

HUROCUP: Basket Ball Laws of the Game 2007

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Abstract

The following rules and regulations govern the Basket Ball event in HUROCUP, a robotic game and robotics benchmark problem for humanoid robots.

Latest Version of the Rules for HuroCup

The latest official version of the rules of the game for HUROCUP is always available from the FIRA HUROCUP website (<http://www.fira.net>).

1 Basket Ball

The goal of the basket ball competition is to encourage research into humanoid robots that are able to dexterously manipulate small objects.

2 Changes in the Laws of HuroCup for 2007

The year 2007 marks a big change in the history of HUROCUP as it will be the inaugural competition for the HUROCUP, which greatly increases the status and scope of humanoid robotics competitions within the FIRA framework.

3 Laws of the Game: Basket Ball

The following laws describe the specifics of the basket ball event. For general specifications relevant to all HUROCUP events (e.g., robot dimensions, playing field and lighting, responsibility of the referees) please refer to the general HUROCUP laws.

BB-1 The Field of Play

- BB-1.1. The dimensions of the playing field are at least 180cm by 180 cm (see Figure 1).
- BB-1.2. One side of the playing field contains a basket. This side of the playing field shall be called the basket side. The opposite side of the playing field is called the empty side. The two other sides are called side lines.
- BB-1.3. The basket is placed in the centre of the basket side.
- BB-1.4. A three point circle is drawn
 - 40cm away from the basket for small robots,
 - 80cm away from the basket for large robots.
- BB-1.5. The start point for
 - small robots is 50cm in front of the basket in the center of the playing field.
 - large robots is 75cm in front of the basket in the center of the playing field.

BB-2 The Ball and Basket

- BB-2.1. The ball as shown in Fig. 2 is a standard table tennis ball. The colour of the table tennis ball is either white or orange.

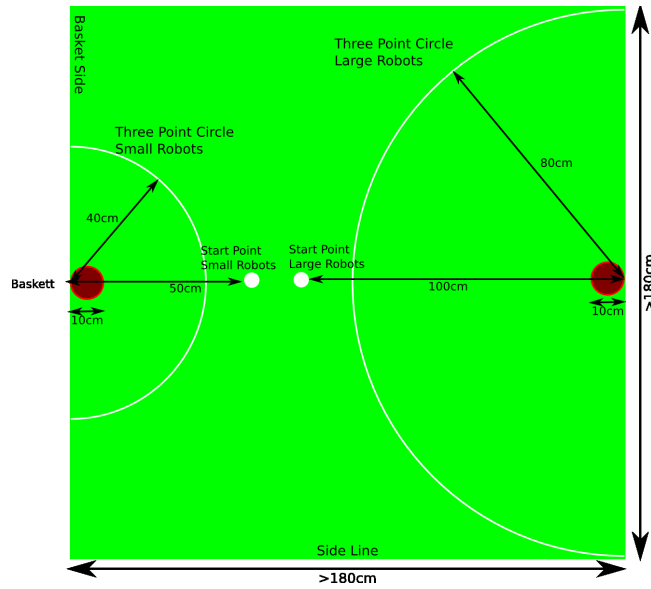


Figure 1: The field of play for basket ball

BB-2.2. The basket is a red coloured cup with a diameter of approximately 10cm and an approximate height of 10cm. The diameter of the bottom circle is approximately 8cm. See Figure 2 for an example.

BB-2.3. The top rim of the basket is mounted at a height of 25cm.

BB-2.4. The basket contains a white backboard. The backboard is 20cm to 25cm wide and 10cm to 15cm tall.

BB-3

Number of Robots

BB-3.1. A single robot competes in a match.

BB-4

The Players

Please refer to the general HUROCUP laws for a description of the players.

BB-5

The Referee

Please refer to the general HUROCUP laws for a description of the referee.

BB-6

The Assistant Referee

Please refer to the general HUROCUP laws for a description of the assistant referee.

