



2016
IRAN
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POLYTECHNIC
AUTCUP
International Robotics Competitions



Athletics

● Explanatory Guide

In the name of Allah

Humanoid Robots Athletics League Rule Book and Setup

For the 2016 Amirkabir International Robotic Competitions

League Technical Committee

Soroush Sadeghnejad, Jacky Baltés, Nima Pourmohammadi

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Humanoid Robot Olympics Technical Committee Email Address: AUTCupHuro@gmail.com

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Preamble

Athletics is a collection of sporting events that involve competitive running, jumping, throwing, and walking.

Organized athletics are traced back to the Ancient Olympic Games from 776 BCE. The rules and format of the modern events in athletics were defined in Western Europe and North America in the 19th and early 20th century, and were then spread to other parts of the world. Most modern top level meetings are conducted by the International Association of Athletics Federations and its member federations.

1st Athletics competition was held on 453 BCE, in that time Venues were straight lines or they had horseshoe form. After that time venues and rules are going to be better and better and they change step by step to be what they are now.

We have the same goal in our competition to make everything better and familiar to the real Athletics competition year to year.

Events

The International Association of Athletics Federations, the sport's governing body, defines athletics in five disciplines: track and field, road running, race walking, cross country running, and mountain running.

We define our athletics competition in **track and field discipline** for the first year of this competition and we are planning to add other parts in next years.

Table 1 Track and field events

Field		Track				
Throws	Jumps	Relays	Hurdles	Long-distance	Middle-distance	Sprints
Shot put	Long jump	2x3m relay	3m hurdles	10m	6m	3m
	High jump	2x5m relay	5m hurdles	12m	8m	5m

1. Track events:

The track events come in four parts: Runnings, Relay races, Hurdling and Marathon competitions which we explain each part below:

Article 1: Runnings

A variety of running events are held on the track which fall into three categories: sprints, middle-distance and long-distance track events. These three parts are running match with different distances which we mention in Table 1.

Article 2: Relay races

Relay races feature teams comprising two runners each, who must touch their teammate after a specified distance with the aim of being the first team to finish. This part is Drop-in match, it means that teams are divided in twosome groups for competing in this match. This classification will be done by referees.

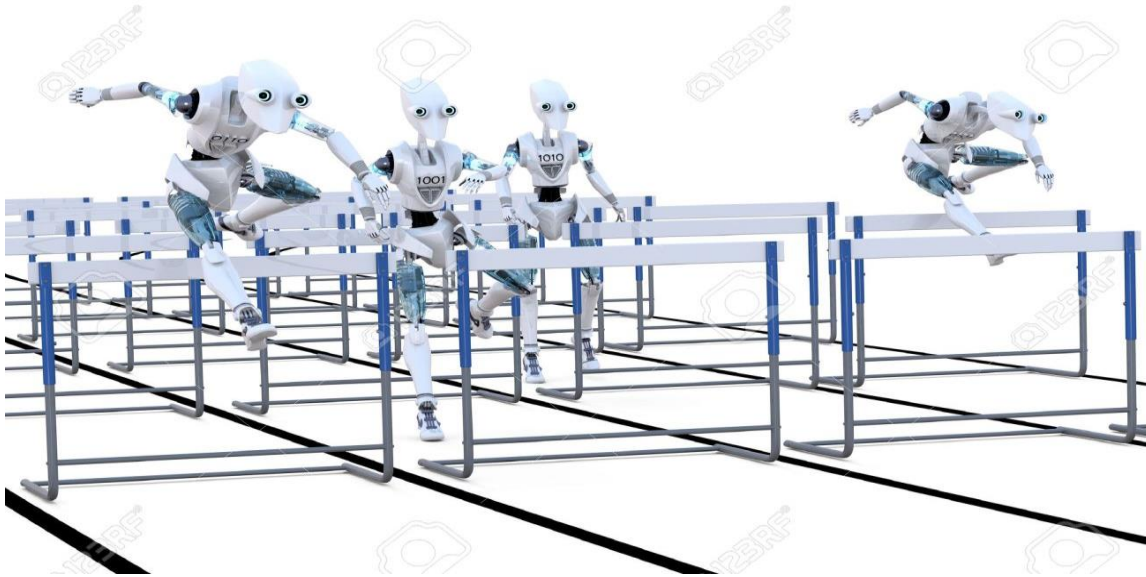
At the start point, one robot of each team should stand behind the start line and the other robot should wait for it in the specific place that mention by the referee. Match will be started by referee's permission and first robots can run throw their teammate to touch them. Second robots shouldn't move until their teammates done their job, completely. After second robot get permission to start (its teammate finish all tasks), it should run as fast as it can to reach the end line before the others to win the match.

