Mobile Robotic Arm

Group B (Industrial entries): 80kg max

Robotic arms can be classed into four main groups: on path movement, pathless movement, object handling and image recognition. We hope to guide the contestants with tracks that require tactical thinking and creative minds to achieve what could be beneficial to industrial applications in the future.

I. General rules of competition

IRHOCS 2015 Mobile Robot Arm contest (as the "Contest") will be conducted under the following rules, formulated by the 2015 IRHOCS competition committee (as the "Committee"), and applies only to this competition.

1. Requirements:

   Under graduates and graduates with student identifications.

2. Team organization:

   Consisted of at least two and up to six members, with the additional advisor of one person, who can be hired by multiple teams. One contestant can only sign up for one team.

3. Software:

   Not restrained, while the committee encourage the use of NI LabVIEW.

4. Hardware:

   A. The robot should has it's own power supply and control unit.

   B. The committee recommended using the KNR system as the main control units, and use it to assemble the robotic arm.

   C. Size regulation：Stand within 80 cm x 80 cm on the ground, with stretched arm within the area of 130 cm x 130 cm, while under the height of 150 cm.

D. Weight：No more than 80 kg.
E. The robot should have an emergency abort bottom easily accessible to the referee whom can stop the tournament for any infringements of the Game Rules.

5. Fouls
   A. Sabotage on equipment, personnel, or robots.
   B. The use of hazardous article on personnel or robots.
   C. Any improper act or speech towards other teams, judges, or the audiences.
   D. Any insult to the competition according to the judge will be scored 0 points.
6. The judges' decisions are final, even after video inspection.
7. The total scores will be calculated after each match is over, signed by team for agreement, and will not be adjust after that.
8. Teams that were expelled from contest should leave immediately, and will get no scores.
9. Serious violations of the rules can lead to being expelled from the competition.
10. The judge can call a restart when there's any situation that stops the match or disturbed the scoring. Anything on the match ground or to the fairness of the match, the contestants can request for a rematch, if agreed by the judge, the match can be start over again, and the new score should be final.
11. Any question to the rules of the competition should consult the committee before the contest.
12. Anything beyond the rules of competition is for the judge to decide.

13. The committee has the right to photograph, record, remake and adjust any usage on the media.

II. Facility and Equipment

1. The IRHOCS 2014 Mobile Robotic Arm Competition comprised of a single sheet of printed canvas placed on the floor, robots are expected to overcome any unevenness
2. Zone A serves as the starting area, the black PVC tape (2cm in width) marked 80cm square, where it also served as the finishing area. (Black PVC tape is part of the base.)
3. Zone B, C, D are the work platform, on top of them are four snooker balls (black, blue, yellow, and red), 5.7cm in diameter, and 150g-170g in weight.
4. Zone B, C, D each has its own height. Zone B is 5cm, Zone C is 10cm, and Zone C is 15cm.
5. The referee will place the sphere and square objects randomly before the match.

