

# **Team Griffins**

## **Soccer Simulation Challenge**

### **RoboCupJunior Soccer at RoboCup 2021**

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**Abstract.** We are team Griffins and this is our first time on Soccer Simulation. Each of our robots has a fixed role assigned to them on the field. The first is the goalkeeper and the other two are the strikers. The goalkeeper moves in front of his goal area. The attackers try to get the ball into the goal. They are able to predict position of the ball to catch it in an ideal position. During programming, we also learned a lot of new things and we hope that in the future we will be able to improve even more.

**Keywords:** Robocup, Soccer Simulation Challenge.

## **1 Introduction**

We are 14-16 years old students from 2 schools in Bratislava – Slovakia:

- 8-year grammar school Grösslingova 18 (GAMČA).
- 5-year high school Bilíkova 24

Team members: Matúš Mišiak, Tomáš Kováč, Mathias Suroviak.

Our mentor: Radoslav Kováč.

In the past we participated in soccer with real robots, but this is our first time in simulation soccer.

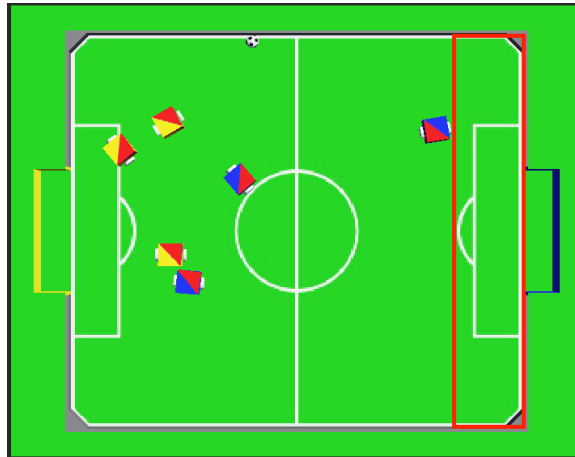


**Fig. 1.** Our school buildings in Bratislava, Slovakia

## 2 Robots

### 2.1 Goalkeeper – Robot1

- Most of the time he is in front of his own goal.
- Its basic rotation is parallel to the goal line and by moving forwards and backwards it tries to get to the estimated position of the ball.



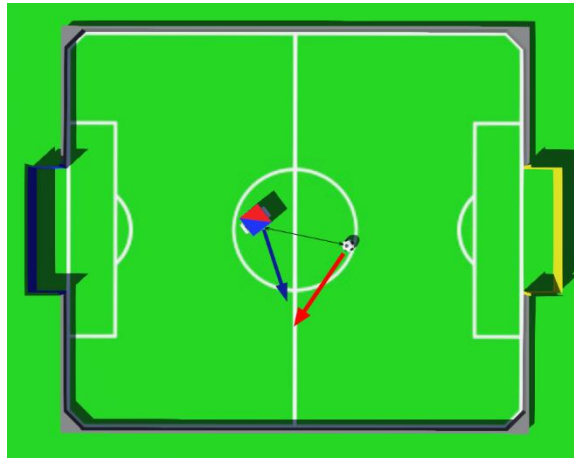
**Fig. 2.** Goalkeeper defense area (red)

- The main task of the goalkeeper is to keep the ball in front of the area behind him (red area in the picture).
- it uses two techniques for this, depending on where the ball is located.
- If the ball is on the opponent's half, the robot moves only in front of his goal in order to catch the ball if it goes to the goal.

- If the ball is on our half, it goes to the edges so that the ball does not get behind it.
- And if the ball gets behind him, he turns around and goes after it and tries to push it away.

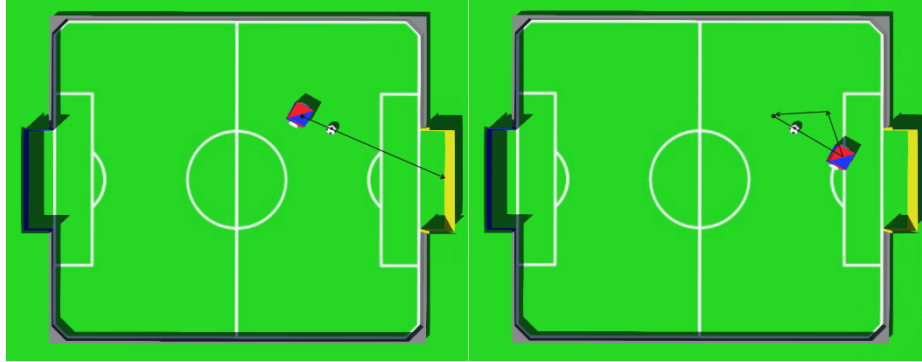
## 2.2 Primary striker – Robot3

- Calculates the position of the ball in the moment the robot reaches it (provided that the ball does not change direction)
  - Repeats the calculation three times, each with just-calculated new position of the ball (because the time it takes for the robot to reach the ball depends on the position of the ball)
  - From now on the robot will use the new position of the ball



