

MECHATRONICS PROBLEM STATEMENT



Robotic Arm Control:

Build a mechatronic system to control a multi-degree-of-freedom robotic arm. The arm should be capable of precise movements in 3-Dimensions.

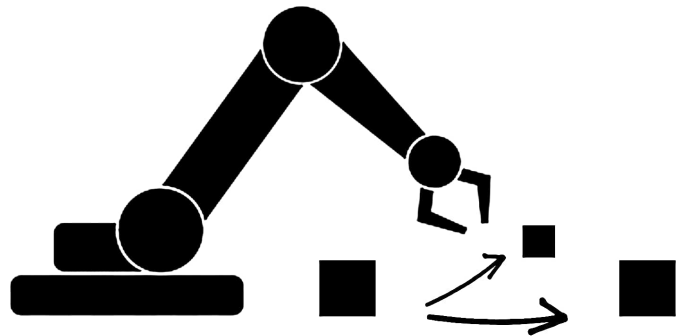
Multi-degree-of-freedom may include the X,Y,Z movements along with rotations.

You have to make the bot **physically** or in **3D-simulations** like in SolidWorks or in Matlab or other preferred softwares.

BASE PROBLEM:

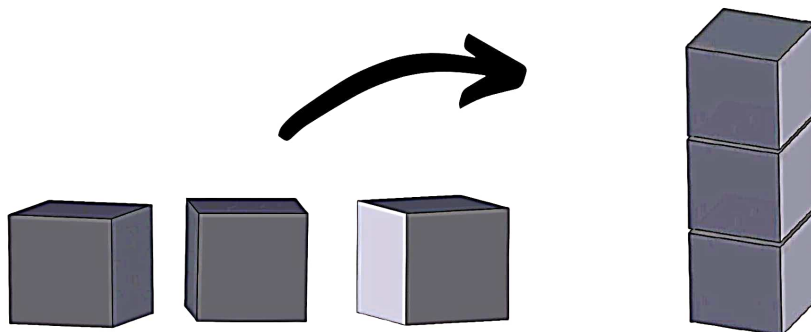
The Arm should be capable of moving a box of dimension 5cm×5cm×5cm from a plane to another region of that plane.

Participants should optimize their design such that the multi-degree-of-freedom is achieved by using the least number of motors or joints.



BONUS PROBLEM:

In front of the Robotic Arm there should be 3 to 4 boxes of above mentioned dimensions. The Robotic Arm should be capable of stacking the boxes one upon the other. Some of the boxes cannot be in right orientations i.e. they can be rotated, so the Arm should rotate them respectively and stack them in a same side



You have to make the bot **physically** or **Simulate the mentioned situation in 3D-simulation** like in SolidWorks or in Matlab or other preferred softwares.

PLACE FOR INNOVATIONS:

Participants are allowed to use innovative ideas over the base problem.

Innovations may include use of different **sensors and cameras** and implementing AI-ML to recognise the boxes automatically or designing a good web server through which we can control the Robotic Arm with **feedback** etc. Optimizations taken to reach proper **accuracy**, power consumption etc.

CONSTRAINTS:

Box dimensions: **5cm×5cm×5cm**

Dimension of the Robotic Arm: **There are no fixed Restrictions on Dimensions.**

Participants can use any **material** for building their Robotic Arm.

Any **power** supply and any microcontroller or microprocessor board can be used.

Any **motor** can be used like BO motors or Stepper Motors or Geared Motors etc.

RULES:

You have to make the Robotic Arm physically or in 3D-simulations.

Participants will be scored according to:

Base Problem (0-100 points)

Bonus Problem (0-50 points)

Innovations (0-50 points)

Submit a report which should contain the followings:

You have to make the bot physically or in 3D-simulation.

1. Full description such as, model design, hardware and software working, electronics used, circuit schematics, power management, etc.

2. Optimizations taken to reach proper accuracy, power consumption.
3. Model limitations and places for further improvement.

Participants also have to submit working videos of their model if made physically or in simulations.