# Power

## RCJ Soccer Simulation Challenge 2021

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**Abstract:** In this TDP you are going to meet our team and read about the strategies and algorithms we used in this league.

Keywords: team, strategies, algorithms, league

### 1 Introduction

Power team is formed from students. We are studying robotics for 5 years. This team was stablished four months ago and before simulator league we also participated in a league named junior cup. We also made linefollower robot and soccer player robot and we know 2 programming languages: c++ and python.

**2 Software**

The first and the most important part of our program is the roles. This part determines that a robot should become a goalkeeper, an attacker or a midfielder. It works with the distance between our goal with the robot and the ball with the robot using this formula :

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

The robot with the lowest distance between our goal and the ball was always the goalkeeper, the robot with distance from the ball was the attacker wand the other was our midfielder there was a problem .


In this screenshot for example as you can see in team yellow the robot in the middle(Y3) is the goalkeeper because it is closest to our goal and situations like these gave the opponent an opportunity to score a goal easily. This problem was solved by just an 'if' for situations like this.

The attacker always compares ball's x,y and its own x,y and then goes behind the ball. That way the amount of goals scored by our own attacker decreases.

Midfielder is a support for attacker which always stays in the middle of the field and supports the attacker. sometimes like this:


The attacker was in the corner but it doesn't recognize it and goes forward then the ball shoots out towards the middle of the opponent's goal. Normally the ball goes to the other corner but here we have our midfielder which is present in front of the goal and scores a goal easily.

**2.1 Shift2**

This strategy meant to complete the regular shift we had. We divided the field into 3 rectangles and it was based on ball's y. The middle on didn't need change because the ball was in front of the goal so it required the normal shift. But the other 2 rectangles needed a change. This shift was that change so that the attacker turns around into a curtain angle and goes forward until it is behind the ball then robot again turns around and goes forward this made the balls which weren't in front of goal a straight score.

When the program was done we compared it with the first shift. We put the yellow team the one with shift 2 and the blue the one with the first shift. Yellow team lost 3 games out of 2 by far so we removed shift 2 from the program but the is still available.

**2.2 Defence**

A strategy that didn't last long. The idea was that if opponents robot and the ball are too close to our goal the three robot get in the best position to defend the goal and program was almost ready then we realize that the opponent team can change their robot's name so we couldn't access to their robot's data and this was the end of the line for this strategy.

**2.3 Easy move**

So if we give a point's x,y the robot will go to that point. It is very helpful of course. We added this function to every single robot with a simple but effective strategy. Whenever the ball goes to the corner and sticks in there and if the robot is around that area it will use the function and goes to the middle of the field. Then when the operator  moves the ball out of that area our robot is ready to catch the ball and score a goal.

## 3 Conclusions and future works

This program had many ups and downs we added things and removed them. The hardest part was probably having an idea to work on it. Writing the exact same program for the other robot team was hard as well since everything was the opposite. all of the remaining programs are functional and works perfectly and try their best to score a goal. But overall it added some good and new experience to all of us .

In the next year we will expand our work and we might change our league. We will make more robots as well.

## 4 References


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