# Robocup2021
# Junior soccer simulation

## Team name: Allameh Tabatabaei

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**Abstract:**

The jounior soccer robot just includes software.Jounior soccer simulator is disigned with webots that is kapble of programming with python.After starting webot simulator and runing robots program we recived program data that includes posion of robots ,posion of the ball and direction of robots.using this data we programed our robots and we tried to write difrent algorithems.We used farest robot to the ball algorithem for goal keeper.We made a program that moves the goal keeper inside a difined area for getting read of lec of the progress and we used another algorithm named headlook that finedes where the ball is going to be and moves the goal keeper to that posion.

**Keywords:**
Software,Simulator,Webot,Programming,Python,Algorithm

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## 1 Introduction

Robotics is one of the most popular subjects in the world.We started learning robotics and programming from last year in school.We first made junior soccer robots then we heared about robocup simulator league we downloaded the simulator named webots and started learning and using it.Then we learned python for programming the robots in webots.We first made a simple program that just follows the ball and then we added new algorithms like headlook to the program and submited the code and then we got ready for technical challenges.Varieties of knowledge's and sciences are used for design, implementation and construction of robots. Robots are intelligent, programmable and flexible machines that perform the necessary steps to achieve the goal of the assigned mission using received data from their surrounding sensors and transmitting these data to the command section and then performing commands.Our team started its activity at early 1398 with tips of teachers and succeed to obtain permission for presence in Iran Open 2018. Using experiences of participations in internal competitions like Junior Cup and Iran Open 2018, we try to solve the problems of our robots for a better presence and participation in the tournament of the 2021 Asian and Pacific championship in junior cup sim. Considering the terms of competition, our team members started to study other robots and to earn necessary information for design and use the simulator of the robot. It should be noted that, the team activities include necessary study to improve the functionality of our previous robots. In this regard, we study the mechanic and hardware of similar robots and duties of their parts, recognition of their equipment (software and hardware) and their workmanships. The team activities divided into two phase ; In the first phase, we performed introductory programming, advanced programming . The second phase (advanced phase) includes running our program and use the webot. Considering details of each phase, our team do the best to prepare new robots for best appearance in Iran Open 2019 and Asia pacific competition were held in juniorcup 2021. In the following, each of the sections mentioned above is explained.(figure_1)


Figure_1: Robotics and Robocup

## 2 Software

Robocup jounior soccer simulator league is based on software and does not contane any physical part or electronic it uses a robot and physics simulator named weboots and uses python for programming the robots.(figure_2)


Figure_2: webot simulator

## 3 Webots

Webots is a platform for making simulators for robots at .Robocup jounior soccer simulation leage simulater is made with webots to it made of two teams that each have three robots that can only move with two wheels that limits the movement of the robot to forward and backward but if you want to move the robot in anoather direction you need to first rotate the wheels in uposit directions that turns the robots the you can move.(figure_3)

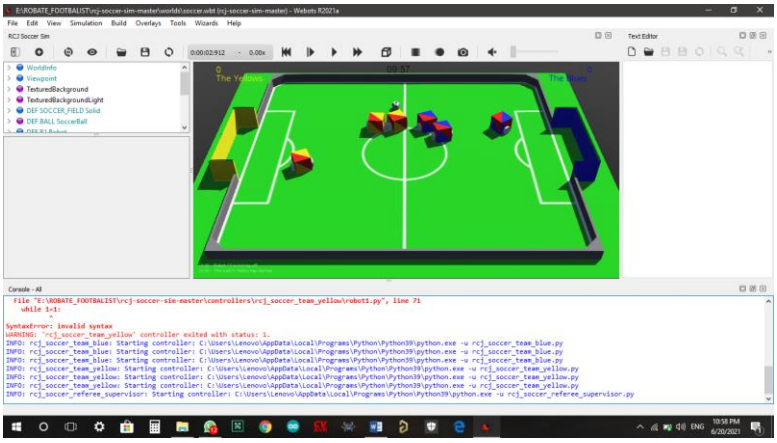

Figure_3: webot software

## 4 Program

We program the robots in webots with python. .Python is one the worlds most popular programming languages that is used in so many programs and projects.We learned python in last year at school and practiced python a lot in this year.We used python in a lot of projects in pass.(figure_4)

