

# ROBOLYMPICS

Robolympics 3.1  
Rule book





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# INTRODUCTION

"Mayday... mayday.

We are stuck, the game is... is trying to imprison us. Help!! help!!

We will signal you again."

After you receive this message, you need to help your friends who are stuck in the game. But to ensure that you too will not get stuck in that game, you need to design and make a robot to do the mission instead of you.

The robot has different parts with different designs and functions. Thus, you'll need to make a team. Each member will be responsible for a certain task so choose your team members carefully.

To reach your friends in the game and rescue them, your robot will face four stages: The Fortress, From the Deep, Transportation Shed, The mighty roar.

Your robot should survive and finish the game.  
And remember, survival is for the smartest.

Good luck! May the odds be in your favor.





# INTRODUCTION

## What is the rule book?

The rule book is our reference and instructions in Robolympics 3.1. that helps all robots to survive and finish all tracks successfully.

It contains the official set of rules that must be followed which are check points, points system, robot requirements, fully detailed explanation for each track, & other general rules and safety.

**Check points:** these are the phases of progress for the robot, the robot must pass this points to be able to pass the tracks.

These points check the robot electrically and mechanically.





# TIMELINE

## 1- Learning phase:

- Sessions start: 2/1/2021
- Sessions end: 14/1/2021
- Sessions Exam: 19/1/2021

### Electrical content:

- Introduction to programming.
- Introduction to Arduino.
- Sensors & motors.

### Mechanical content:

- SolidWorks.
- Theory of machines.
- Gears.
- Motor sizing.
- Manufacturing tips.

## 2- Checkpoints:

- *1<sup>st</sup> checkpoint*: 31/1/2021  
( full mechanical CAD design – electrical circuit & selecting components)
- *2<sup>nd</sup> checkpoint*: 20/3/2021  
(All Manufactured Parts of Robot - Robot Code)
- *3<sup>rd</sup> checkpoint*: 27/3/2021  
(Testing & integration)

## 3- Big day:

- *Competition Day*: 31/3/2021

*\*Dates can be changed according to any new change in academic calendar.*





# TEAMS

1. Each team consists of a minimum of 6 members and a maximum of 8 members.
2. No participant cannot be in two different teams.
3. Only undergraduate students can participate.
4. Minimum number of team members that attend on the competition day is 3 members.



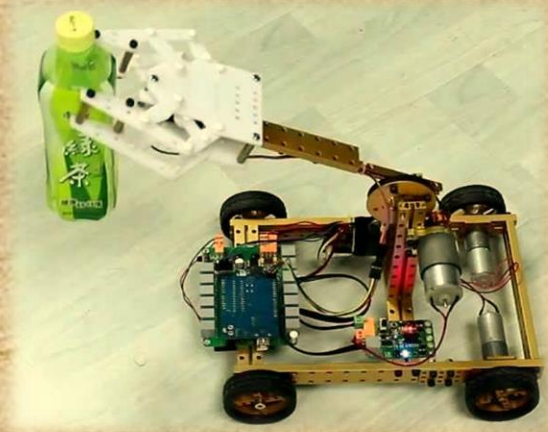


# ROBOT

There is only one robot enter the four Tracks & should follow the next requirements:

## For Tracks

1. Robot must have arm.
2. The arm should be modular (easy to installed & remove).
3. Robot must have obstacle detection feedback (Ex: ultrasonic sensors).
4. Control unit (App or Joystick) should be able to receive feedback from robot.



## Mechanical

5. Max Robot base dimensions **Including Wheels:** 30 cm(L) \* 30 cm(W).
6. Max Robot base length with folded arm: 65 cm (L).
7. Max Robot height: 40 cm (L).
8. Max Robot Weight: 5 Kg
9. Materials: Wood or Plastics.

**Note:** The frame of the robot cannot be metal, but it is allowable to have metal parts, as in lifting mechanisms.

## Electrical

10. Power Source is DC & do not exceed 24 V.
11. Robot controlled manually with wireless signal.





# PLAYGROUND

## Floor of the tracks:

The floor of the tracks will be made from moquette.



## Objects to be collected:

Dimensions: 5 cm\*5 cm\*5 cm

Material: Wood or foam.

**Hint:** Objects will be placed on a floor.

## Walls of the tracks:

Material: Wood.



