

Turbo-Technorobiran

RCJ Soccer Simulation Challenge

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Abstract: In this article, we wrote about the general resume of the group members and their introduction. We also wrote about the robot programming process and its programming problems and solutions. And after that, we give a brief explanation about the final performance of the robots. Finally, we wrote about the common career goals of the band members and the experiences we have gained.

Keywords: c++, phyton, go_xy, corner, att, bar, line-follower

1 Introduction

Each of our members has a similar resume almost, but this is the first time that We have become a team. We can program in C++ and Python language well.

about the hardware, we have built a line-tracking robot with three sensors for beginning of working with the hardware and then we built another line- following robot with five sensors and for the last, we built another line-follower with thirteen sensors. in building these robots, we tried more for each one of the robots with three sensors to thirteen sensors and Each of these has a much more advanced and accurate operation than.

We use some Electrical parts for building them like Transistors and Infrared transmitter and receiver (as their sensors) and something else like two drivers for two wheels of them or Resistors and capacitors with different values and the most important part of robot-microcontroller. We designed the circuits of the robots, and after printing the them and installing and soldering the parts on them, we programmed the robots completely and witnessed the correct operation of each of them.

In general, our programming was how that the robot was in usual state (means when the sensor of center is top of the line and it can see it) and some other states like when the right sensor can see the line but another sensors can't or when the left sensor can see the line and some other states.

We programmed all of these and we made ready it to work properly and after building these robots, we I continued learning C++ and after that, we built a high weigh footballer robot how it was completely with the rules related to the game of football robots.

I designed its circuits and installed its part on it and I programmed everything that it needed to know should to do.

the most important parts of this robot and Reason for using them:

- "sharp" = to distinguish distance to the walls of the game ground and not Crossing of the special white line

- "compass" = to smooth the robot towards the opponent's goal and prevent the goal itself

- "LDR" = to distinguish color of lines on the game ground

- "Driver" = to control the amount of electric current which motors need

- "TSOP1138" = to connect the Pulse transmitters in the ball

and now we are learning Graphic programming alongside Asian competition.

We were in another match a few months ago named "Junior Cup 2021". It was a new and good experience for all four of us, because it was the first competition for all four of us, but in that match, we were not a team and only Zeinab Mousavi and Parinaz Khodadad Jafari were in the same team that time. It was 7 rounds in two trial and original versions.

We learned how we can find our code's problem with watching the streams and something other things. And it was the biggest event for us.



2 Robots and Results

2.1 software

The default program provided to us had many shortages. After fully learning how to work with the simulator and understanding all the commands that were given to us, we started writing the initial program, which was qualified. In that program, we first increased the robot's ratings and the type of movement to increase its probability of the robot reaching the ball faster by returning its value.

Our general plan was that one of the robots would be a goalkeeper throughout the game, one a striker and the other a midfielder. The goalkeeper's plan was to rotate ninety degrees after being in the penalty area and move to the position of the ball to keep the goal safe.

We expected to reduce the scoring percentage by keeping the robot in the penalty area, but there was a big problem, and that was that if the ball remained in the penalty area for 15 seconds, it would be damaged, leaving the goal empty for a while.

The attacker's robot was more looking for the ball. But by adding a function called Compass in the utils file, we tried to keep the robot at the opponent's goal and prevent it from scoring its own goal. The last bot, the midfielder robot, also identified its task by examining the position of the ball, and at the appropriate and defined time, sometimes went to the aid of the goalkeeper and defended his own defense, and sometimes to the attacking robot, towards the goal. The opponent was going.

