



HuroCup Laws of the Game

Penalty Kick (Pro Adult/U19 Kid)

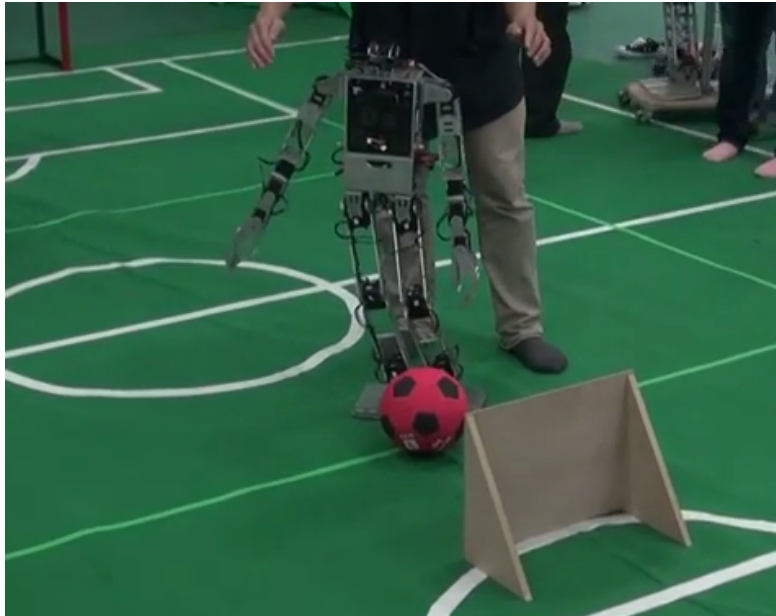
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Abstract

The following rules and regulations govern the penalty kick event of 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 [HuroCup Facebook Page](#).

Changes to the Penalty Kick rules of HuroCup

In 2020, random start points will be introduced for Adult Size kicker robots. Please refer to [PK-7.6](#) for details.

Penalty Kick

In the penalty kick challenge, the robot must approach a ball, dribble it through a set of simulated defenders into the shooting zone and then kick it past a simulated goalkeeper into the goal.

