JULY 2021 | Fantastic Group | Roaa & Lujain
& Fantastic group members

INDUSTRIAL SCENARIO

Script for multi-purpose humanoid robot

OPERATIONS

FIRST OF ALL ...

This robot is **component** of 3 parts:
1- The arm.
2- The Ballon.
3- The body,whitch contains the wheels & the base.
And ofcourse we have the battlefield..
We will give more details in incoming parts.

The **target** of the robot is pop the balloon :

We gonna reach the target by make 2 robots fighting through the sharp arm which made by the **Fantastic** mechanical engineer ..
And operated by the **Fantastic** electrical engineer ..
Then It is programmed and controlled by **Fantastic** engineers in IOT & AI ..
Finally all these processes are followed-up and managed by **Fantastic** industrial engineers in the team .

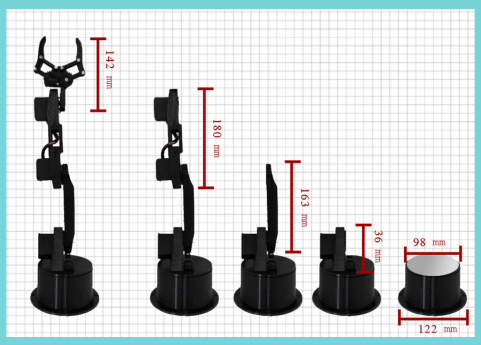
The **tools** are 3D printing to manufacture the parts and we will use aurdino and servos to operate the robot ..
We will also use web-programing langueges to control and linkage the parts.

OPERATIONS

1-ROBOT DIMENSIONS:

This robot is **component** of 3 parts:

1- The arm.



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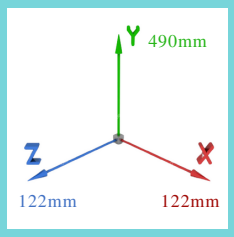
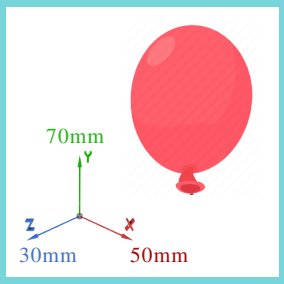
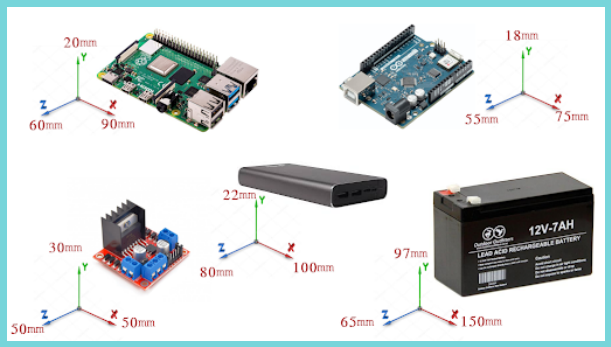


2- The Ballon.



3- The body,whitch contains the base, the wheels & the motors.



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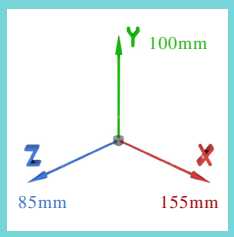
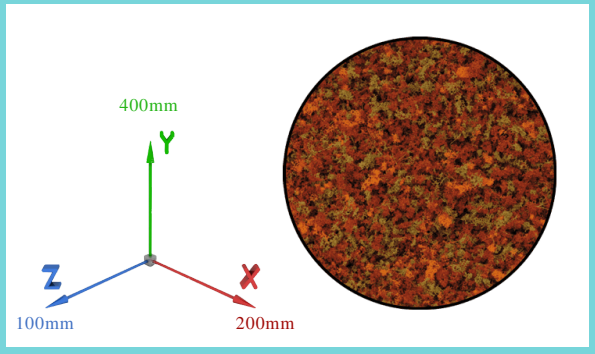


2-BATTLEFIELD DIMENSIONS:



