Competition Robot

INDUSTRIAL OPERATION FILE

PRESENTED BY: SMART METHODS – شركة الأساليب الذكية

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1. OPERATION

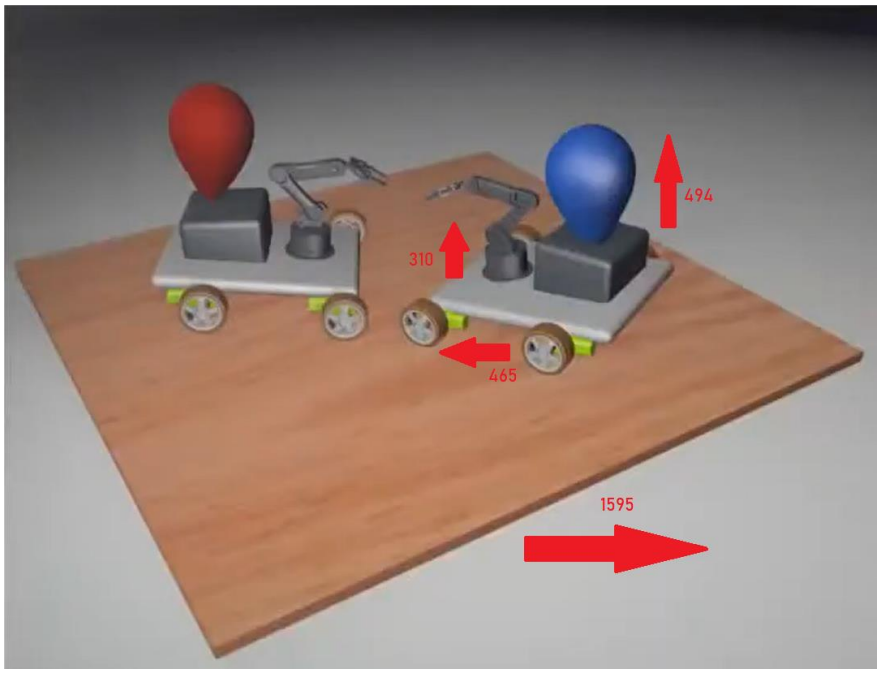
This project is about a competition robot, which has main components which are: base, arm, and balloon. this robot supposed to compete against other robots - rival -, and the winner is the one who can pop the balloon of the rival robot first. Humans will control their player robot remotely by using a control panel interface.

1.1 ROBOT DIMENSIONS

As for the dimensions, it depends on several elements, its dimensions will be between 300 x 230 x 280mm to 494 x 465x 310mm.

1.2 PLAYGROUND RING DIMENSIONS

It should be wide enough to move two robots at the same time comfortably. So, the size of the competition arena will be between 1395 mm to 1595 mm square shape.



1.3 COMPETITION RULES

There are some rules for the competition that players must follow, or the players who break these rules will be disqualified from the competition.

-Players must be far away from the competition area at least a meter.

-No physical or verbal violence between competitors.

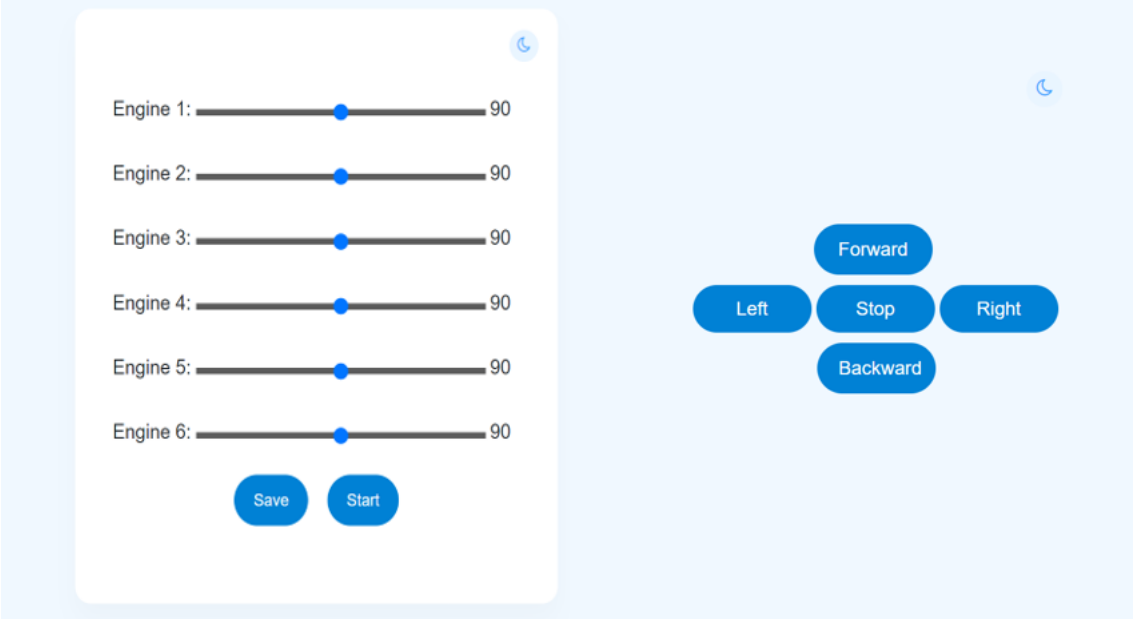
-Prevents the robots from moving in the first 10 s from the start of the round.

