

## **AMiRESot 2008 Robot Soccer Rules**

Version 1.0

### **Preliminaries**

The guidelines for the AMiRE Soccer Tournament (AMiRESot 2008) rules 2008 were conceived at the workshop held at the 4<sup>th</sup> AMiRE Symposium in Buenos Aires in October 2007 with the objective to push autonomous minirobot technology another quantum step further while keeping the tournament affordable. The contribution of the attendants at the workshop is acknowledged and greatly appreciated by the authors of this document.

The tournament is intended for wheeled robots, because wheeled robots are easier and cheaper to build than humanoid walking robots. Wheeled robots are as useful as humanoid robots for developing all the necessary real time environment perception capabilities and cooperative behaviours required for a soccer game with a high level of realism.

The robots for the AMiRESot game are fully autonomous. There is no global vision system and communication with a field side computer is not necessary during the game. The referee gives whistle signals for starting, halting and stopping the game, and for announcing penalties for rule infringements. The robots need to recognise these whistle signals. Although the intention is that the robots have on-board vision, there are no restrictions as to what sensors can be used as long as they do not interfere with similar sensors on the other players.

The main characteristic of AMiRESot is the limitation on the size of the robot soccer players to a diameter of less than 110 mm. This allows the field of play to be small enough to not require a large space. The playfield can be quickly and easily set up in the home, the school or small university laboratory or corridor. The ball is a squash or golf ball. The AMiRESot game can be played by teams of 1 or more robots each, as long as the contending teams have the same number of players. Reasonable team sizes would be 1,3 or 5 players.

The AMiRESot 2008 rules follow the FIFA Laws as close as it makes sense for the type of robot players and the field of play described herein.

### **Law 1 : The Field of Play**

The field of play is rectangular. The shorter side boundaries of the field are called the goal lines.

The longer side boundaries of the field are called the touch lines.

#### 1.1 Dimensions

The playing field is 2000 mm long (touch lines) and 1400 mm wide (goal lines) ( 1/50 of the typical FIFA field for international matches) with cut-off corners to avoid the ball getting cornered. The cut-off is along a diagonal line that intersects the borderlines at 50 mm from the corners. The playing field is enclosed, except for the goal opening by a white frame 20 mm high and 20 mm wide. The surface of the playing field has a dark green felt cover .

#### 1.2 Field Markings

Markings on the field are white lines 10 mm wide. The playing field will have the following markings:

The **half-way line**, parallel to the goal lines, that divides the playing field into equal sized areas.

The **centre** of the halfway line is marked by a filled circle of 15 mm radius.

The **goal area** is a rectangular area in front of each goal that extends 110 mm to each side from the inside of the goal posts and 110 mm from the goal line into the play field.

The **centre circle** with a radius of 200 mm.

The playing field dimensions and markings are as shown in Appendix 1.

#### 1.3 Goals

The goals have an inside width of 400 mm and a depth of 110mm. The goals are enclosed from on the side and the rear by 40 mm high barriers painted flat black. The goal barrier locks into the field barrier on each side so that the field barriers are flush with the goal opening.

#### 1.4 The field location

The field can be indoors or outdoors.

#### 1.5 The lighting condition

The playing field should be located in a well lit area. The lighting should be diffuse without casting any strong shadows such as provided by office style overhead fluorescent lighting.

**Law 2 : The Ball**

The ball is a white squash ball painted white or a golf ball.

### **Law 3 : The Players**

#### 3.1 Players

The players are fully autonomous robots. A player must fit into a gauge cylinder of 110mm internal diameter. There is no limitation on the height of the player.

#### 3.2 Number of players per team

The game may be played by teams consisting of one, three or five players. In a game the number of players must be the same in each of the two teams.

#### 3.2 Changing the goal keeper

In games with more than one players per team, any player in the team may act as goalkeeper. The goalkeeper can only be changed during a stoppage in the match and with the permission of the referee.

