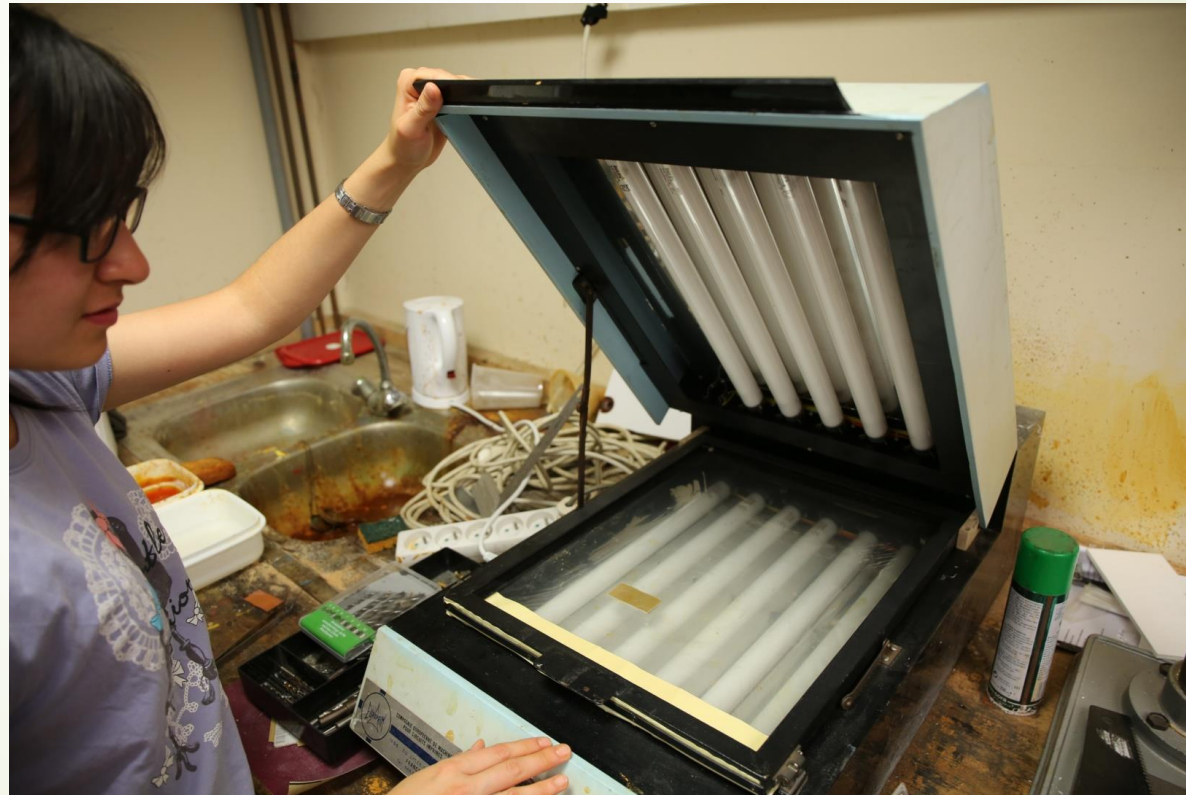
Manufacturing of circuit boards

Printing a negative



Manufacturing of circuit boards

First step: Insolation of the blank card using a transparent



