

Rule book of

# Transporter robots

advanced

6<sup>th</sup> Amirkabir International Robotic  
competition

AUTCUP2016

## **1- Introduction:**

In transporter league, has been trying to make robots which are closer to the industry world and could be used in industry milieu with little changes. We all hope our students realize a part of their abilities in entering the industry world by building these robots.

The pitch is a simulated place of a very big warehouse. We need a robot which can take the incoming goods to their special rooms in this warehouse. This robot is waiting next to the warehouse entrance door and whenever a good enter the warehouse, put it in the specific place throw the specific path.

## **2- Conditions of the competition**

### **2-1- Participants**

2-1-1- This league will be held in two different stages, major and junior.

2-1-2- Only the students less than 18 years old are allowed to participate in junior stage, which means only the students whose birthday date is after October 23<sup>rd</sup> 1998.

2-1-3- Participates in junior stage must have perfectly mastered robot programming and the robot must be programmed by the members of the team. During the competition the team might be asked to run a specific program for their robots. Therefore they have to bring sufficient facilities like programmer, laptop etc. The team will be omitted from the competition if it is known that the robot is not programmed by the student members of the team.

2-1-4- There is no age limitations in the major league.

2-1-5- The differences between major and junior leagues will be discussed later.

### **2-2 – Robots**

2-2 -1- The dimensions of the must not overpass 25cm.(length, width and height)

2-2 -2- The maximum allowed weight is 1 kilograms.

2-2 -3- Robots must act automatically and any kinds of controls from outside of the competition area are not permitted.

2-2 -4- Using external power sources for robots are permitted.

### **2-3 Competition's arena**

2-3-1- Covering of the area is made of MDF, chipboard or white covering.

2-3-2- The might be white or black reflective in some parts.

2-3-3- Lines showing the way are electrical tapes or reflective tapes, with the width of 15 or 20 millimeters.

2-3-4- There might be puddles with the maximum height of 1 centimeter.

### **2-4- General rules**

2-4-1- The organizing committee is not responsible for the preparation of required equipments such as power sources, wires etc.

2-4-2- Each team is only allowed to have one robot.

2-4-3- Only two members are allowed to stay by the area during recording.

2-4-4- Any objection to the holding must be reported written and with proof (such as video or image). The orally reposted reposts will not be investigated.

2-4-5- The reception time for each team is 2 minutes, the team will be omitted from the competition provided that they do not appear by the arena within the given time.

2-4-6- In each level the final call is up to the judge.

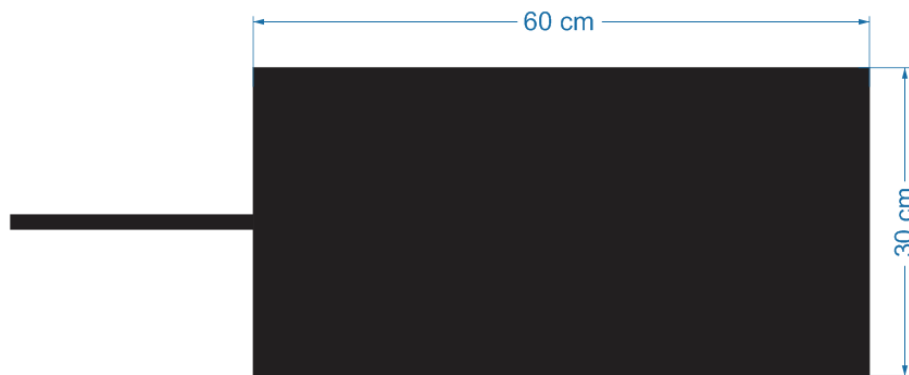
### 3- Competition Rules

#### 3-1- The main task of the robot is to carry a 10cm diameter ball.

3-1-1- This ball is attached to or put on the robot by team members before the competition starts.

3-1-2- Use of any kinds of glue is not permitted. However, the ball can be held on the robot by fastening a belt or any other kind of equipment.

3-1-3- At the end of the path, there will be a rectangular in the size of 30\*60 square centimeters. Robot must stop there and release the ball.



3-1-4- After releasing the ball, it must remain in the rectangular. Otherwise there will not be any points.

3-1-5- The robot will only gain the point of carrying the ball, provided that it reaches the rectangular and can not release the ball.

3-1-6- The recording for each team is the time robot needs to reach the rectangular. The time needed for releasing the ball is not included in the recording.

3-1-7- The maximum allowed time for releasing the ball is 30 seconds.

3-1-8- Team gains the point of releasing the ball as long as the ball remains within the rectangular.

**3-2-** The competitions will be held in two levels (primary and final) A few number of team will make it to the finals and the number will be announced after the primary level.

