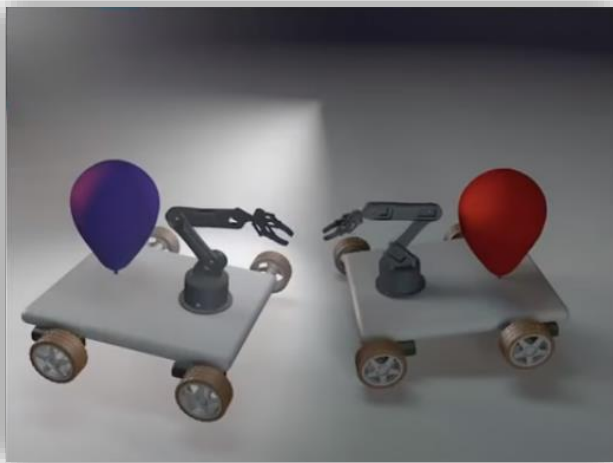


Industrial Operation File

CATCHING ROBOT



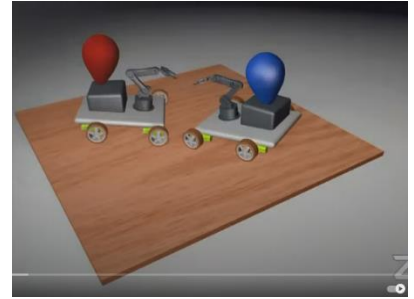
2021 SUMMER
2021/7/8

Abdullah Adnan Jahri
Industrial & Systems Engineering
(Individual Work)

SmartMethods
الأساليب الذكية

Operation:

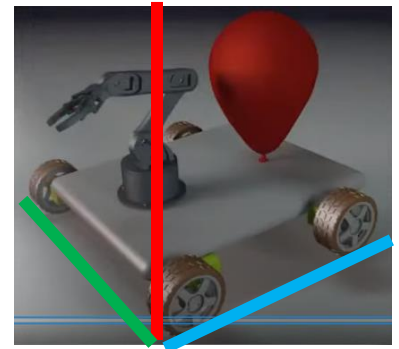
In this project we want to make a friendly competition by using two catching robots and a battle ring. The robot containing a base with wheels and a robotic arm, and a balloon attached at the base. The goal of this competition is the first robot that will explode the opponent's balloon with out getting out the ring will win. So, the robotic arms will be combined with any sharp tools like knives or needles. The controlling of the robots will be full remotely by a website. We insist in this competition that the players who control the robots will not be at the same location as the competition.



Robot dimensions:

The dimensions of the robot were studied to be ideal for this competition and taking into account the dimension of the robotic arm and the electronic parts.

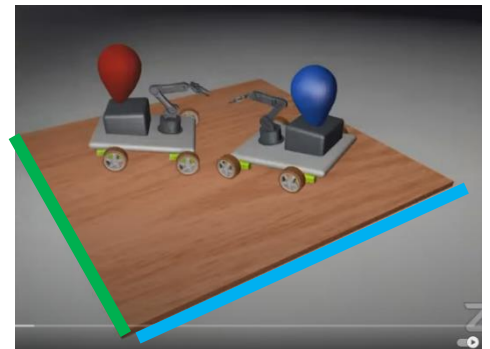
- Height (Y) = 655 mm
- Length (X) = 500 mm
- Width (Z) = 410 mm



Battle ring dimension:

The dimensions of the ring were measured to be fit for the movement of the robots around each other and be perfect for the competition.