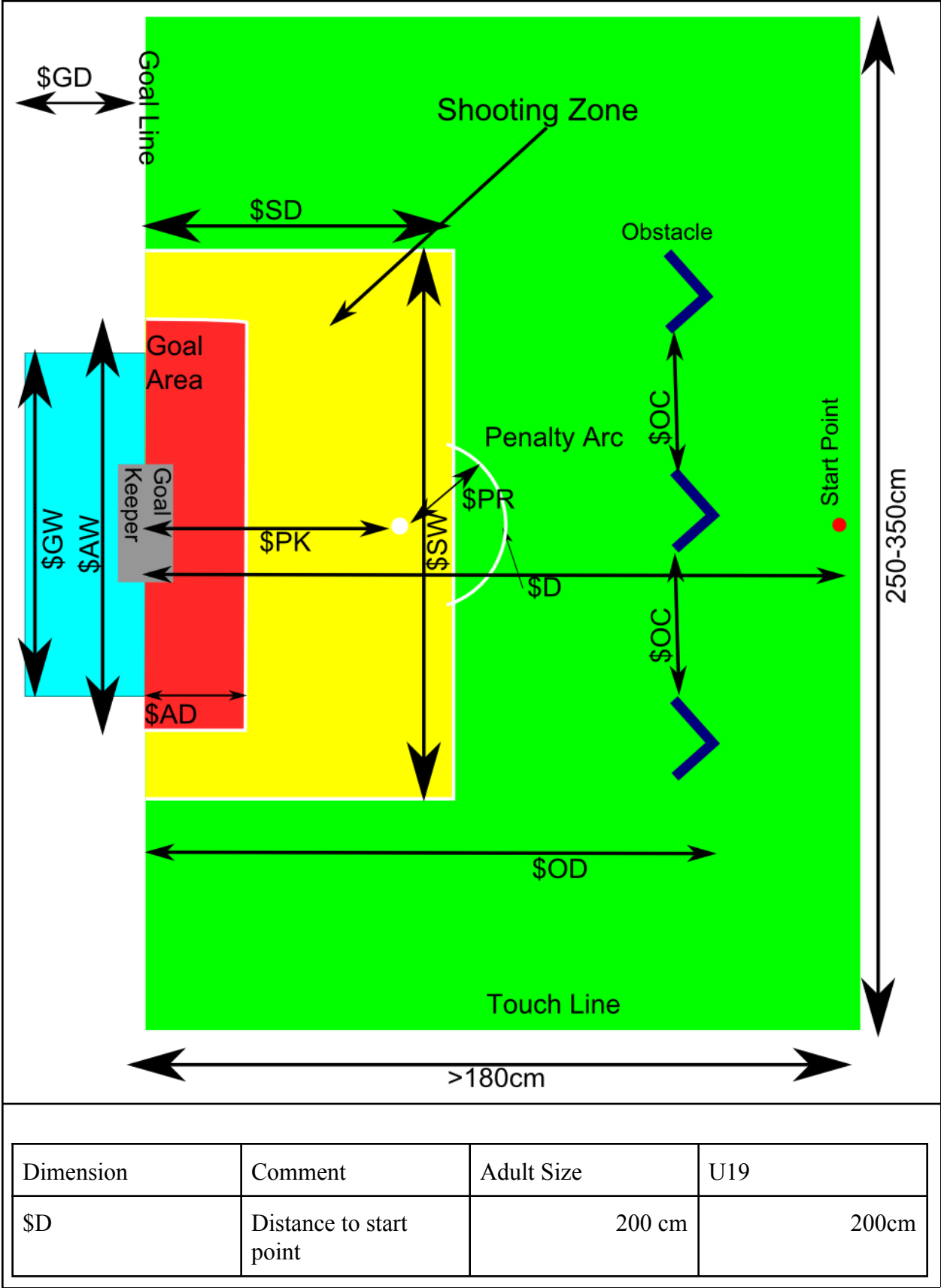
HuroCup Penalty Kick - Laws of the Game

The following laws describe the specifics of the penalty kick event. For general specifications relevant to all HuroCup events (e.g., robot dimensions, playing field and lighting, the responsibility of the referees) please refer to [General - HuroCup Laws of the Game](#).

[PK-1]: Field of Play

[PK-1.1]: The dimensions of the playing field are at least 250 cm by 250 cm.

[PK-1.2]: One side of the playing field contains a goal. This side of the playing field is called the goal side. The opposite side of the playing field is called the empty side. The two other sides are called touch lines. See Figure [Penalty Kick Field of Play](#) for more details and dimensions. All dimensions are approximate and small variations may occur.



\$GW	Goal width	200 cm	200cm
\$GD	Length of end zone	30 cm	30cm
\$OC	Clearance of obstacles	> 80 cm	> 40cm
\$OD	Distance to obstacle line	160 cm	160cm
\$SW	Width of shooting area	300 cm	300cm
\$SD	Length of shooting area	120 cm	120cm
\$AW	Width of goal area	250 cm	250cm
\$AD	Length of goal area	30 cm	30cm
<i>Penalty Kick Field of Play</i>			

[PK-1.3]: The goal is \$GW wide and \$GD deep and is placed on the goal side of the playing area with its center along the center line of the playing field.

[PK-1.4]: An area \$AW wide and \$AD deep centered directly in front of the goal is called the goal area.

[PK-1.5]: An area \$SW wide and \$SD deep centered directly in front of the goal is called the shooting area.

[PK-2]: The Ball

[PK-2.1]: Please refer to [General - HuroCup Laws of the Game](#) for detailed information about the ball.

[PK-3]: Number of Robots

[PK-3.1]: A single robot competes in a match.

[PK-4]: The Players

[PK-4.1]: Please refer to [General - HuroCup Laws of the Game](#) for detailed information about the players.

[PK-5]: The Referee

[PK-5.1]: Please refer to [General - HuroCup Laws of the Game](#) for detailed information about the referee and his or her duties.

[PK-6]: The Assistant Referee

[PK-6.1]: Please refer to [General - HuroCup Laws of the Game](#) for detailed information about the assistant referee and his or her duties.

[PK-7]: Game Play

[PK-7.1]: One robot is designated the kicker and another robot or a static robot is designated the goalkeeper. All other robots must be positioned behind the centre line and must not interfere with the designated kicker or goalkeeper in any way.

[PK-7.2]: The only robots allowed to move during a penalty kick are the designated kicker and the goalkeeper.