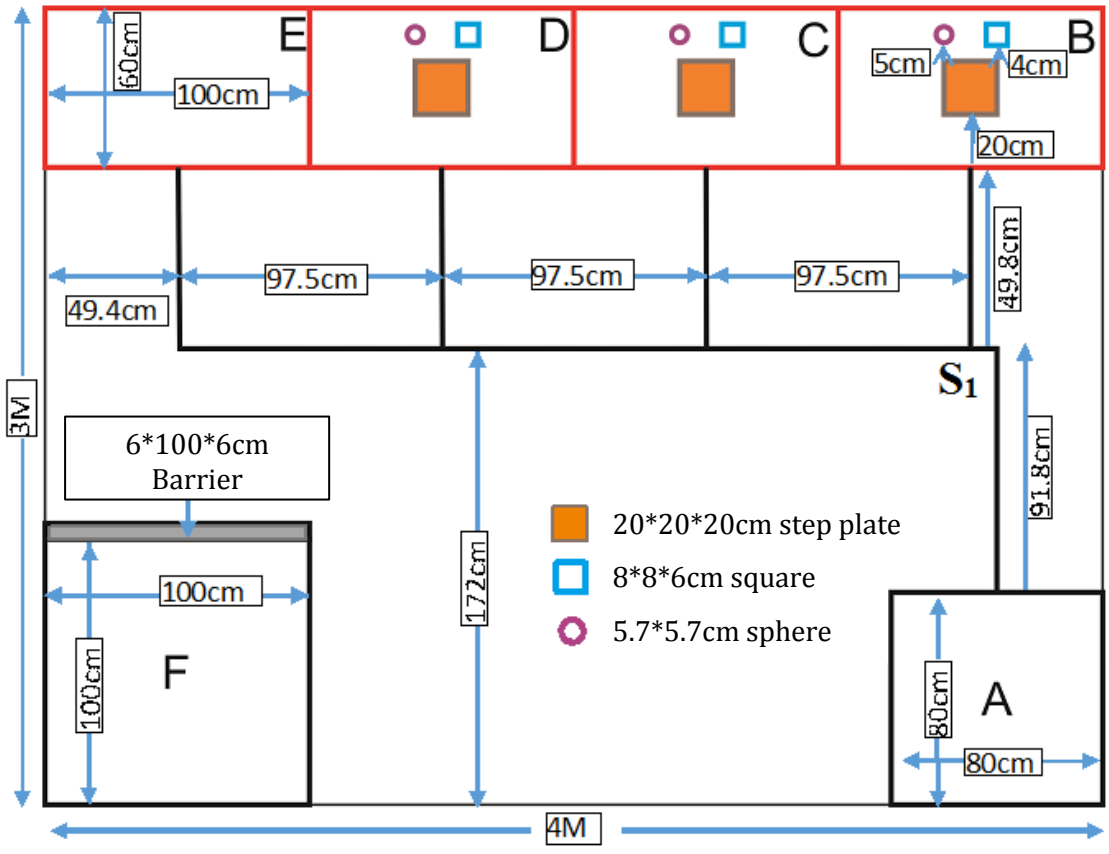

Figure 1. The Arena (300cm x 400cm^2)

III. Game Rules

The purpose of this competition is to simulate the work of a robot maneuvering objects inside factories, or to move to a certain position to process objects automatically. Begins at the START area Zone A, the robot should use its own sensors to follow the path to Zone B, C, D, finished the tasked assembly by grabbing each object with its robotic arm from Zone B, C, D, and stack them on the corresponding area on top of the pallet, move the entire pallet to Zone E. Finally, stop in Zone F once finish moving all objects to Zone E.

1. Each match will be consisted of two rounds, and the final score will be the sum of the two.
2. Only one team member and one robot is allowed to enter the field , other members should stay behind the START area.
3. When the robot leaves the START area, team member should keep away from their own computer to make sure the robot is moving on its own.

   The match would only be paused by the judge; team member and robot cannot be replaced during the match.
4. A match would be five (5) minutes long, with two (2) minuets for preparation before each match.
5. Robots should be fully automatic.
6. Team members in the START area can only move the robot back during the breaks between the two rounds.
7. During an emergency the judge can call a halt if agreed by both side. Contestants can only enter and move away the robot when the round ends; a foul can be a score 0 for the team.
8. Robots should have an emergency abort bottom easily accessible to

the referee whom can stop the tournament for any infringements of the Game Rules.

Table 1. Task and Scoring

	Task	Points	Explanation
1	Leave Zone A	10 points	If it's not entirely clear (comes in contact with PVC tape) will result in 5 points.
2	Move along path	20 points each	Move along route to point S1(black line must always within the projection of the robot)
3	Place all the objects into the matching containers with in Zone B, C, D	20 points for each area	Place the round object into the square ones on the designated pallet.
4	Move the entire step plate to Zone E along with contents from Zone B, C, D	20 points each 60 max	20 points for moving the entire pallet along with all objects to position, 10 if anything drops.
5	Move to Zone F	20 points	If it's not entirely clear (comes in contact with PVC tape) will result in 10 points.
6	Stack the plates in Zone E	30 points	10 points for 2 layers, 30 points for 3. 0 if anything drops.