Article 2: Marathon

In marathon, robots should pass a long path which designed by the referees (it shouldn't be straight). This match takes a long time so every robot can have one extra battery pack with them to be able to finish the path. We have some check points during the path where teams can stop their robots by referee's permission to change its battery. Each team has special place in these check points, where they should put their extra battery pack in there before the start of the match. In the check points, teams just have permission to change their robot's battery pack and any other process is illegal.

Article 2: Hurdling

Hurdling is the act of running and jumping over an obstacle at speed. In this event, a series of barriers known as hurdles are set at precisely measured heights and distances which each athlete must pass by running over. Failure to pass over, by passing under, or intentionally knocking over hurdles will result in disqualification. Accidental knocking over of the hurdles is not cause for disqualification, but the hurdles are weighted to make doing so disadvantageous.



In this competition we use cubic type timbers of wood as hurdles that have square base with side of 2cm. Each timber puts on two stands with 3cm height so that the total height of hurdle become 5cm. These barriers will be paint in black and white.

Distances

Distance of race	Distance from start line to first hurdle	Distance between hurdles	Distance from last hurdle to finish line
300cm	50cm	40cm	50cm
500cm	90cm	50cm	60cm

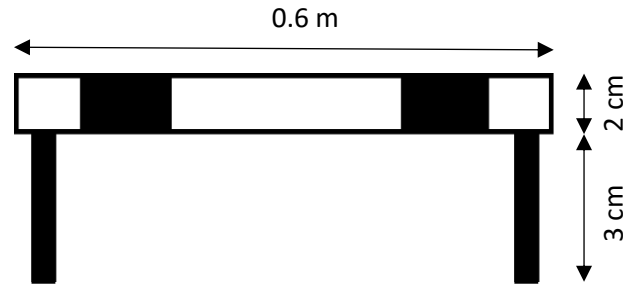


Figure 1 Example of a hurdle

Article 2: General rules for track events

- In each part, we have two rounds. Qualifying round and final round. According to the number of participant, we have one or more groups for Qualifying round. In each group, 4 robots compete against each other and 2 of them will be qualified for the final round (if we have more than one group, the four robots that achieve better records at all will be qualified for final round).
- During these matches, every robot should run in their own line and exiting the line intentionally or involuntary cause the robot to start from the starting point. Each Line has 0.6m width and separate from other lines by white thin lines.
- We use brown carpet for playground.
- Match will be started by the referee's announcement. Robots should stand behind a start line. If any robot moves and passes the start line before the referee's permission it is foul and robot should stand behind a start line again and start match with others. If this happened second time the robot will be place behind the start line and after referee's permission to start, it should wait 30 seconds to start the game.
- There should be at least 10 minutes between qualifying round and final round.

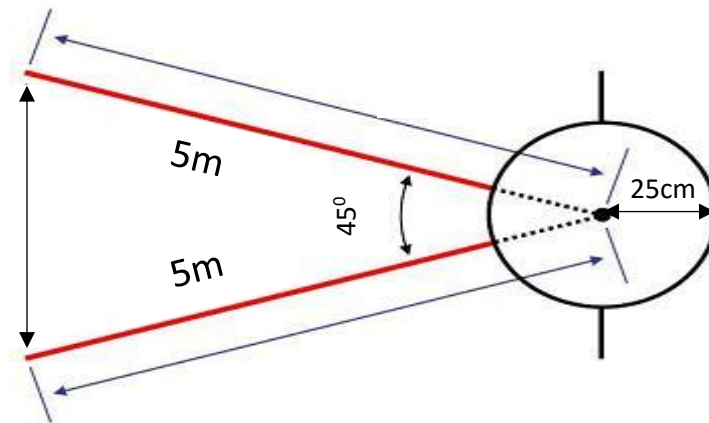
2. Field events:

The Field events come in two types – jumping and throwing competitions. In throwing events, athletes are measured by how far they hurl an implement, with the common event being the shot put. There are two common jumping events: the long jump which is contests measuring the horizontal distance an athlete can jump, while the high jump is decided on the height achieved.

Article 1: Shot put

The field of this game consist from one circle with 25cm radius and graded plate in front of it. By referee's permission robot should stand in a circle and take shot on its hand. Throwing the shot should happened by referee's permission. If robot throw the shot before referee's announcement the throwing coming account as fault. When referee gives the permission to the robot to start throwing, it has 20 second to throw the shot, if this take longer than 20 second it is foul.

In throwing period, robots should stay in circle and any exiting or touching the circumference is foul. Each robot has 6 throw and they come in turn to do their throw one by one. after all robots done their job they will be sorted by their best throw. In this competition shot is a yellow tennis ball.



Article 2: Long jump

In this part robots have 3 jumps. There will be graded plate, which will be separated by red line from runway arena. Each robot should be placed behind the red line in runway arena in their turn. Runway arena is a rectangle with 1.2m width and 3m length. Robot can be placed anywhere in the runway arena but they can't exit this area during their jump. Robot has 60 second to jump after referee's announcement. During jumping process robot shouldn't touch red line in anyway and if it does that jump count as foul. Deciding that if the robot touch the line or not is belong to line referee; he will raise red flag if touch happens and white flag for correct jump.

