# Hades2D soccer2D simulation Team Description paper

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**Abstract.** Soccer Simulation 2D League is one of the oldest leagues of Robocup competitions. In this league the soccer game is being sampled and simulated, and there are two teams playing toward each other. This paper contains descriptions of the activities of the Hades2D team through 2022, 2023 year. This year, we tried to use our own ideas to better increase the clarity of pass by dividing the goal and shootability and kicking. We also have improved formation.
**Keywords:** Robocup, Soccer Simulation 2D, pass, shootability

## 1    Introduction

The Hades2D team was formed in 2018 with the same name, and the team's activity continues until now. We started coding on staterAgent [1]. The starterAgent base of Agent2D or HeliosBase base had been simplified for students to use and we implemented the previous years' code on it [2] Hades2D team has participated in the IranOpen2020, JapanOpen2020 ,RoboCup2021 and RoboCup2022 competitions so far and managed to win the second place in the IranOpen2021 and JoniorCup2021 competitions. This year's team members are participating in these competitions for the first time.

## 2    Related work

Here is a brief description of articles from other 2D teams that helped us. Hillstone2019 shows the ability to shoot using angles.[3] Hades2D 2021 We implemented our code on the code of this TDP and also got help from their pass strategy.[2]

## 3    Offense

### 3.1 Shoot

First, we divide the goal for accuracy and better performance in the shoot into 24 different regions, and according to the position of the goalkeeper, we remove the quarter near the goalkeeper's location and the secondary paths, and finally, according to the specified criteria and factors, the ways are scored and the best We choose the way to hit.

Conditions that must be considered in scoring the route:
- The distance between the ball and the goalkeeper
- Location of the goalkeeper
- The distance between the ball and the opponent's player
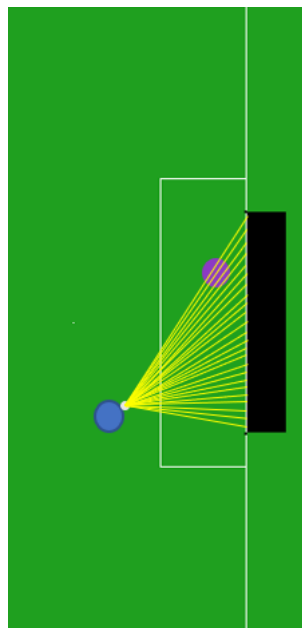


**Fig. 1.** How to split and score the ball holder for a shoot

### 3.2 Shootable

We said above that we divided the gate into 24 parts. Using this pattern, we calculate the probability of a successful shoot based on the angle of the player and the target,

toward each of these areas, and then shoot toward the area that has a higher probability of scoring.
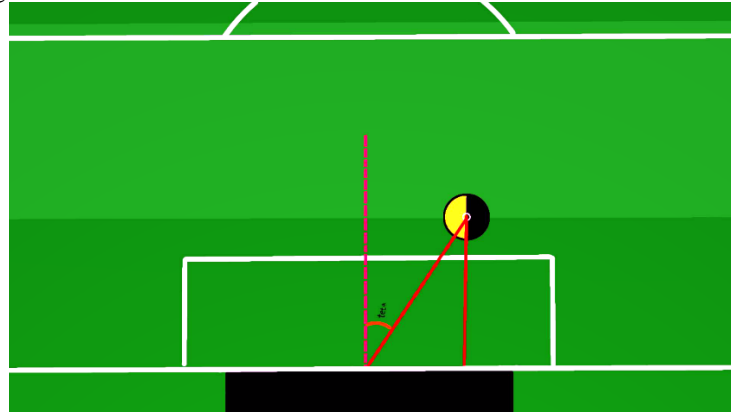


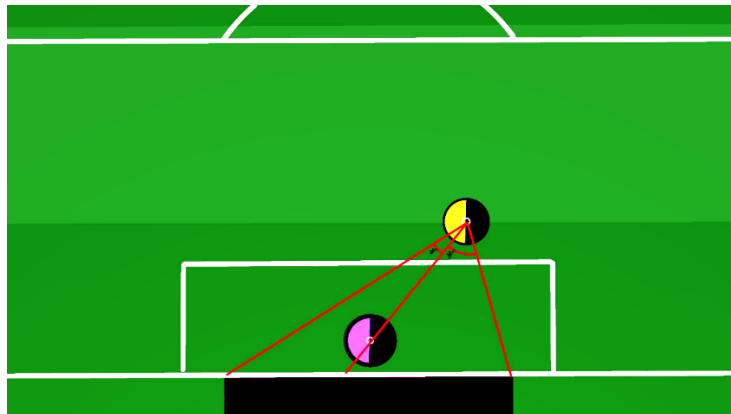**Fig. 2.** Drawing angle to find the position between the ball holder and the goal



**Fig. 3.** Drawing angle to find the position between the ball holder and the goal

### 3.3    Pass

A direct pass is a type of response that goes directly from the responder to the receiver. Here too, we must pay attention to the distance between the ball and the opponent's player and the amount of energy of the ball.

Factors that should be considered in choosing the recipient player:

- Number of nearby opponent players
- Distance between receiver player to opponent
- Available certain limit for the distance between the passing player and the receiver

- Available teammate near the receiving player

We rank the players according to these characteristics and choose target the player who had more points.

### 3.4 Formation

In our program in the formation section, we divided the playing field into triangular sections. According to the ball's position in each triangular area, we determine the layout of the players(showed in Fig.4).
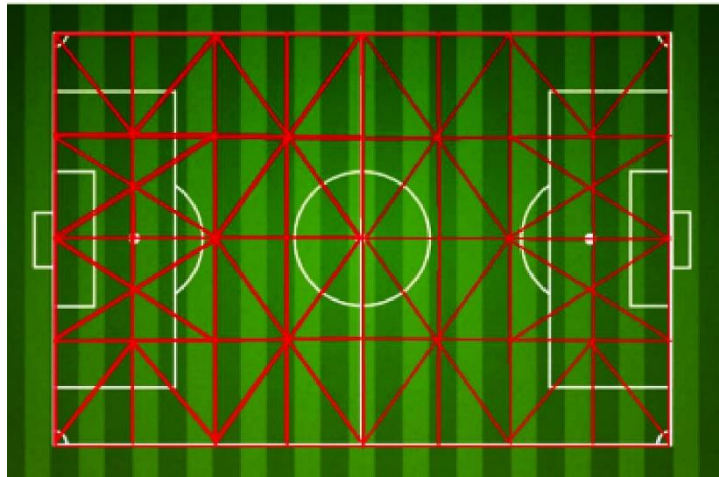


**Fig. 4.** Formation triangular section in the field

## 4 Future ideas

Currently, our team is working on the deep pass pattern, and our future tasks include:
- Adding deep and side passes to the attack strategy: In these two passes, we choose the best place for the pass using the scoring method.[4]
- Blocking[5] and unblocking[6] and strengthening the defense: in blocking, our player blocks the way of the opponent player so that he cannot receive the pass of the ball owner.

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