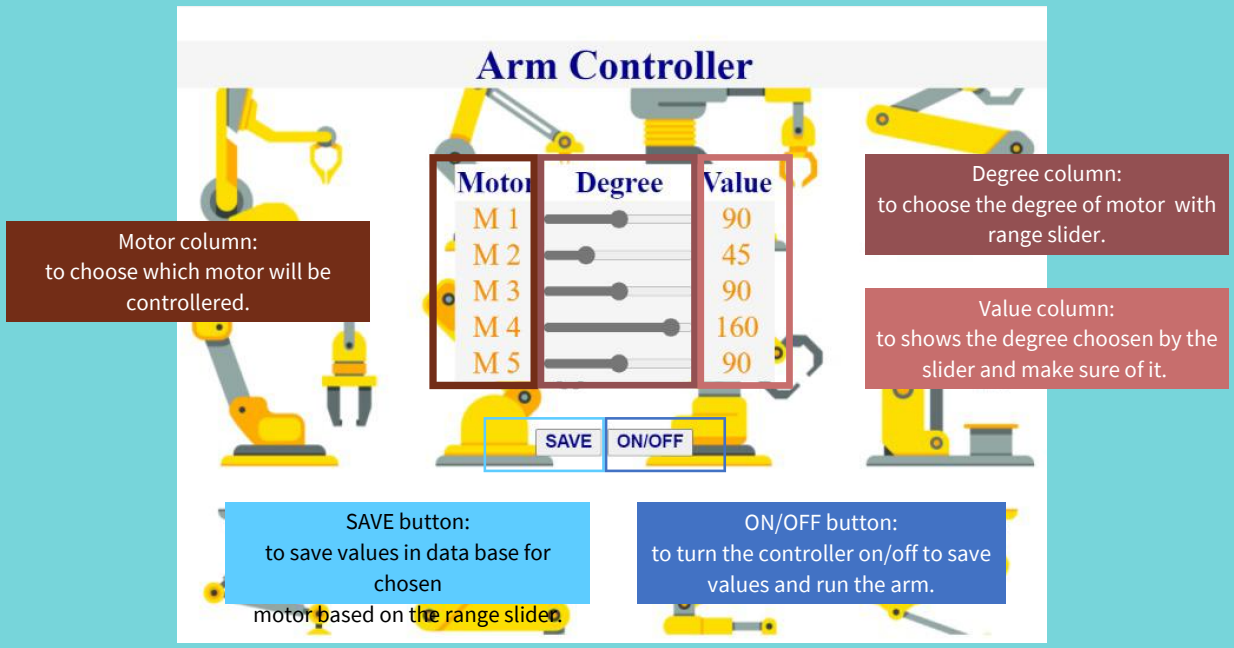
OPERATIONS

3-OPERATING RULES:

It will be ..

1- Wait for the green lights.
2- Never step/jump over the guardrail.
3- ROBOTS, stay on the FIELD during the MATCH.
4- Players, stay off the FIELD during the MATCH.
5- No wandering during the MATCH.

4-CONTROL PANEL:



5-TECHNICAL OPERATION DETAILS:

Here the circuit has been designed to be composed of a 12V DC voltage source, a 5V DC voltage source, a microcontroller (Arduino Uno), L298n motor driver, two DC motors and a joystick to control the speed and direction of the motors. Moreover, the 12V battery is a rechargeable battery (Varicore). This battery is light and has a long lifetime. The recharging circuit is included, all these parts are connected and take values from database based on the degrees that taken from the control panel, that taking a place on the server.

TESTING

-UNIT TESTING:

The Part	Result
Arm: Motor1	It works fine.
Arm: Motor2	It works fine.
Arm: Motor3	It works fine.
Arm: Motor4	It works fine.
Arm: Motor5	It works fine.
Balloon	The distance between the arm and the balloon is excellent, so that the arm can pop the balloon.
Body: Base	The dimensions of the base and its area are good and fit with the dimensions of the arm and the location of the balloon , as well as suitable for the size of the wheels.
Body: Wheels	We have four wheels that I tested individually and they all work great.

-INTEGRATION TESTING:

The Part	Result
Arm: Motors	In the first stage I tasted each motor separately and now I'm trying to test them all together and result was positive because all the motors work perfectly.
Balloon	As we mentioned in the previous part, the distance between the balloon and the arm is excellent so that the arm can reach the balloon easily and pop it, in addition to the fact that the balloon is well fixed so that if there is wind the balloon does not fly
Body: Base	At this stage, I collected all the base engines and tested them with each other and found that all of them work perfectly, in addition to that they endure for a long time.
Body: Wheels	All four wheels work well and excellent in addition to that they can bear the weight of the arm and the balloon well and can walk long distances.

TESTING

-SYSTEM TESTING:

It has two stages, which are shown in the following table...

The Arm	Result
System testing on arm motors:	It has no defects and works perfectly, also there is no slow movement, on the contrary, it works quickly and regularly as well.
Body	**Result**
System testing on base motor:	We have four wheels that I tested individually and they all work great.
In the end I tested the system on both arm drives and base drives, and from the beginning of the test to the end of the test, I did not find any glitch or error.	

-USABILITY TESTING:

I came with another robot to test the use of the robot and its movement, I drew a movement for the robot so that after 10 minutes of launching the robot it goes and turns around the other robot and moves the arm, and the robot succeeded in that, but I was not satisfied with that, but I brought several other people to do this test and the robot succeeded in all tests.