The distance of jumping will be measured from red line to the first point that robot's feet will touch the ground after jumping.

Article 3: high jump

This part is about jumping over the bar that set on different height. Every team should decide how high their robot want to jump and say that to referee to set the bar in that height in team's turn (The accuracy of measurement is 1cm, it means that teams can select integer numbers in centimeter.) Each robot has 3 chances to fly above the bar and make the better record. It is important to know that when one team decide about the bar's height for their jumping and their robot can't jump correctly for any reason they can NOT decrease the high of the bar for next jump.

In this match, like long jump, we have runway arena before the bar for robots to make better jump by increase their speed. In each turn, robot should place in runway arena and start its process by referee's permission. Just like long jump, we have one referee for deciding that if the robot touch the bar or not.

During jumping process, robot shouldn't touch the bar in any way and if it does that jump count as foul.

3. Robots specification:

- Every robot should have a number, which is announced by the referees before the competition start and each team receives two labels that show their number which should be installed in both sides of robot.
- Robots should Not use colors like red which makes extra noise on others robot's vision.

Appendix 1: competition Arena

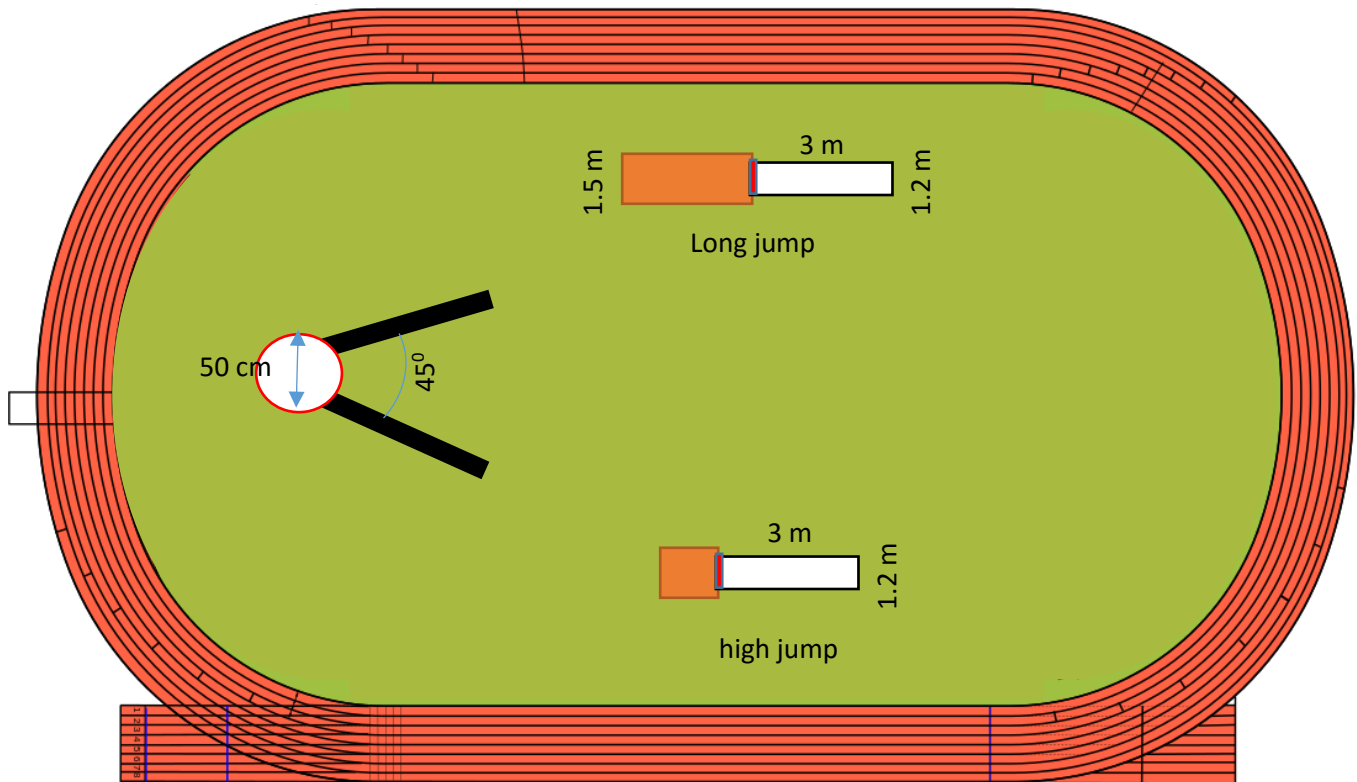


Figure 2 Competition Arena