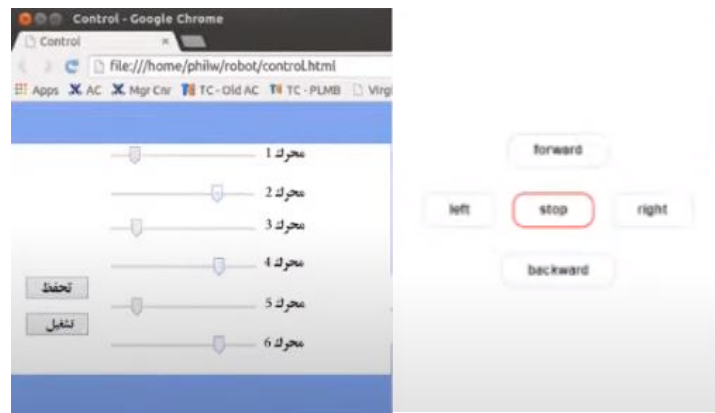
- Length = 1.5 m
- Width = 1.5 m



Operating rules:

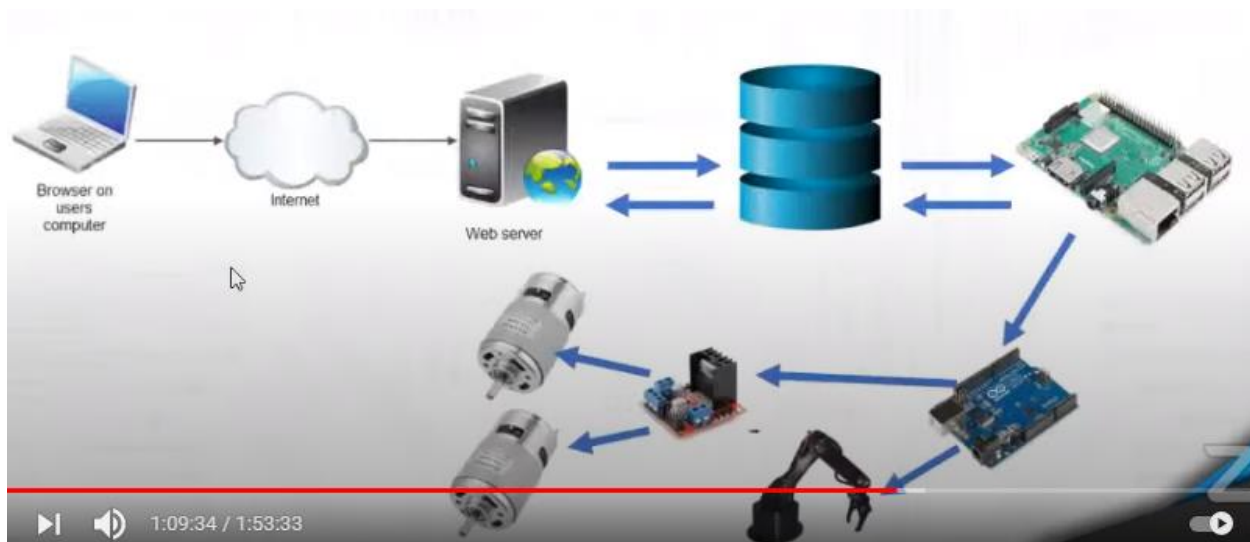
- The players who controlling the robots must not be at the same location of the competition and the controlling will be remotely.
- The first 10 seconds of the battle the robots should wait and does not move.
- Not allowed to attach any fire or electric weapons to the arm for safety concerns.
- The balloon should fill with the same size of air in the two robots.
- If the robot gets out of the ring more than 3 times will lose the match.

Control panel:



The control of the robot will be remotely by a website developed by IoT engineers. In this website we will control each engine in the robot and turned it on or off by clicking a button. We can control the power of these engine also by a slider. Also, we have five essential buttons for controlling the directions (forward, backward, right, left) and we have a button in the middle to make the robot stop moving. So, this is a briefly discription to the control panel.

Technical Operational Process :



First of all, IoT engineers will develop a website to let the controlling of the robots remotely from it. The website will be connected to the internet and stored in a web server. Then artificial intelligence engineers will let the website connected with the raspberry pi of the robot and make the robot as intelligent. Now the electronics engineers will handle with the Arduino UNO and connected with the electronic arm and the motor driver (H bridge). The motor driver will be connected with two DC motors.