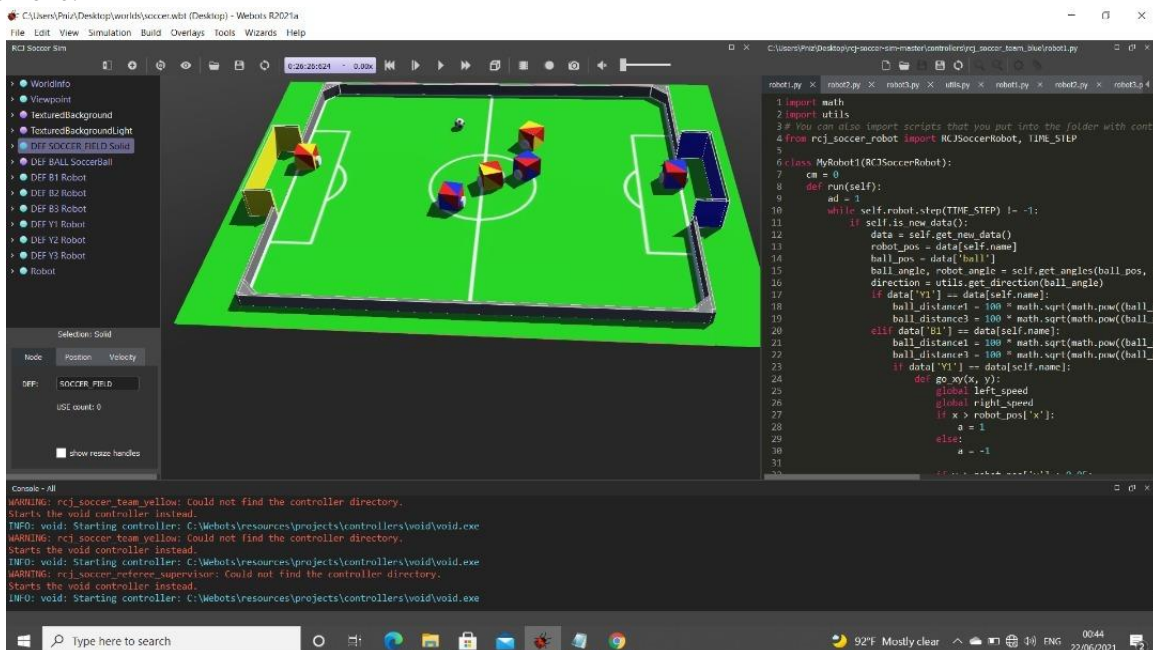
Finally, we established a connection between the robots so that when two or three of our own robots are close to the ball, one of them, which is closer to the ball, takes possession of the ball and the other until a condition is entered. Stand up with. We also calculated the distance between the ball and the robots using a mathematical formula and stored it in a variable called "ball_distance".

But after qualifying, we realized a lot of weaknesses by holding a few competitions inside the school and decided to change the code a lot.

First, we changed the ranges we specified in the direction function a little, and then in the main program, by returning the values of that function, we wrote new conditions to better follow and control the ball.

In this new program, we had a goalkeeper and two strikers. Robot two, our goalkeeper robot, and robot three and one were attacking robots

We made the conditions of the second robot more precise in order to get a better performance, and we almost solved the problem that existed in the program that had been qualified by increasing the robot's interval. We went for better ideas for robots one and three and wrote them down by experimenting with each one.



2.3 Cmp function

The “Cmp” function, the shift function, and the follow function were the first functions we were able to write successfully. We wrote the connection that was safe in the previous program (maintaining the distance between the robots) in a function called “att”.

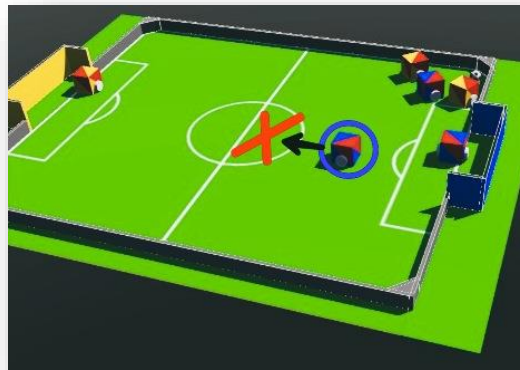
With more thought and experimentation, we came up with other practical terms that we wrote in a function called “bar”.

Then we looked at the corners of the field, which sometimes caused the robots and the ball to be engaged and stationary in a corner of the ground for a few seconds, and the referee ended the conflict after 15 seconds by placing the ball on the neutral point. We came up with an idea for the connection between the robots.

One of the most used neutral points was the neutral point in the middle of the ground. If one of the robots reached the back of the neutral point before reaching 15 seconds, he could have scored a great goal by placing the ball in the neutral point in the middle of the field. But to do this, we needed a program to use it to instruct the robot to go to a certain point on the ground and stand there.

2.4 go_xy function

By testing and printing the values of X and Y robots in different parts of the ground and different positions of the ball and the robot, we were able to write this program and put it in a function called “go_xy”.



2.5 corner function

After that, we turned the idea of communication between robots when stuck in the corners of the ground into a program and wrote it in a function called “Corner”. Finally, we could call the whole program by calling two main functions called “corner” and “bar”, Used the whole program.



3 Conclusions and Future Work

In these competitions, we learned how to use our knowledge of programming and prepare one or more robots for a specific purpose and program. We also learned how to see the problems and weaknesses of our robots in competitions and then understand the programming problems and try to solve them.

All of this led us to gain valuable experience, and to record these events in our resumes.

About our future, each of us has almost different goals, but some of our goals, which are the same, are to be able to get the result we expect from each match and our efforts. And their experience will help us to have an easier way to continue this field in school and university. One of our common goals is to study at a university, in one of the fields related to software or hardware, and to succeed in it so that we can get a scholarship and continue our studies better. And at the end of the university, to start a job related to our interests, to serve the world and our country.

4 References

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