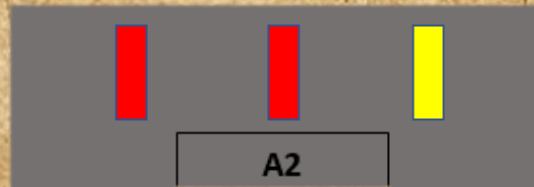
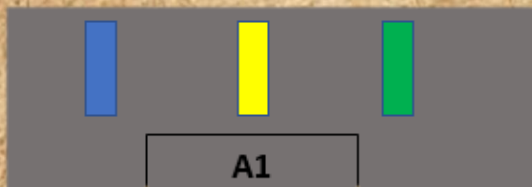


# TRACKS

## 1. Fortress (50 points)

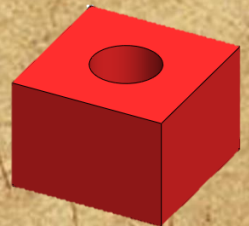
**Time allowed: 15 minutes.**

1. Two teams will be playing in parallel at the same time, and each team will be graded individually.
2. The track is divided into four stages with 2 entrances.
3. First, the robot must push the shelves to enter to the other side of the track using the robot's arm. Once done, the team will get 5 points.
4. In the second stage, the robot must collect **2 matched cubes** to get color code (example shown in the figure). Once done, the team will get 5 points.



5. In the third stage of the track, the robot should collect the boxes with required colors to achieve the color code and put them in its bucket (attached to the robot).

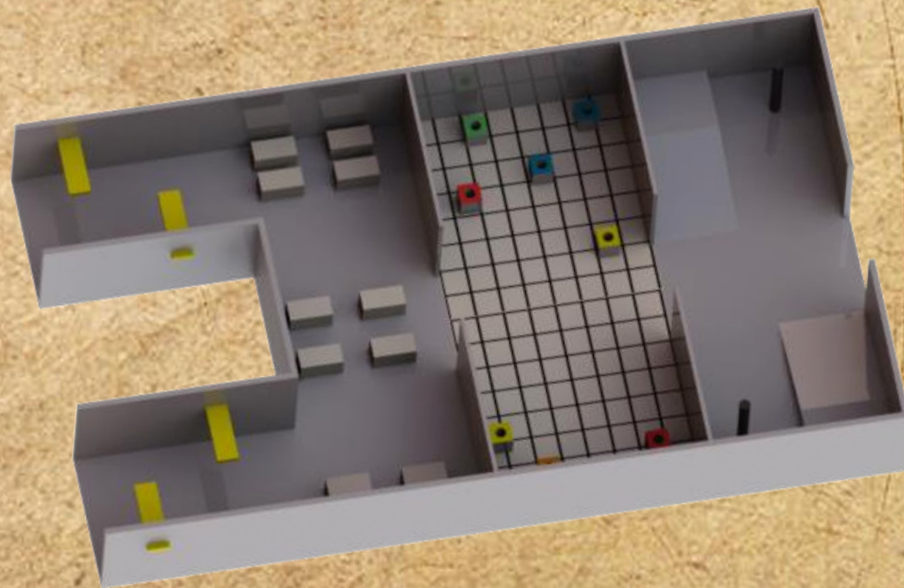
In this stage you should notice that the area contains **bomb points (-1 when touching one of them)**, you can avoid these bomb points by a given code at the beginning of the track. Once done, the team will get 15 points.





6. At the final stage, the robot will arrange the colored boxes at the column at the corner using its arm (note that: in this stage there are 2 ramps used if they are needed). Finally, the robot can go out from this track. Once done, the team will get **25 points**.
7. If the team finished before the time, the team takes 2 points for each minute early.