-If the two balloons pop at the same time, another round held to determine the winner.

-Any robot that deviates from the competition arena will be disqualified.

1.4 DISCERPTION OF CONTROL PANEL

The control panel interface is the main way to control the robots during the competition. The control is based on two important components: the base to move the robot through the arena, which include a button to determine the direction of the robot's movement. and the arm to aim to pop the balloon of the rival robot by giving each joint the angle magnitude to move using a slider.



1.5 DETAILED DESCRIPTION OF THE OPERATION

The operation starts when the user sends data from the control panel to the cloud to send a request to the server to reach the database, then the single-board computers will retrieve data from the database and send it to the control unit. Now the control unit either controls the arm which is connected directly to it or sends the data to the driver which will control motors to move.

2.TESTING

This section will show the testing phase the team is going to implement to this robot project.

2.1 FUNCTIONAL TESTING

Unit testing:

Unit	test
Arm:	
Base motor	Each unit of the arm is going to examine alone, the team will try to move each joint at all possible angles, continuous movement, to measure the capability of each motor.
Shoulder motor	
Elbow motor	
Wrist motor	
Gripper	
Base:	
Motors on each wheel	the team will try to move each wheel motor, continuous movement, to measure the capability of each motor.

Integration testing:

Unit	Test
Arm	here the team will try to examine the arm as a whole unit, try all possible positions the arm can make in a continuous movement
base	continuous movement in all possible directions

System testing:

Testing will be a rehearsal which will start by sending data from control panel and monitor the performance of the entire robot.

2.2 NON-FUNCTIONAL

Performance testing	Load testing	give more than one request at time
	Stress testing	send a continuous request
	Scalability testing	monitoring the response time between sending the request and moving the parts of the robot
	Stability testing	examine stability for more than one position
Usability testing	give the control panel to end users to try the interface	
Compatibility testing	monitor the compatibility between all the component of the robot in a real environment	

3. TOLERANCE

The table will show each part of operation and the expected down that could happened.

Part	expected down	To be fill by engineers
Brower on user computer	Network disconnection	
Internet	Network traffic	
Web server	Overload on the server Port disconnection	
database	Disconnection Duplicate value Slow query execution	
single-board computers	Disconnection to control unit some dependencies have not been installed	
Control unit	Damaged in some pins	
Arm	Some joint not connected properly	
Driver motor	Disconnection between driver and motors	
motors	Incorrect connection get damaged	

4. USER MANUAL

4.1 ROBOT IMPLEMENTATION USER MANUAL

Start by ensure of the connection between all element and electronics, then switch on the controller. now you can control the robot using the control panel interface.

4.2 USER MANUAL WHO PARTICIPATES IN THE COMPETITION

Competitor should position his robot away from edge of the ring by 1395mm and switch it On, then prepare a device that is connected to the internet to browse the control panel. Wait for competition to start and remember to follow the rules.

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5. WARRANTY

Customers can get the robot and its parts only after being subjected to the quality controls, and tests to certify its capabilities and performance.

However, normal handling or operation will be repaired free of charge during the warranty period, which is 24 months begins from the date of purchase based on our examination and tests results.

but in some cases, customers will be charged for repairs even during the warranty period. such as damage caused by improper use, damage caused by improper adjustments, or attempts to repair, Damage caused by natural disasters.

For more information, please feel free to contact Smart Methods using:

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