Manufacturing of circuit boards

Second step: Bath of sodium hydroxide



Manufacturing of circuit boards

Third step: Bath of iron chloride

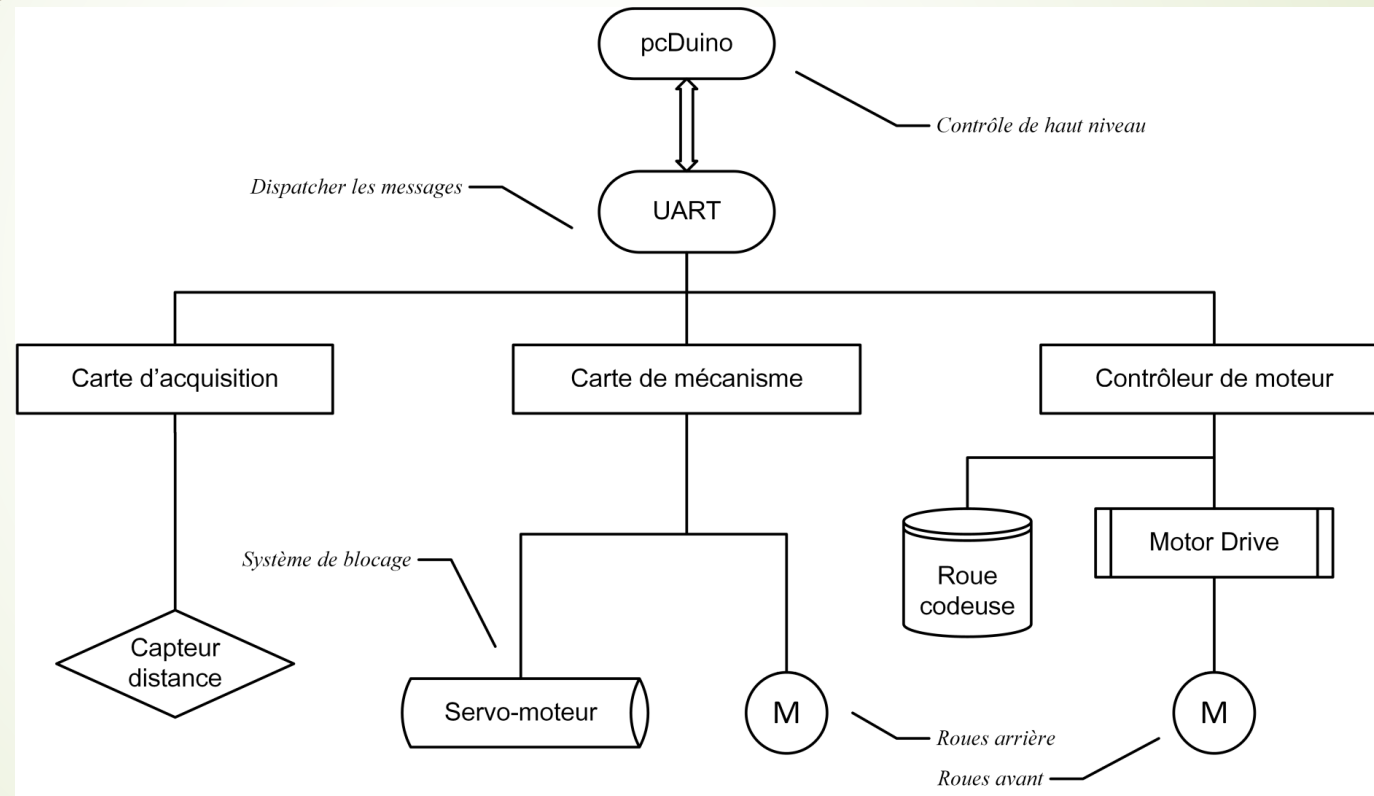
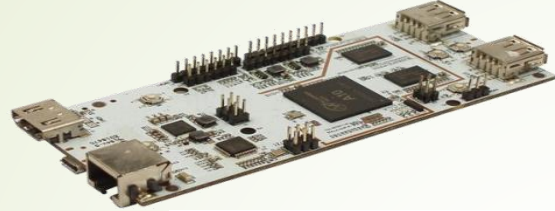


