

Mechanizo League-Zonal Round PS

Introduction

In this exhilarating competition, the stage is set to show your Creativity through your Robot to demonstrate their prowess in the intricate art of pick and place. The task at hand is deceptively simple yet profoundly challenging - to design, assemble, and use robots that can skillfully identify, grasp, and relocate objects with precision and efficiency.

Note: Lego kits are not allowed in the competition.

Content:

1. Junior Category Problem Statement
2. Senior Category Problem Statement

Problem statement for junior Category

A Team must assemble a wired/wireless robot capable of picking up objects and placing them in target zones to complete the task.

Robot Specifications

- The main robot's body dimensions should be less than or equal to 30 cm X 30 cm X 30 cm (LxBxH), failing which the team will be disqualified from the competition (this excludes the dimension of the gripper but includes wheels). The bot can, however, extend its size once the run starts. An error of ($\pm 5\%$) is permitted.
- The bot must be controlled with a wired/wireless remote.
- Teams can use wired/wireless control mechanisms.
- The dimensions of the remote are not included in the size constraint of the bot.
- The participants are allowed to use ready-made gear assemblies.
- Failing to meet any of the above specifications will lead to immediate disqualification.
- AC power supply will not be provided and cannot be used in the competition.
- Participants may use a MechanoZ Kit or a Similar kit for the mechanical assembly.

Rules

- The maximum number of students per team is 3.
- The potential difference between any two points of ROBOT should not exceed 12V.
- Use of pneumatics and hydraulics is not allowed.
- The final built ROBOT in the arena needs an additional power source, which participants must have.
- The motors should be DC motors of a maximum of 150 RPM.
- Electric tools are not allowed in this competition.
- There should be several mechanical components in the ROBOT assembly.
- Negative marking would be applied for dragging and displacement.
- Teachers and Mentors are not allowed in Arena.
- To participate at the Zonal level, participants must adhere to all rules.
- The robot should weigh no more than 3kg.
- Dimension of the main part of Robot: Height = 30 cm, Width = 30 cm, Length= 30 cm.
- In case of any discrepancy in Scoring or during the competition the final decision will be of the Judges.
- **The rules of this competition are subject to modification by the organizer, so it is advisable to regularly check the website for any updates.**

Scoring and Penalties

The general scoring is as follows:

S.No	Task Completed	Points Awarded
1	Time Score	
	- Completed within 6 minutes	+10 points
	- Completed within 7 minutes	+5 points
	- Completed within 8 minutes	0 points
2	Object Placement Accuracy	
	- Perfect placement	+10 points
	- Near-perfect placement	+5 points
	- Slight deviation from target (Some parts touches the target)	+2 points
	- Significant deviation from target (No part of robot touches the target)	0 points
3	Design and Innovation	
	- Excellent design and innovation	+5 points
	- Good design but lacks innovation	+2 points
	- Basic design with no innovation	0 points
4	Collision/Touches Wrong Area	
	- Robot touches the Restricted Area points	-3 points
	- Two Robots collide with each other points	-5 points
		-5 points for the team that strikes the other robot

	<ul style="list-style-type: none"> - A Robot strikes the other robot by mistake or intentionally 	
5	Object Retrieval and Dropped Objects <ul style="list-style-type: none"> - Smooth retrieval without errors - Requires minor adjustments - Drops the object multiple times 	<p>+ 5 points</p> <p>0 points</p> <p>-1 per drop</p>
6	Miscellaneous	Points assigned based on judges' discretion

Arena Specifications

- The dimensions of the arena are 205 cm X 190 cm (LxB).
- The object dimensions are 7.62 cm x 7.62 cm x 7.62 cm (LxBxH).
- Drop point dimensions are 12 cm x 12 cm (LxB).
- Object weight is less than 100 grams.
- Checkpoints are not available.
- Objects are indicated by squares with numbers 1-4.
- Drop spots are indicated by circles with numbers 1-4.

Note: The above dimensions may vary during the competition

ARENA

Top View



Note: The above pictures are just for representation and it does not resemble the arena.

Gameplay

- This game is played between two teams at once.
- Both robots are initially placed at the starting point.
- The judge starts both robots simultaneously.
- Each robot is assigned one color (Red or Blue).
- Robots must avoid touching the Restricted Area while moving.
- To win, the robot must skillfully pick up all four color-coded blocks from the square region and accurately deposit them into the allocated circular drop locations of the corresponding color.
- Points are awarded based on the following criteria:
- Time Score: Depending on the completion time.
- Object Placement Accuracy: Points are awarded for the precise placement of all four blocks.
- Design and Innovation: Points based on the level of creativity and innovation in the robot's design.
- Collision/Touches Wrong Area: Points are deducted for rule violations.
- Object Retrieval and Dropped Objects: Points based on the smooth retrieval and minimal dropping of objects.
- Miscellaneous: Additional points at the judges' discretion.
- Both teams must finish in the least amount of time feasible while adhering to the rules.