#### 3.4 Player identification

Players will be distinguished by their jersey. Jerseys are tubes of elastic fabric pulled over the robot. The jerseys are painted with a vertical stripe pattern of the team colours. The goalkeeper has a uniform coloured jersey.

**Law 4: The Player's equipment**

The players must not have any mechanism that protrudes from the convex hull of the player at any time during the game. Neither are they allowed to have any device that will interfere with the sensory system of other robots. Active infrared and ultrasound proximity sensors are allowed.

The body of the player may have a concave depression no more than 5mm deep into the body's convex hull below 40 mm above ground level to assist in the control of the ball.. A player may only exert a force on the ball through pushing with direct contact of the player's body. In other word no active kicking mechanism is allowed.

Players must not be capable to inflict undue damage on collision with other players, at the discretion of the referee.

## **Law 5: The Referee**

Each match is controlled by a referee who has full authority to enforce the Laws of the Game in connection with the match to which he has been appointed.

The referee has the same function as in the FIFA rules:

- enforces the Laws of the Game.
- controls the match in co-operation with the assistant referees.
- ensures that the ball meets the requirements of FIFA LAW 2.
- ensures that the players' equipment meets the requirements of FIFA LAW 4.
- acts as timekeeper and keeps a record of the match.
- stops, suspends or terminates the match, at his discretion, for any infringements of the Laws.
- stops, suspends or terminates the match because of outside interference of any kind.
- allows play to continue when the team against which an offence has been committed will benefit from such an advantage and penalizes the original offence if the anticipated advantage does not ensue at that time.
- acts on the advice of assistant referees regarding incidents which he has not seen.
- restarts the match after it has been stopped.

## **Law 6: The Assistant Referees**

### **6.1 Duties**

One or more assistant referees may be appointed for a match. The duties of the assistant referees, subject to the decision of the referee, are to indicate:

- when the whole of the ball has passed out of the field of play,
- which side is entitled to a corner kick, goal kick or throw-in,
- when a player may be penalized for being in an off-side position,
- when misconduct or any other incident has occurred out of the view of the referee.

### **6.2 Score and time keeping**

The referee may assign the duty of time keeping and keeping a record of the score to an assistant referee. The referee may delegate some of his duties and also assign other appropriate duties to an assistant referee.

## **Law 7: The Duration of the Match**

### 7.1 Periods of Play

The match lasts two equal periods of 10 minutes.

### 7.2 Half-Time Interval

There will be a 5 minute interval between the two periods of play. The duration of the half-time interval may be altered only with the consent of the referee.

### 7.3 Allowance for Time Lost

Allowance is made in either period for all time lost through

- substitution(s) or removal of inoperative players from the field of play.
- assessment of faulty players and eventual repair in less than 30 seconds.
- any other cause.

The allowance for time lost is at the discretion of the referee.

### 7.4 Penalty Kick

If a penalty kick has to be taken or retaken, the duration of either half is extended until the penalty kick is completed.

### 7.5 Extra Time

There will be no extra time except for the allowance of lost time.

### 7.6 Abandoned Match

If one team becomes unable to play a match due to malfunctioning of players the referee may:

- Terminate the match and declare the other team to be the winner of the match
- Cancel the match and order a replay of the match at a later time.

## **Law 8 - The Start and Restart of Play**

### 8.1 Preliminaries

A coin is tossed and the team which wins the toss decides which goal it will attack in the first half of the game.

The other team takes the kick-off to start the match.

The team that wins the toss takes the kick-off to start the second half of the match.

In the second half of the match the teams change ends and attack the opposite goals.

### 8.2 Kick-off

A kick-off is a way of starting or restarting play

- at the start of the match,
- after a goal has been scored,
- at the start of the second half of the match,

### 8.3 Procedure for kick-off

- All players are in their own half of the field,
- The opponents of the team taking the kick-off are outside the centre circle until the ball is in play.
- The ball is stationary on the centre mark.
- The referee gives the whistle signal
- The ball has to be kicked forward into the side of the defending team. In this case kicking means literally kicking the ball, not pushing it.
- The ball is in play when it has been kicked and moves forward.
- Unless the ball is in play all players stay on their own half of the field.
- The kicker does not touch the ball a second time until it has touched another player.
- A goal may be scored only when the ball was touched by another player.