[PK-7.3]: Each robot may have at most one human handler associated with it.

[PK-7.4]: The human handlers must not interfere in any way with other robots, the referee, or other human handlers.

[PK-7.5]: A human handler may only enter the playing field or touch his/her robot with the permission of the referee. The kick will be declared invalid if the handler touches the robot.

[PK-7.6]: At the beginning of the event, for the adult-size kicker robot, it will be at a random start point behind the ball which is randomly placed by the referee with \$D away from the goal line. For U19, the referee will place the ball \$D away from the goal line centered along the goal line and the kicker is placed behind the ball which is a fixed start point.

[PK-7.7]: The designated goalkeeper must be positioned so that a part of the robot touches the goal line at the start of the game.

[PK-7.8]: Three wall obstacles as described in [Obstacle Run - HuroCup Laws of the Game \(Wall Obstacles\)](#) will be placed \$OD away from the goal line. One obstacle is centered along the goal line and the other two obstacles are placed so that the distance between obstacles is at least \$OC.

[PK-7.9]: Two additional defender obstacles are placed at random inside the shooting zone. The defenders are black paper cutouts with a maximum width of 30cm and a maximum height of 60cm.

[PK-7.10]: The kicker must move the ball from the start point into the shooting zone without touching any of the obstacles or defenders. Once the ball is completely inside the shooting zone, the kicker must kick the ball into the goal.

[PK-7.11]: The designated kicker is not allowed to leave the playing field or to enter the goal area. A robot has entered the goal area if any part of the robot's foot touches the goal area line or the goal area itself.

[PK-7.12]: The designated kicker is not allowed to touch any obstacle.

[PK-7.13]: The designated goalkeeper is not allowed to leave the goal area. A robot has left the goal area if any part of the robot's foot touches the goal area line or the goal area itself.

[PK-7.14]: The designated goalkeeper must remain in a standard walking posture until the ball has been kicked at the goal. The goalkeeper may only squat or block a large part of the goal until after the ball has been kicked at the goal.

[PK-7.15]: During the time between the start of the penalty kick and the time that the ball has been kicked at the goal, the robot may move freely in the goal area as long as it remains completely inside of the goal area and in a standard walking posture.

[PK-7.16]: Any infringements of the rules shall be dealt with according to the general HuroCup rules as far as those rules are applicable.

[PK-7.17]: The penalty kick begins by the referee blowing a whistle.

[PK-7.18]: The end of the penalty kick is signaled by the referee by blowing the whistle a second

time. The referee terminates the penalty kick if either a goal has been scored by the kicker,

1. or the ball is kicked into the goal from outside of the shooting zone,
2. or the ball moved outside of the playing field,
3. or a robot is immobilized by a technical defect,
4. or a robot leaves the playing field,
5. or a robot touches an obstacle,
6. or the maximum duration of the competition (2 minutes) has elapsed.

[PK-7.19]: After the end of the penalty kick, the next robot is designated the kicker.

[PK-8]: Method of Scoring

[PK-8.1]: There are five tries in one round of the competition. Each try consists of all robots being designated the runner exactly once as a kicker and once as a goalkeeper. The kicker receives one point for legally touching the ball inside the shooting zone to follow up the dribbling and one point in which it manages to score a goal. The goalkeeper receives one point for legally saving a goal (if the goalkeeper touches the ball and it does not go in afterwards).

[PK-8.2]: Any robot that has not scored a goal at least once is automatically awarded no rank and 0 points.

[PK-8.3]: 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 scored.

[PK-8.4]: In case of a tie, i.e., more than one robot having scored the same number of points, the robots will be ranked based on the total points scored from goals and follow by total time required to score all goals.

For more details about the point allocation, please refer to [Point Allocation \[Organization - HuroCup Laws of the Game\]](#).

[PK-9]: Tiebreaker

[PK-9.1]: In case two or more robots have the same number of points after all rounds in the penalty kick event, the sum of the goals in all rounds will be used a tiebreaker.

[PK-9.2]: In case two or more robots have the same number of points after all rounds and are still tied after applying the previous tiebreaker, the maximum number of goals in a single round will

be used as tiebreaker.

[PK-9.3]: In case two or more robots are still tied after applying the previous tiebreaker, the time for the maximum number of goals in a single round will be used as tiebreaker.