-COMPATIBILITY TESTING:

At first I tested all the parts of the robot in detail, then gradually I started to collect the parts and test them with each other, and finally and in this part I tested the robot completely with each other “with its software and non-software functions” and everything went well and there are no comments.

T E S T I N G

-PERFORMANCE TESTING:

It comes in four stages, which we will separate mow...

***Load testing** "withstands power up to 500 Volts and the arm doesn't break until after a great effort with three arms ".

***Stress testing** "The robot was tested under very high pressure, at first it was working fine, but with the passage of time specifically
after the sixth test, the robot became slowly working and then the arm broke, meaning that it could not withstand more than 500 volts".

***Scalability testing** "I came with another robot to measure the extent of my robot's scalability, when the first robot the other my robot held, then I decided to make it two robots and also my robot held, then after that I made it three robots and my robot held, but on the fourth robot my robot broke and no longer It works, that is, the robot can expand to three other robots ".

***Stability testing** "The robot underwent several different tests under different conditions,I tested it with four robots,I also tested it with several circuits,even the environmental climate was changing and I tested it in extreme heat and in extreme cold,all in order to measure the stability of the robot,and I found that The robot can work under different and harsh conditions,but in extreme heat and in extreme cold, the robot cannot bear that,that is,it works under a temperature of up to 50 degrees Celsius as a maximum and also cannot withstand more than 3 robots, also tested the distance "The robot can Endurance up to 10 km".

-ADDITIONAL TESTING PROJECT:

I built another robot with the same strength and size as mine, I made them fight nonstop, the struggle continued for several days but after 7 days both robots broke down and did not work, then I brought another robot but with a bigger size and greater strength, and I made them fight in the same way as the first, the struggle continued For several days, but after 4 days, my robot was the one who broke down because of the great force in the other robot, and from here I found the defect in my robot, and I have to increase the power of the robot's motor to make it work better and stronger.

TOLERANCE

If we determine the tolerance it will make the process easier by making us ready for any risk, and the good tolenace table will increase the efficiency.

MECHANIC

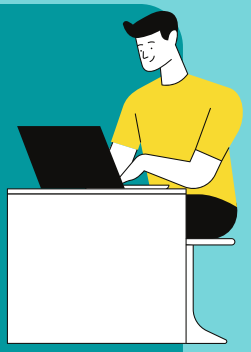
1- Dimensions difference.
2- Difference in weight.
3- Low quality of pieces.
4- Use pieces with excessive force.
5- Different places or number of wheels.
6- Missing pieces.
7- Heavy parts.
8- Erosion of the bearing.
9- Assembly incorrectly.
10- Using the robot for too long.

ELCTRONIC

1- Red flag errors in the code.
2- Connecting parts incorrectly.
3- Applying a voltage to the motor driver.
4- Applying excessive voltage to power the Arduino board
5- High DOF might pop your ballon.
6- Applying wrong voltage.
7- Wrong rotation because of polarity switched.
8- Using wrong motors.
9- Using wrong wires.
10- Using loose wires or soldering.

AI

1- No such file or directory.
2- Libraries not installed.
3- Wrong detection.
4- Versions not synchronized.
5- Difficult names of files.
6- Change files directory.
7- Wrong file linking.
8- Duplicate files.
9- wrong libraries names.
10- Delay of response.



