

Robotic Arm Project

- **Project Idea:** Manufacturing a Robotic Arm with a specific design which is programmed to participate and win in the Robotic Arms competition. The concept of the competition is putting two Robotic Arms in the ring with a balloon behind each Robotic Arm. Each Robotic Arm will try to destroy the balloon of the other Arm while protecting its balloon.

- Project Plan:

1. Starting Stage:

Getting ready for the project by gathering all the team members and discussing the mechanism of the project. Also getting all the required electrical and mechanical parts for the project.

2. Mechanical Design Stage:

Designing and putting the Robotic Arm parts together by using Cinema4D or SOLIDWORKS programs or any 3D program while making sure to design an appropriate **End Effector** and adding a new **Degrees of Freedom** to the parts of the Arm.

3. Printing Stage:

Printing the required parts which has been designed by the Mechanical Designer using an **ABS 3D printer** and assembling them.

4. Programming Movement Stage:

Building an electric circuit with one main goal which is moving the Arm.

5. Remote Controlling Program Stage:

Building up a user interface and a programmed data base to remote control the Robotic Arm.

6. Artificial Intelligence Program Stage:

Implementing the Robotic Arm on the Simulation program (**ROS**) to control the motors by simulation.

7. Finishing Stage:

Assembling all the remaining parts and making sure the all stages have been completed, and delivering the Robotic Arm to the costumer.

Distribution of Tasks:

The Mechanical Designer:

- A. Getting all the shapes of the required parts from Smart Methods account on **GitHub**. Then assembling it to **Initial Position**.
- B. Designing an appropriate **End Effector**
- C. Adding a new **Degrees of Freedom** to the parts.

The Electronics and Power Engineer:

- A. Building up an electrical circuit which can control 5 Servo Motors.
- B. Programming the electrical circuit to put all the motors on the **Initial Position** (90 Degrees).
- C. Programming the Servo Motors to be moved by the usage of changeable resistance.

The Software Engineer:

- A. Building up the user interface which will control the motors.
- B. Building up the data base which will apply the user interface orders.
- C. Connecting between the data base and the user interface by using any available programming language such as **JS**.
- D. Building up **PHP pages** to connect the data base with the hardware.

The Robot and Artificial Intelligence Engineer:

- A. Getting the **Robotic Arm Package** from Smart Methods account on **GitHub** and running it on **ROS**.

The Industrial Engineer:

- A. Leads the whole process from the first stage until the costumer receives the Robotic Arm.

- Project Timeline

[illegible]

- Production Line

1. Forming:

It will be printed by **ABS 3D Printer**.



2. Assembling:

Then it will be assembled **Manually**.



3. Packaging:

After that it will be packaged in a **Rigid box**.



4. Final Program:

The costumer can run the Arm by attaching It's **USB to any device**.