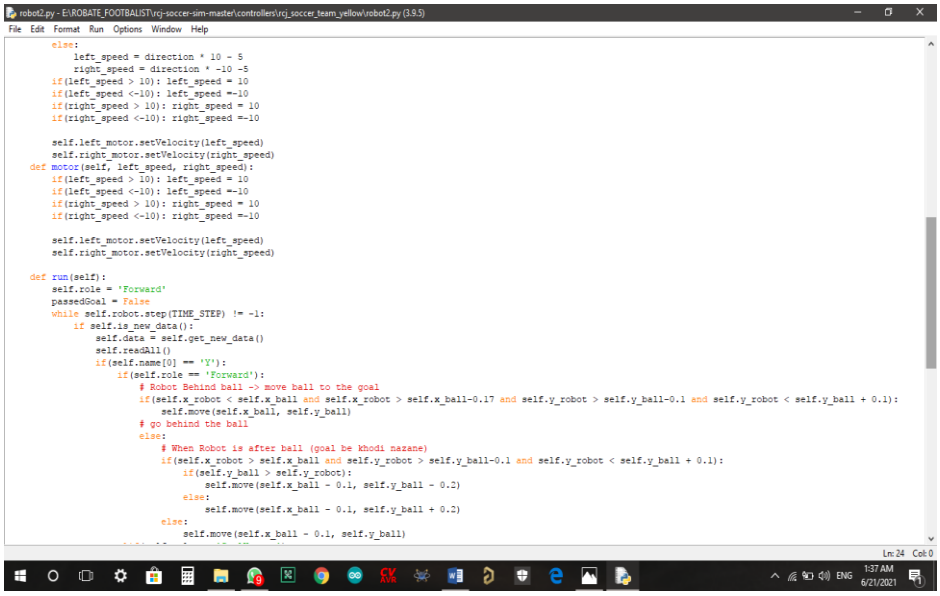


Figure_4: programing software

```
def newDataProccessing(self):
  self.rawData = self.get_new_data()
  self.position=self.rawData[self.name,
  self.rawData[self.name]['y']
  self.lastBallPosition=self.ballPostion
  self.ballPostion = self.rawData['ball']['x'],
  self.rawData['ball']['y']
  self.distances = {}
  for i in ROBOT_NAMES:
  self.distances[i] = utils.getDistance(
  (self.rawData[i]['x'],self.rawData[i]['y']),(se
  lf.rawData['ball']['x'],
  self.rawData['ball']['y']))
  def move(self, position):
  x,y = position
  angle = utils.correctAngle(self.get_angles(
      {'x': x, 'y': y},
  self.rawData[self.name])[0])
  direction = utils.getDirectionBy4(angle)
  value = self.distance/0.15*1.5
  if value < 1:
  value = 1
  if angle < 90 or angle > 90:
  if direction == 1:
  self.left = -10
  self.right = +10
```

## 5 Algorithms

An algorithm is a procedure or formula used for solving a problem.You need to make a lot of algorithms in order to make a program for soccer robots.we used some algorithms in our program to like head look or farest robot to the ball algorithm.heal look algotirh caculates the vertical posion of the the ball inside the goal based on two posions of the ball in two difrent times that calculated with line equlations.The farest robot to ball algorith finds the farest robot to the ball and puts it inside the goal it fineds it using pythagoras theorem but we use a simple trick to higher preformance.We use the squre of a number instade of calculating the squre root of a number that highers the preformance a lot becuse it does not need to calculate a squre root every time.(figure_5)


Figure_5: ball distance

## 6 References:


- https://drive.google.com/file/d/1WdsB8ayPtIh3qTKui0jDZdmWI-ShMa8/view
- https://github.com/RoboCupJuniorTC/rcj-soccer-im/archive/refs/heads/master.zip
- https://www.python.org/downloads
- https://github.com/