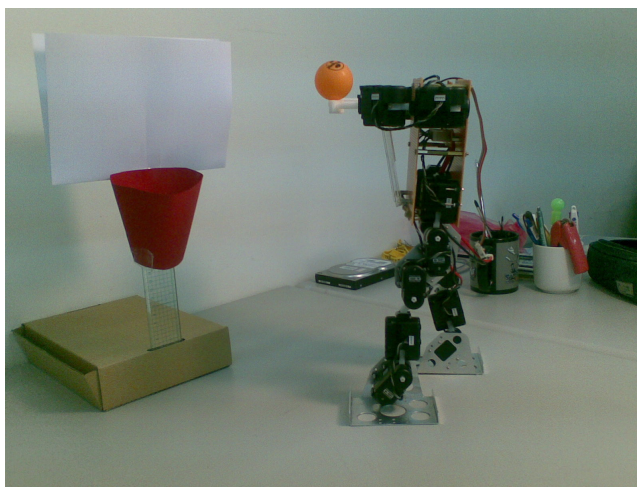


Figure 2: A picture showing the basket ball setup. The robot is holding a yellow table tennis ball.

BB-7

Game Play

- BB-7.1. One robot is designated the thrower. All other robots must be positioned behind the centre line and must not interfere with the thrower in any way.
- BB-7.2. Except the thrower, all other robots are not allowed to move during the throw.
- BB-7.3. Each robot may have at most one human handler associated with it.
- BB-7.4. The human handlers must not interfere in any way with other robots, the referee, or other human handlers.
- BB-7.5. A human handler may only enter the playing field or touch his/her robot with the permission of the referee. The throw will be declared invalid if the handler touches the robot.
- BB-7.6. The thrower must be at the start point at the beginning of the throw.
- BB-7.7. The throw begins by the referee blowing a whistle.
- BB-7.8. The end of the throw is signaled by the referee by blowing the whistle a second time. The referee terminates the throw if
- the ball entered the basket after being thrown by the thrower,
 - the robot damages or moves the basket or playing field in any way,
 - the ball moved outside of the playing field,

- a robot leaves the playing field,
- the maximum duration of the competition (2 minutes) has elapsed,
- at least 1 minute has elapsed since the start of the competition and it is unlikely in the opinion of the referee that the thrower will score in the next minute,
- a robot is immobilized by a technical defect.

BB-7.9. After the end of the throw, another robot is designated the thrower.

BB-8

Method of Scoring

BB-8.1. There are five rounds in the competition.

BB-8.2. The three point cylinder is the volume of space described by the playing field as the base and extruding the three point circle as sides.

BB-8.3. A robot scores if the ball enters the basket, Each robot receives two points when any part of the robot was inside or touching the space of the three point cylinder when the ball was thrown. The robot receives three points if the robot was completely outside of the three point cylinder when the ball was thrown.

BB-8.4. Any robot that has not scored a single point is automatically awarded 0 rank.

BB-8.5. Among the robots that have scored at least one point, the robots are ranked (i.e., 1st place, 2nd place) based on the greater number of points that the robot scored.

BB-8.6. The point allocation for robots is as follows:

- The first ranked robot is awarded 10 points.
- The second ranked robot is awarded 8 points.
- The third ranked robot is awarded 6 points.
- The fourth, fifth, sixth, and seventh place robots are awarded 4,3,2, and 1 point respectively. A summary of the point allocation for placings is shown in table 1.

BB-8.7. In case of a tie between n robots with rank k , all robots will be awarded rank k and receive the average of the scores for ranks k to $k + n$. For example, if the robots A, B, C, D scored 10, 8, 8, 4 goals respectively, then robot A will be declared the winner (1st place) and receive 10 points, both robots B and C will be declared 2nd place finishers and receive $(8 + 8)/2 = 8$, and robot D will be declared the fourth place finisher and receive 4 points.

Place	Points scored
1 (Winner)	10
2	8
3	6
4	4
5	3
6	2
7	1
8, 9, ...	0

Table 1: Point allocation for placings in the HUROCUP events.