**An Incomplete stage gives no points.**



**Track Dimension:** 2 m \* 3.5 m

**entrance dimension:** 50 cm

**colored boxes dimensions:** 5 cm \* 5 cm \* 5 cm

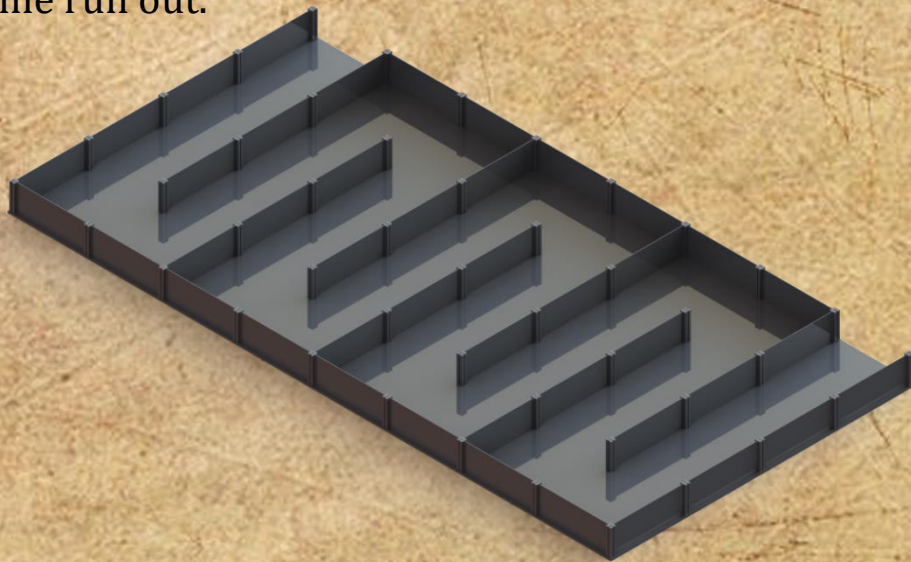




## 2. From the Deep (40 points)

**Time Allowed: 5 Minutes**

1. One team will play on each track.
2. The track will be totally covered, robot should depend on feedback from sensors to finish track.
3. You can receive feedback from robot on mobile app or hardware joystick (camera is not allowable).
4. The track has fixed entrance and exit, but path is variable.
5. Total path is divided into 4 check points, one after ending quarter of path, after each checkpoint you will get 10 points.
6. The team will not see the robot only after time run out or path finishing.
7. The team will know number of check points passed after time run out.



**Track Dimension:** 4 grids\* 8 grids, each grid is 40cm\*40cm.



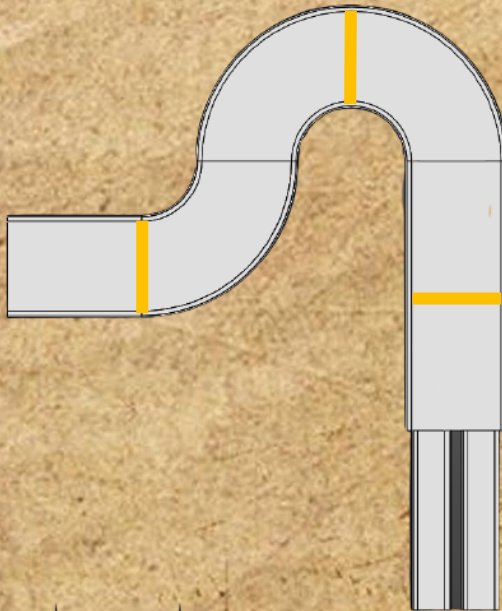


### 3. Transportation Shed (25 points)

**Time Allowed: 3 Minutes**

1. The race is between two teams.
2. Each team will enter to their starting line in the track.
3. There are three check points (the yellow lines). the first checkpoint is at the middle of the straight road, the second one is at the middle of U turn, and the last one at the end before the finish.
4. Each checkpoint = 5 points.
5. The first team finishes the track, before the time (3 minutes), will take the whole 25 points.
6. The winning team will wait for the other team at the end for the Sumo track.

**If any/both teams doesn't/do not finish the track before the 3 minutes, then the teams will get points of checkpoints.**





#### 4. The Mighty Roar (15 Points)

**Time Allowed: 2 Minutes**

1. The two teams will enter together on the same playground.
2. The two teams will play three rounds (or two if enough) to determine the winner.
3. Each team will try to push the other team's robot outside the playground.
4. The winning team will get 15 points.

**If both teams doesn't finish the track before the 2 minutes, then 15 points will be divided between the two teams.**



**Track Dimension:** 500 mm(radius) \* 150 mm(height)





# POINTING SYSTEM

Points will be divided into two phases:

## 1. Learning Phase & Assessment:

### ● Sessions

- **Tasks:** Participant takes a learning phase divided to 7 sessions, with each session there is a task submitted as a team with (1 Point Bonus).
- **Exam:** After the learning phase there is an exam on session, there is only one try per team, teams who can't pass the exam will not continue to the next phase.