Testing:

Unit Testing	
Arm: motor 1	Works without any problems.
Arm: motor 2	Works without any problems.
Arm: motor 3	Works without any problems.
Wheels: motor 1	Works without any problems.
Wheels: motor 2	Works without any problems.
Wheels: motor 3	Works without any problems.
Wheels: motor 4	Works without any problems.
Electric circuit	Works well and located in perfect area.
Website	Works fine with no bugs.

Integration Testing	
Electronic arm	Works great and all the motors fine.
Base	The DC motors in the wheels works well and the electric circuit works great and located at perfect area at the base
Website	Works without any technical problems

System Testing	
Electronic arm	We tested the system of the arm and tried to control it by the website, and it seems that all the motors works fine and the movements are great.
Base	We tested the system of the movements of the wheels. The tests shows that every motor works well and the electric circuit also have no issues.

Performance Testing	
Load Testing	The robot loads a max of 450 Volts.
Stress Testing	We tried to test the stress of the robot by making to robots fight each other and our robot stand to the third match and then broke down.
Scalability Testing	We tested the website too many times to avoid any issues can appear in controlling our robot and we believe that the system might improve more.
Stability Testing	We tested the stability of the robot in several conditions like hot and cold weathers also rainy. The robot can't handle the extreme rainy weather.

Usability Testing
First we tried to use the interface website to control the robot to be honest we faced a little difficulty in controlling the robot in some movements like turning around another robot. We see that the website interface is alright but you should practice to get used to it.

Compatibility Testing
We tested all the parts of the robot in the previous tests from hardware and software. We can say now the robot is completely ready for the competition.

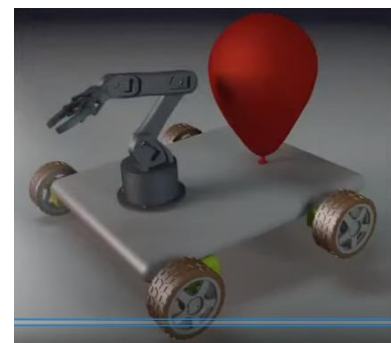
Tolerance:

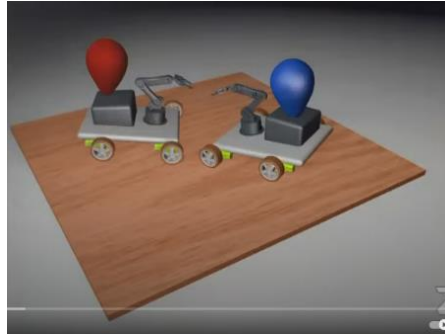
Mechanics	<ul style="list-style-type: none">• Mistakes in dimensions• Bad quality• Too heavy• Too light• Wrong assembly
Electronics	<ul style="list-style-type: none">• connecting the circuit incorrectly.• Excessive voltage.• Using wrong parts in the circuit• Bad batteries.
IoT	<ul style="list-style-type: none">• No internet.• Incorrectly coding• Crash server• Security risks.
AI	<ul style="list-style-type: none">• Delay of response.• Wrong detection.• Fail in synchronization.• Libraries not installed.
Industrial	<ul style="list-style-type: none">• Bad management• Incorrectly writing reports.• Loss control• Disorganization.

User Manual:

How to run the robot:

The robot comes in separate parts, body and wheels and arm and balloon. You will begin to assemble the wheels to the corners of the body and the arm will be on the upper surface of the body. Then you will fill the balloon and put at the back. So, the final shape will be as the picture. To control the robot, open the interface website and put the code of the robot that provided with the package and now it is ready to use.



Competition instructions:

The target of this competition is that the first robot explodes the balloon of the opponent will win the round. The match has 5 rounds each round 10 min. The robot that getting out the ring 3 times in a round will loss the round.

Warranty:

The warranty of the robot is 1 year only because this robot is for competitions and battles and can not stand long life also because the weather in Saudi Arabia not preferable to these robots.