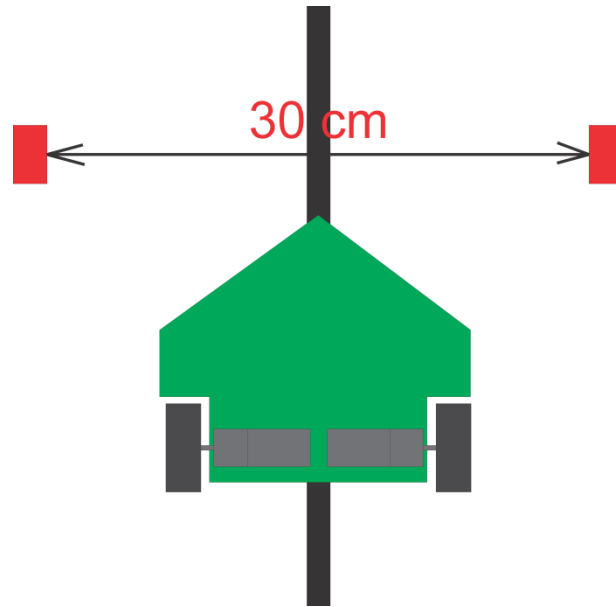
3-3- In each round, each team has ten minutes to do the recording. During this time can register three records and the accepted for them.

3-4- after ten minutes, no other trying will be accepted. But if the robot is still between a recording, it can finish that.

3-5- Any changing of the program or the micro controller during the recorging is not allowed.

3-6- For the team who use power source, ten percentage of their recording time will be added to their total recording time.

3-7- There might be sensors within the path of the competition to measure the time. These sensors are places 15 centimeters from the center of the line and on both sides. Any contact will be counted as damaging the competition arena and the offending team will lose the race.



3-8-1- Cuts with a maximum length of ten centimeters



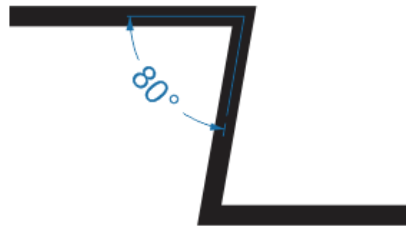
3-8-2- junctions with a minimum angle of 45 degrees(only in major league)



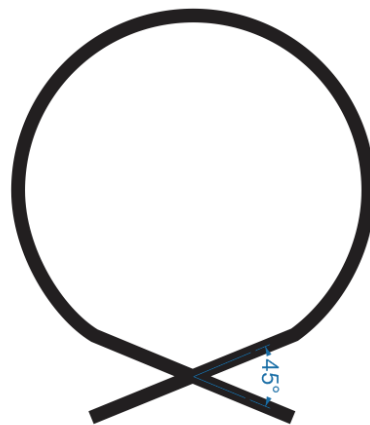
3-8-3- curvature with a minimum radius of 5 centimeters



3-7-4- path with the angle of 80 degrees

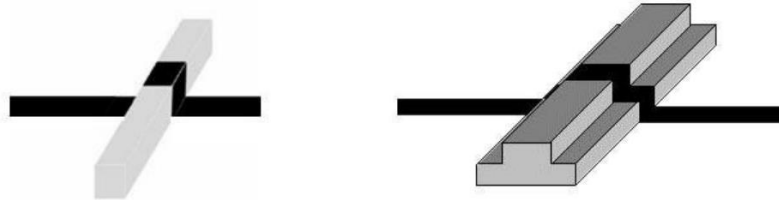


3-8-5- loops with a minimum angle of 45 degrees(only in major league)

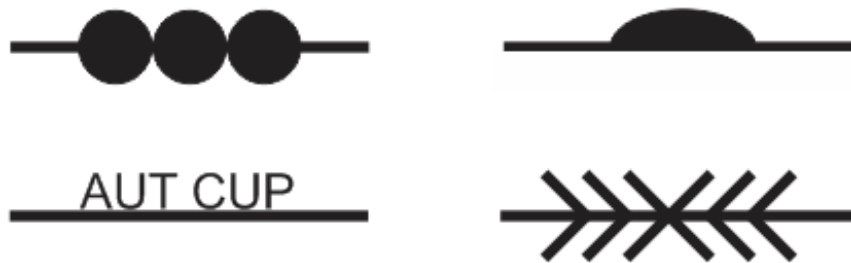




3-8-6- Obstacles with a maximum height of 1 centimeter(only in major league)



3-8-7- change in line width to a maximum of 15 centimeters from the center of the line.



3-8-8- inclines with the maximum slope of 35 degrees.(only in major league)





## Scoring:

The time of reaching the finish line is a principal criterion. The time will be stopped when the first part of robot arrives to the end rectangle of the route. Then, according to the tasks that performs in the black rectangle gaining scores which is calculated by the following formula:

$$F=T-(T*(S/100))$$

F: final record

T: time to reach finish line

S: total scores

Row	Robot's operation	Score
1	Using the external power supply	-10
2	Deliver the ball to the finish line	+10
3	stopping at the finish line	+10
4	Releasing the ball at the finish line	+30

For example, if a robot takes the ball to the end of the path in 20 seconds and using battery, and release the ball in the black rectangle, gains 50 positive points. Therefore 50% will be deducted from record.

$$F=20-(20*(30/100)) =20-(20*0.3) =20-6=14$$

If a team takes the ball to the end of the path using external power supply and stops in black rectangle without releasing the ball, the total scores will be 10 positive points, so 10% will be deducted from the time of this team.

Good luck

Attention: These rules might include changes before the tournament and in this case, will be announced via Telegram channel. It is team's responsibility to be aware of the latest rule changes.