### ● Check Points

#### 1. 1<sup>st</sup> checkpoint (10 Points):

- a. Full mechanical design with detailed CAD.
- b. Electrical Circuit & selecting components.

Hints:

- CAD Must have all details of the robot.
- For all non-manufactured parts / Electrical components, you must mention a link or place to buy them from the market.

#### 2. 2<sup>nd</sup> checkpoint (10 Points):

- a. All Manufactured Parts of Robot (not integrated).
- b. Robot Code.
- c. Feedback receiving method from robot.

#### 3. 3<sup>rd</sup> checkpoint (10 Points):

- a. Testing Robot features & integration.

- Best team in every checkpoint will get (5 points bonus).
- There is a penalty on team (-10 points) who did not submit.





## 2. Playground:

- Fortress (50 points)
- From the Deep (40 points)
- Transportation Shed (25 points)
- The Mighty Roar (15 Points)





# GENERAL RULES

**\*Aviation Club reserves the right to change / add any rules before / during the competition. The participant will be notified before.**

## **\*Technical Support:**

1. When needed, assistance will be provided by the technical support team until a week before the competition. Any further assistance will only then be given on the competition day itself.
2. There will be only one mechanical and one electrical technical support member with each team to help.
3. The technical support team will never take part in the manufacturing process of your team's robots; we will not code, design or build your robots for you. However, we will help you get to a solution if you are facing a certain problem.

## **\*Ethical:**

1. Teams must show respect and follow the judges' orders on the competition day, any failure to do so puts the team at risk of being disqualified.
2. Always show respect to other participants.
3. Share ideas with each other, help one another solve problems, and HAVE FUN!

## **\*For Competition Day:**

1. Referee dissensions are final & not negotiable.
2. Same robot cannot participate with two different teams
3. Robots size and features will be assessed during the registration on the competition day to make sure it fits the declared rules and standards which will be given in this rulebook. If a robot fails to meet these standards for any given reason it will not be allowed to participate in the competition.





4. Do not start driving in the track unless instructed by the referee.
5. In the playground there is one driver and one for assistance.
6. Participants should never step/Jump inside the track for any reason, any parts (for example robot parts) will be collected by the referee and delivered outside. If the robot were stuck only the referee put it again to its path (unless referee allows it).
7. Keep your workplace organized and clean to make any process faster and finish your work easily.
8. For each team, there is a place. One member must be in his team's place.
9. Each team is responsible for their components.

**Hint:** each team should have extra batteries for their robots and a power strip (مشترك).

## Violations

Once the game has begun the following actions will be regarded as violations and will reduce from your team's points.

1. Stepping inside the track (-5 points).
2. Grabbing the robot inside the track after the game has begun (without referee permission) (-5 points).
3. Retrying without the permission of the referee (-5 points).
4. Breaking any part or causing damages to track/s, other robot/s or cause harms to others (-20 points).
5. Team do not attend in his order (-10 points).





# SAFETY

1. Dangerous robots: Robots whose operational design is dangerous or unsafe are not permitted, examples of unsafe situations include, BUT ARE NOT LIMITED TO:
  - Uncontrolled motion that cannot be stopped by the driving team.
  - Robot parts falling outside of the robot field.
  - Robots dragging their battery.
  - Robots that consistently extend beyond the field.
  - Robots operating on gasoline or any other form of combustion fuel.
2. The allowed materials for the robot's chassis design are: Wood, plastic (acrylic) and 3D-printed plastics. No other material is allowed (especially metal).
3. No robot may contain any weapons of any sort, examples of weapons include, BUT ARE NOT LIMITED TO:
  - Saws
  - Sharp blades
  - Flame throwers
4. Covering any sharp edges in the robots' body is a necessity.
5. Each team should take care not to harm a team member or damage the playground.
6. Each team is responsible for the safety of their robot in between the tracks.
7. Each team is not allowed to damage the other team's robot.





# Prizes



**1st Prize: L.E 5000**



**2nd Prize: L.E 4000**



**3rd Prize: L.E 3000**