Manufacturing of circuit boards

Soldering

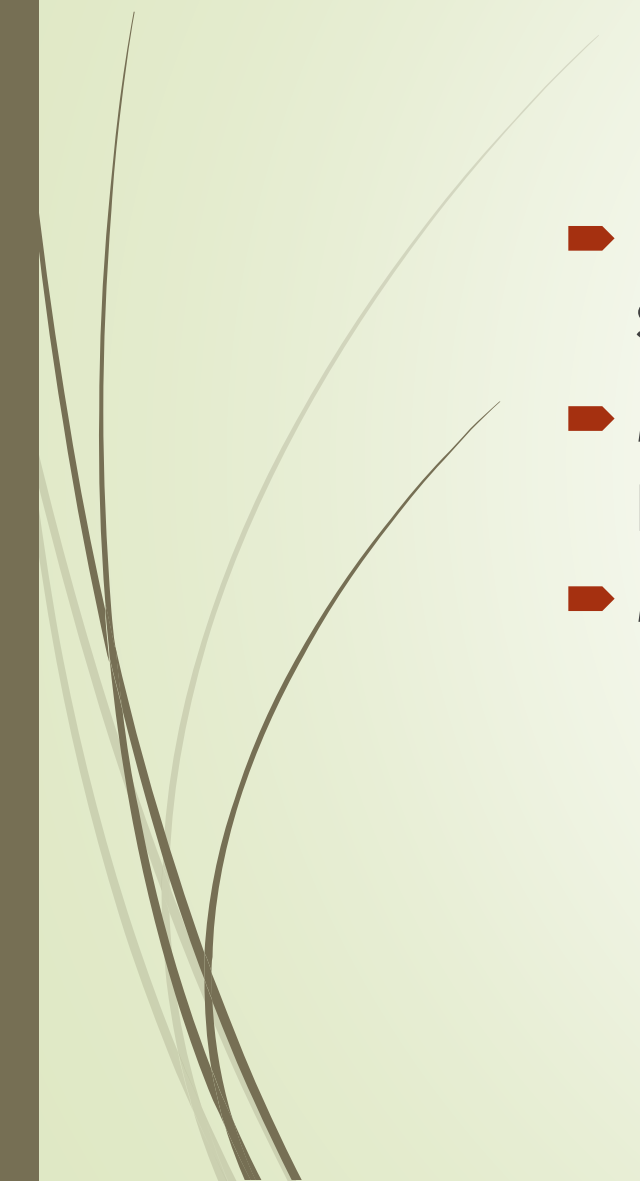


General structure





Mistakes and solutions

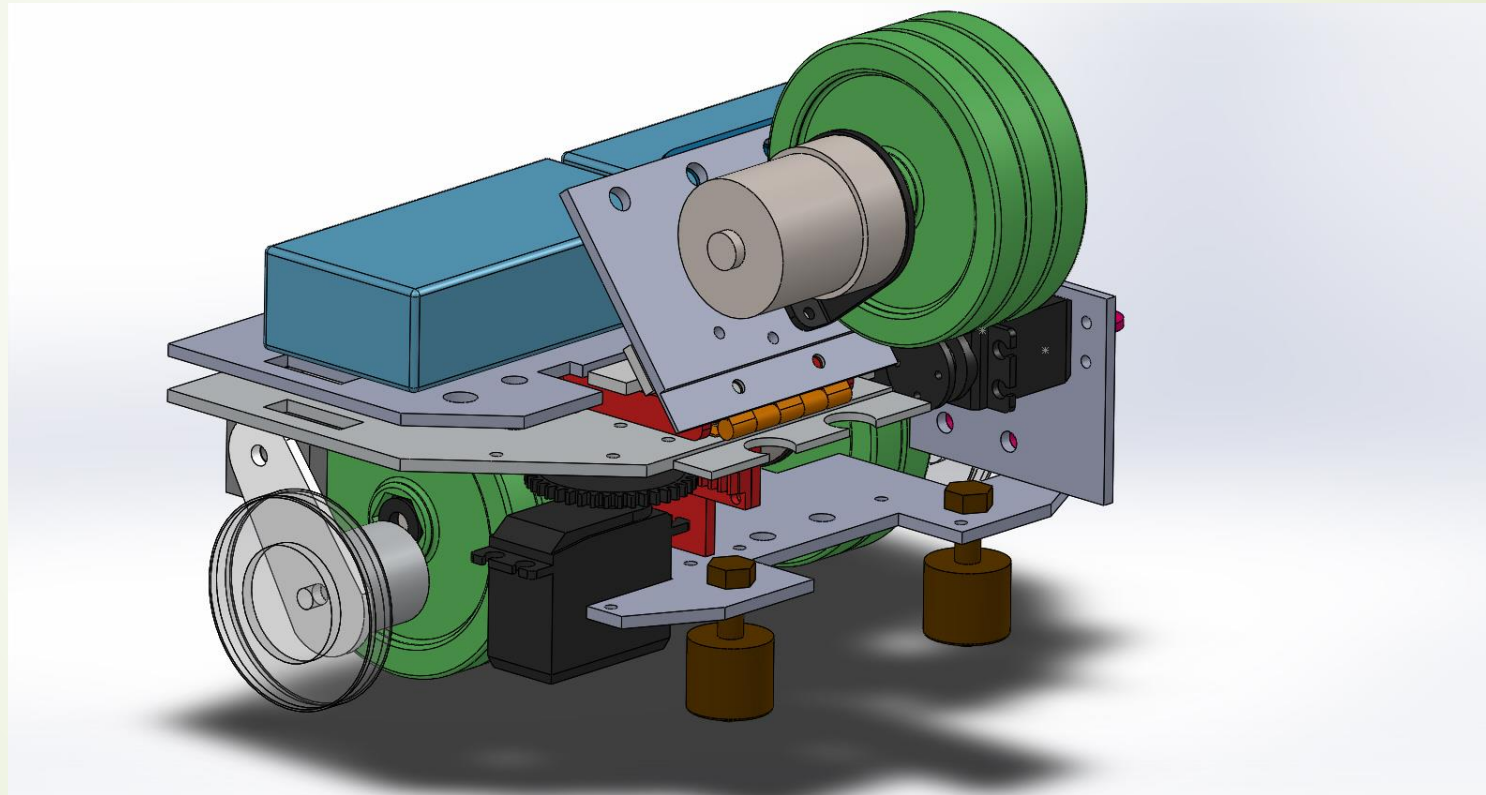
- It is necessary to be particularly meticulous during soldering(short circuits, no contact)
 - Microcontrollers that are not always correctly programmed
 - Manufacturing of circuit boards: correct concentrations
- 