After a team scores a goal, the kick-off is taken by the other team.

### 8.4 Infringements/Sanctions (for kick-off)

If the kicker touches the ball a second time before it has touched another player:

An indirect free kick is awarded to the opposing team to be taken from the place where the infringement occurred.

For any other infringement of the kick-off procedure the kick-off is retaken.

### 8.5 Dropped Ball

A dropped ball is a way of restarting the match after a temporary stoppage which becomes necessary, while the ball is in play, for any reason not mentioned elsewhere in the Laws of the Game.

### 8.6 Procedure (for dropped ball)

The referee puts the ball at the place where it was located when play was stopped. Play restarts when the referee gives the whistle signal.

## **Law 9 The Ball In and Out of Play**

### **9.1 Ball Out of Play**

The ball is out of play when:

- It has crossed the barrier around the field of play.
- Play has been stopped by the referee.
- Before kick-off

### **9.2 Ball In Play**

The ball is in play at all other times.

**Law 10 : Method of Scoring**

10.1 Goal Scored

A goal is scored when the whole of the ball passes over the goal line, between the goalposts, provided that no infringement of the Laws of the Game has been committed previously by the team scoring the goal.

10.2 Winning Team

The team scoring the greater number of goals during a match is the winner. If both teams score an equal number of goals, or if no goals are scored, the match is drawn.

## **Law 11 Offside**

### 11.1 Offside Position

It is not an offence in itself to be in an offside position.

A player is in an offside position if it is nearer to his opponents' goal line than both the ball and the second last opponent (which is normally the goal keeper).

A player is not in an offside position if:

- it is in his own half of the field of play,
- or it is level with the second last opponent,
- or it is level with the last two opponents.

### 11.2 Offence

A player in an off side position is only penalized if, at the moment the ball touches or is played by one of his team, he is, in the opinion of the referee, involved in active play by:

- interfering with play,
- or interfering with an opponent,
- or gaining an advantage by being in that position.

### 11.3 No Offence

There is no offside offence if a player receives the ball directly from:

- a goal kick,
- or a throw-in,
- or a corner kick.

### 11.4 Infringements/Sanctions

For any offside offence, the referee awards an indirect free kick to the opposing team to be taken from the place where the infringement occurred.

## **Law 12 Fouls and Misconduct**

### 12.1 Direct Free Kick

No direct free kicks are awarded

### 12.2 Penalty Kick

No penalty kicks are awarded.

### 12.3 Indirect Free Kick

An indirect free kick is awarded to the opposing team if in the opinion of the referee or an assistant referee a player does any of the following:

- Deliberately runs towards and consequently collides with an opponent. There is no offence if the collision occurs due to the opponent accidentally crossing the path of the player.
- Pushes against another player for more than 5 seconds.

The indirect free kick is taken from where the offence occurred.

## **Law 13 Free Kicks**

### 13.1 Types of Free Kicks

Only indirect free kicks are awarded. The ball must be stationary when the kick is taken and the kicker does not touch the ball a second time until it has touched another player.

### FL 13.2 The Indirect Free Kick

The referee indicates an indirect free kick by two successive short whistle blows.

When the free kick has been taken and the ball has touched another player.

the referee signals the continuation of the game with a start of game whistle signal (one short blow). If the ball goes out of play the referee signals the halting of the game by a long whistle blow.

If the ball enters the goal no goal is scored and the game is started by the dropped ball method at the position of the offence for which the indirect free kick was awarded.

An indirect free kick awarded inside the goal area is taken from that part of the goal area line which runs parallel to the goal line, at the point nearest to where the infringement occurred.