Problem statement for Senior Category

Teams are tasked with designing a wireless **Drag and Place Bot** capable of performing the assigned task of moving objects and arranging them within designated zones. The robot should be pre-programmed and operated using an **Arduino controller**.

Robot Specifications

- The main part of the robot's dimensions must not exceed 30 cm X 30 cm X 30 cm (LxWxH) during the initial inspection, excluding the dragging part but including the wheels. However, the bot can extend its size once the run begins. A tolerance of $\pm 5\%$ is allowed.
- The bot must be controlled wirelessly using a remote/Mobile App.
- Teams are permitted to use Wi-Fi or Bluetooth control mechanisms only.
- The dimensions of the remote control are not counted in the bot's size constraint.
- Participants are allowed to incorporate ready-made gear assemblies in their robots.
- Failure to meet any of the above specifications will result in immediate disqualification.
- AC power supply will not be provided or allowed in the competition.
- Participants may use the MechanzO Kit or a similar kit for mechanical assembly.

Rules

- Each team can consist of a maximum of 3 students.
- The potential difference between any two points on the Drag and Place Bot should not exceed 12V.
- The use of pneumatics and hydraulics is not permitted.
- Participants must provide an additional power source for the final built bot used in the competition.
- Motors used should be DC motors with a maximum speed of 150 RPM.
- Electric tools are not allowed for robot assembly.
- The Drag and Place Bot must incorporate various mechanical components.
- Negative marking may be applied for errors in the dragging and displacement task.
- Teachers and mentors are not allowed in the competition arena.
- To participate at the Zonal level, participants must strictly adhere to all rules.
- The robot's weight should not exceed 3kg.
- Main Part Robot dimensions must conform to: Height = 30 cm, Width = 30 cm, Length = 30 cm.
- In the event of any scoring discrepancies or issues during the competition, the judges will make the final decision.
- **The competition rules are subject to modification by the organisers, so participants are advised to check the competition's official website for any updates regularly.**

Scoring and Penalties

The general scoring is as follows:

S. No	Task Completed	Points Awarded
1	Time Score <ul style="list-style-type: none"> - Completed within 6 minutes - Completed within 7 minutes - Completed within 8 minutes 	+10 points +5 points 0 points
2	Object Placement Accuracy <ul style="list-style-type: none"> - Perfect placement - Near-perfect placement - Slight deviation from the target (Some parts touch the target) - Significant deviation from the target 	+10 points +5 points +2 points 0 points

	(No part of robot touches the target)	
3	Design and Innovation - Excellent design and innovation - Good design but lacks innovation - Basic design with no innovation	+5 points +2 points 0 points
4	Collision/Touches Wrong Area - Robot touches the Restricted Area - 3 points - Two Robots collide with each other -5 points - A Robot strikes the other robot by mistake or intentionally	-3 points -5 points -5 points for the team that strikes the other robot
5	Miscellaneous	Points assigned based on judges' discretion

Arena Specifications

- The outer dimensions of the arena are 205 cm X 190 cm (LxB).
- The object dimensions are 7.62 cm x 7.62 cm x 7.62 cm (LxBxH).
- Drop point dimensions are 12 cm x 12 cm (LxB).
- Object weight is less than 100 grams.
- Checkpoints are not available.
- Objects are indicated by squares with numbers 1-4.
- Drop spots are indicated by circles with numbers 1-4. Note:

The above dimensions may vary during the competition.

ARENA



Note: The above pictures are just for representation and it does not resemble the actual arena.

Gameplay

- This game can only be played between two teams at once.
- Both Robots are initially placed at the starting point.
- Both robots will start at the same time when the judge says.
- Both robots will be assigned one color either Red or Blue.
- The Robots must avoid touching the Restricted Area while moving.
- To win, the robot must skillfully navigate the square region, drag all four color-coded blocks, and precisely place them into the allocated circular drop locations of the corresponding color.
- Points are awarded based on the following criteria:
- Time Score: Depending on the completion time.
- Object Placement Accuracy: Points are awarded for the precise placement of all four blocks.
- Design and Innovation: Points based on the level of creativity and innovation in the robot's design.
- Collision/Touches Wrong Area: Points are deducted for rule violations.
- Miscellaneous: Additional points at the judges' discretion.
- Both teams must finish in the least amount of time feasible while not making fouls.