**Fig. 3.** Ball position calculation. Black arrow: current distance between robot and ball.  
 Red arrow: position of the ball in the moment the robot would be on current ball position.  
 Blue arrow: position where robot should go instead (quite shorter because we do not know new distance between robot and ball)

- Calculates the position for shooting
  - The ideal position for shooting lies on the line defined by position of the goal and position of the ball, 8 cm from the ball:
- If there is the ball in the way to target position, it tries to avoid it:
  - While the ball is in the way, the robot moves  $30^\circ$  more right than it should

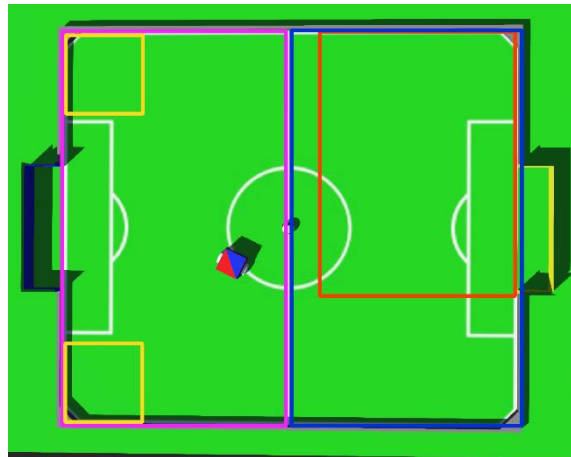


**Fig. 4.** Position for shooting (left). Avoiding ball (right).

- When the robot reaches calculated position for shooting, it goes to the goal, pushing the ball along.
- While moving to target position, robot decides whether it is faster to turn to the position with the front side and go forward or turn to the position with back side and go backward (whereas the robot is symmetrical).

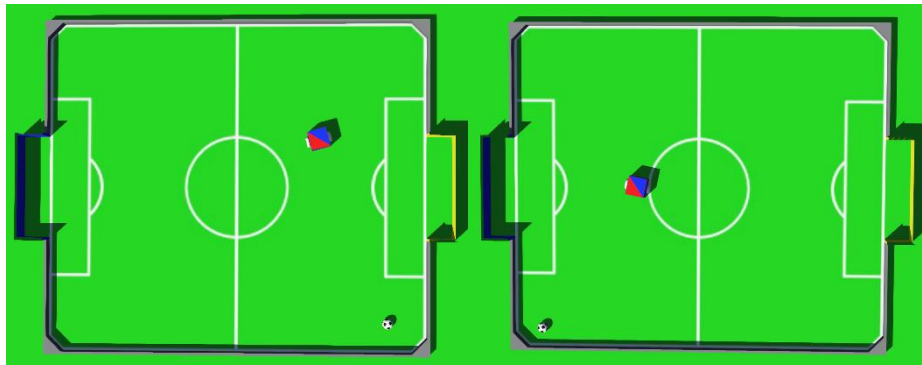
### 2.3 Secondary striker – Robot2

- Secondary striker assists Robot3 during attack.
- Calculates future position of the ball and tries to strike it in that position (same as Robot3)
- Doesn't touch the ball if it would lead into a shot on his own goal



**Fig. 5.** Different zones considered in Robot2 behavior

- If the ball is in the blue zone, then Robot2 helps Robot3 with scoring a goal by waiting at a position in red zone. If the ball is in the blue zone, he waits for it to come to the red zone and when ball gets in red zone, he tries to score goal.
- If the ball is in the pink zone, then Robot2 tries to deffend a goal. If the ball is in one of the yellow zones and is closer to his own goal than Robot3, then he goes on a position, from which he can guard shot on goal from lack of progress.



**Fig. 6.** Robot2 attacking position (left). Robot2 defense position (right).

### 3 Conclusions and Future Work

We learned:

- How to use github
- Object oriented python programing
- Lot about strategies from watching videos of other robots playing
- How to work together as a team

What to do in the future:

- We would like to implement striking a ball, which bounces of the wall
- Adjust positions for Robot
- Clean up the code

### References

1. RoboCupJunior - Creating a learning environment for today, fostering technological advancement for tomorrow. RCJ Soccer Simulation Challenge (2021). Retrieved June 20, 2021, from <https://junior.robocup.org/rcj-soccer-simulation/>