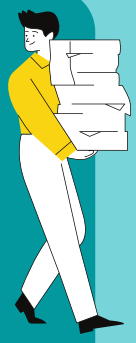
TOLERANCE

IOT

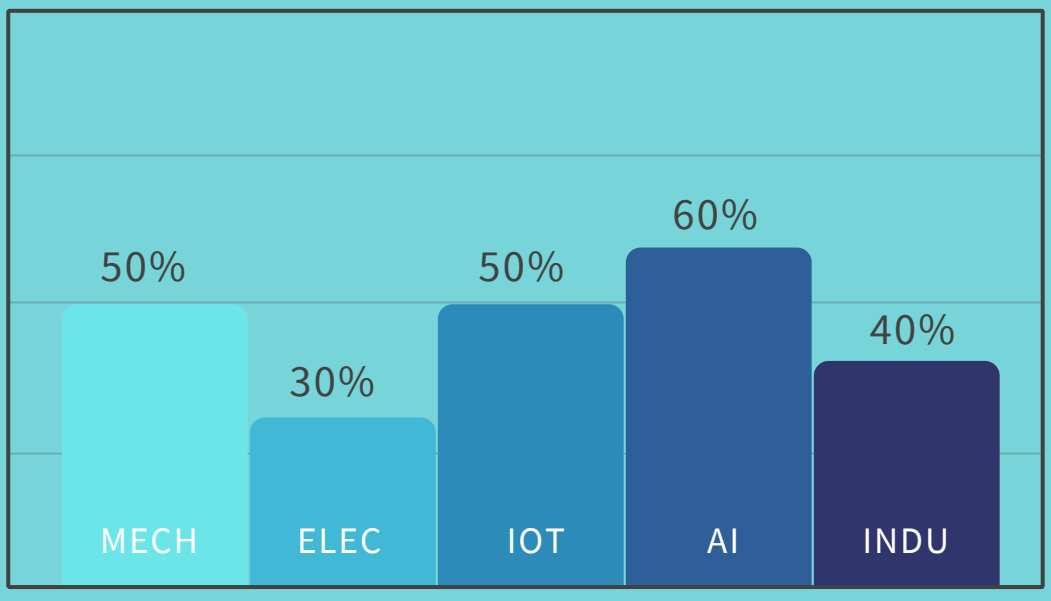
1- No internet connection.
2- Incomprehensible interfaces.
3- Lack of query performance.
4- Too delay time for response.
5- Viruses and Cyber Hacking.
6- Lossing data.
7- Website traffic overload.
8- Crash server.
9- Security risks.
10- Fail connection to DB or API.

INDUSTRIAL

1- Lack of regular follow-up.
2- Not writing properly.
3- Urgency.
4- Incompatibility between members.
5- Disorder of ideas.
6- Disorganization.
7- Difficult dates for some members.
8- Improper management.
9- Loss control.
10- Lack of time management.



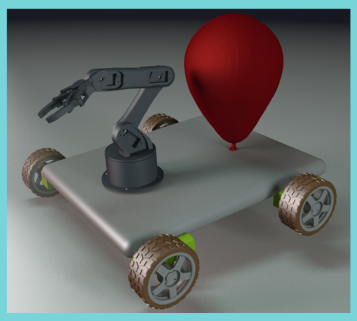
Analyses the tolerance and shows which errors are maybe repeating make the process continue easier, faster and clearer for engineers.



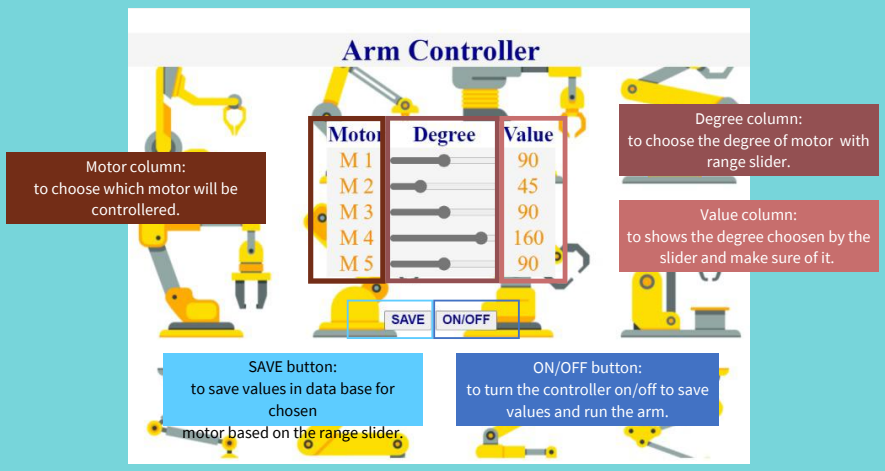
USER MANUAL

1-USER MANUAL TO RUN ROBOT:

It will come in 3 parts: the body which contains motors and wheels, the arm and the ballon.
First you will assembly the wheels in the bod, then put the arm in the front of the body and the ballon in the back, finally you will get the full robot.
It should be like this:



To control the robot you will have a small piece like USB plug it into your laptop, you will see this controller :



Now that you have learned how to install and control the robot, you can operate it as you like.

Warning: This robot has sharp arm and pieces, be carful.
and also has electric waves, use adults.
Keep it away from children.

USER MANUAL

2-USER MANUAL TO THE CONTEST PARTICIPANT:

First of all as long as you are here you should know that you have instructions to follow, read it carefully..

Your **target** is popping the other robot's balloon, by controlling the sharp arm through control panel that already installed on you device.
In this competition we have 3 rounds and the duration of each round is 15 minutes, between each round and a 5 minute rest period, who reach the target first will get the point and go to next round.

award details will be presented by hosts.

WARRANTY

The warranty is for one year, because of the geographical location of our country, our environmental climate is very hot, and based on this, the internal parts of the robot cannot withstand extreme heat and even extreme cold, and this statement was proven based on the numerous experiments that I conducted on the robot.