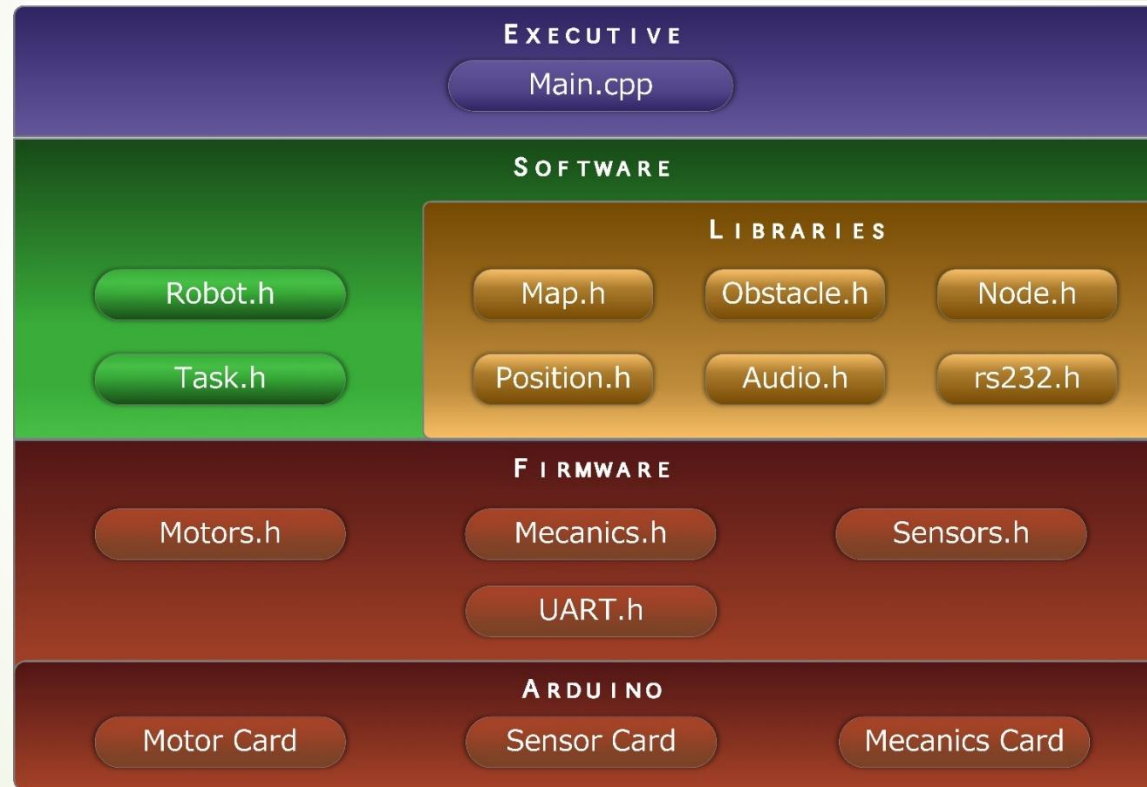
Programming part

Control system and simulation

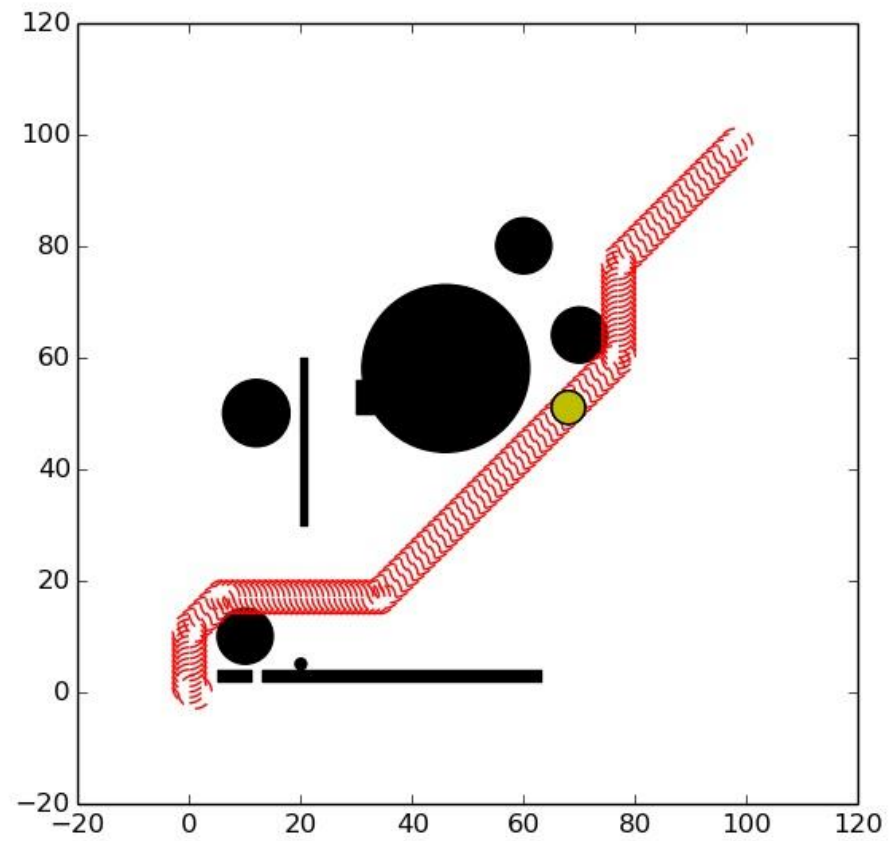
Modeling - SolidWorks



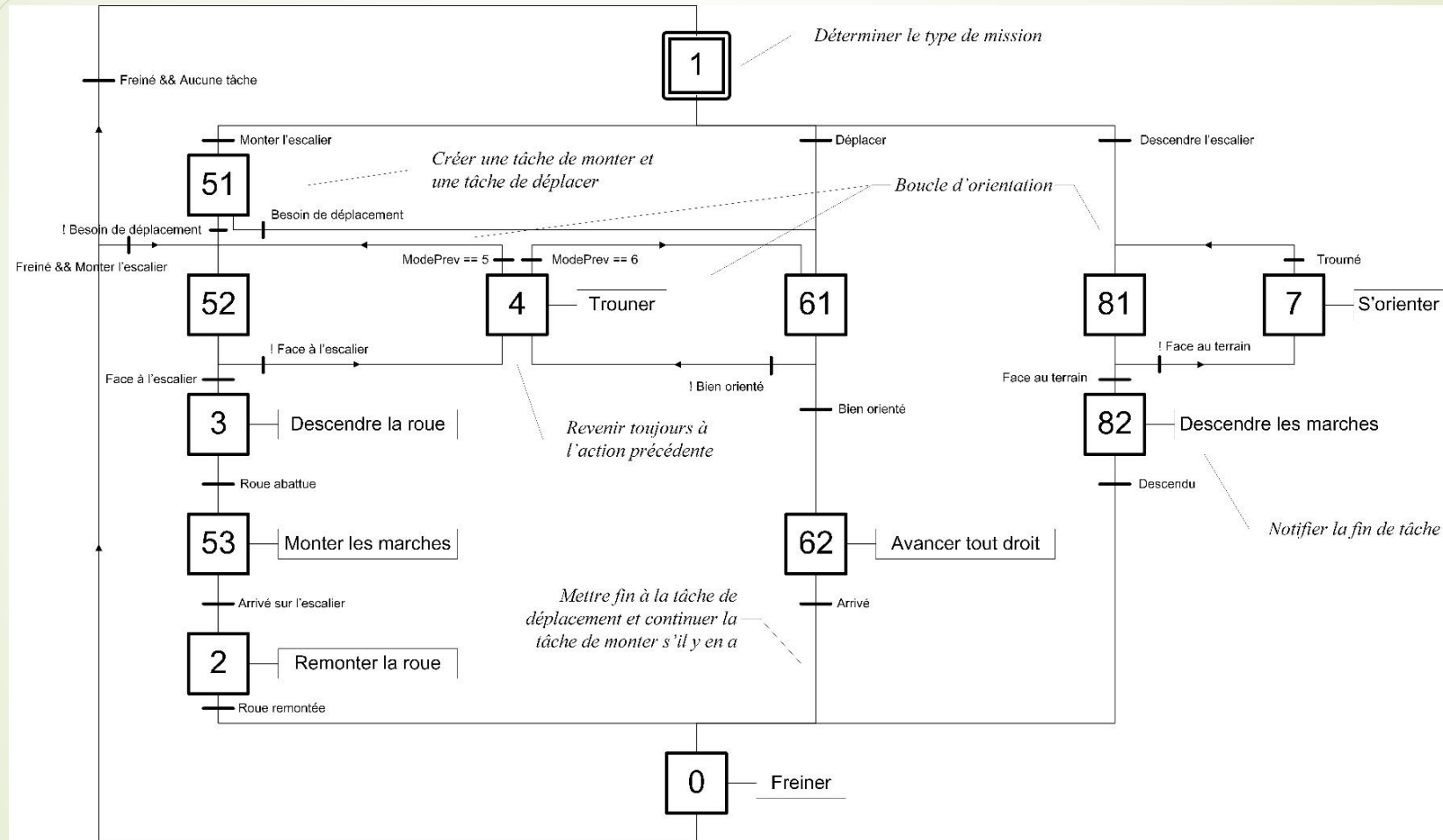
Architecture – modular code



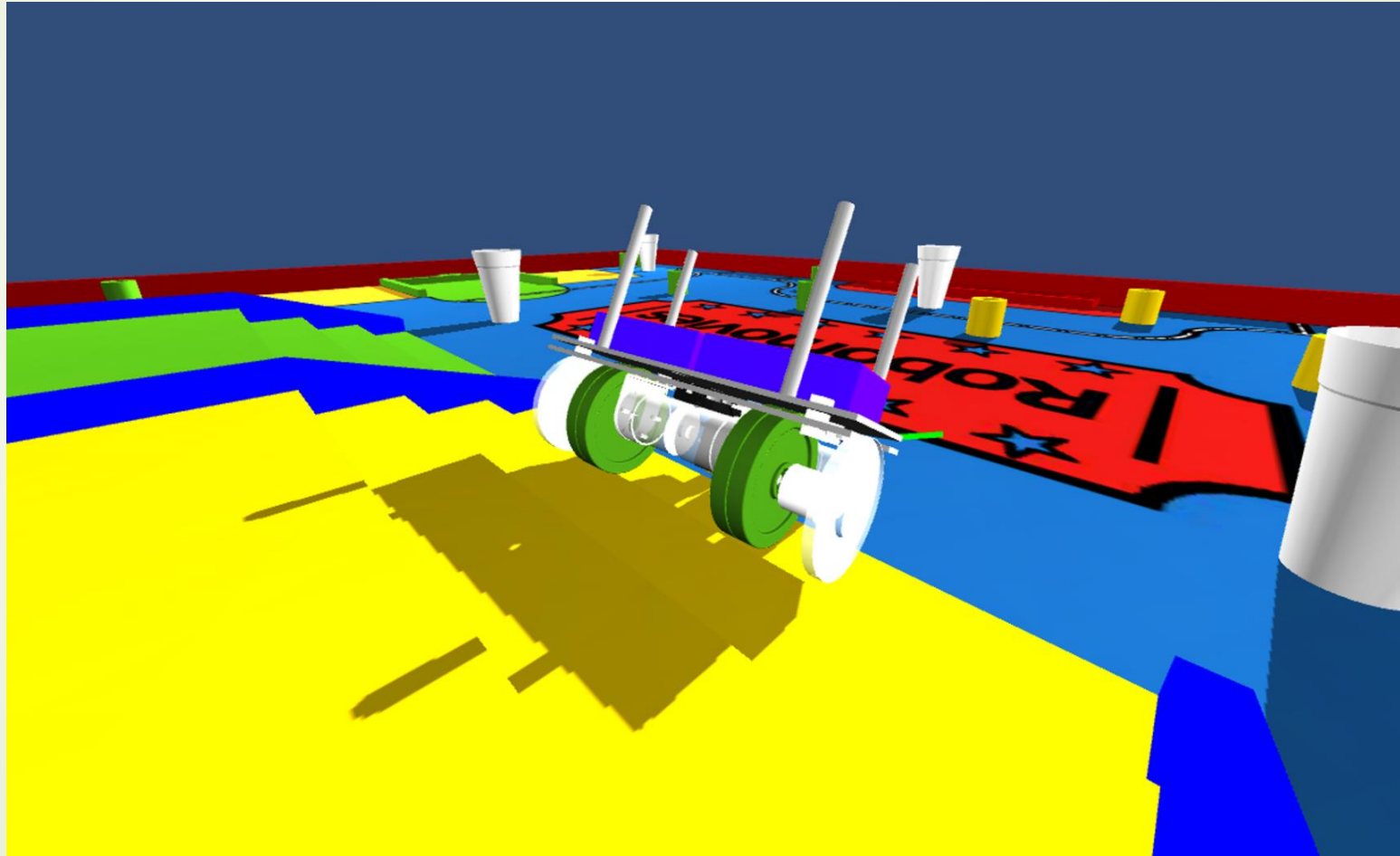
Algorithms



Strategy



Simulation – Unity 3D





In practice

- Add the engine control to the Mechanics class
- Plan the route by hand
- Moving without sensors



Conclusion



Tasks
Get started with hardware, components
Distribute tasks between the two robots
Build prototype of the rolling base
Final version of the rolling base
Design and manufacture the "carpet module"



Conclusion



Tasks
Manufacture circuit boards Program basic control functions
Determine the general structure of the program
Program all control functions
Add the sensor system
Calibrate task execution programs Compare different algorithms
Adjust the system to actual scenarios