IESL Robogames - Final Challenge

This is the final and actual challenge that you must complete in order to be ranked in Robogames 2022.

Resources

You will be provided with this document, and a Webots project containing the world file. The world file will contain the maze (arena), “E-puck” robot, and a supervisor robot (not a physical robot). The supervisor robot will determine the rules of the challenge. It will keep the score and generate collectibles etc.

Extract the .zip file, go to worlds folder and double click on “FinalizedMaze.wbt” to open the world.

Challenge Description

As you are most probably aware, Sri Lanka now faces an economic crisis centred around the currency. The robot “Dave”, has decided to collect rupees scattered across the country and convert them into US Dollars. You have to teach Dave to collect Rupees and convert it into Dollars.

Rules

- Rupees are yellow spheres. They will be generated randomly. (Run the simulation to see a couple of them)
- Dave needs to move towards a yellow sphere to collect the rupees.
- Each yellow sphere contains 1000 LKR.

- Dave has to pay taxes. He will be taxed Rs. 5 per second, but only from his rupees account. (He will not be taxed for holding on to dollars.)
- When Dave moves into one of the black and white squares in the maze (the goals), all rupees Dave currently possesses, will be converted into Dollars.
- But different goals have different exchange rates. And the exchange rates change randomly every minute.
- Only dollars will be counted for the final score. Not rupees.
- Dave's wallet can only hold 10000 LKR at once.
- Dave can hold an infinite amount of Dollars.
- If you exceed the maximum amount allowable in Dave's wallet, the Exceeding amount will be lost.
- In Robogames 2022, the team whose Dave possesses the most amount of dollars after some designated period of time, wins.
- Timecounter will be started after Dave gets his first rupees. (You can use the time before he collects his first rupees as you see fit.)

Emitter

The supervisor robot will contain an emitter that will transmit certain data in channel 1. This data will be useful for Dave. Since Dave has a receiver built-in, he can listen to channel 1 and receive that data. Click here to see how to use Receivers in Webots. The data will be transmitted as a JSON string.

Data that will be transmitted:

- Time passed since the start of the simulation in milliseconds.
- X,Y coordinates of collectibles (yellow spheres that contain rupees)
- Amount of rupees that Dave currently possess
- Amount of dollars that Dave currently possess
- X,Y coordinates of the goal and the exchange rates of the goals (Try to make Dave reach the centre of the goal because even though the goal looks like a white rectangle, the actual goal that

the supervisor considers is a circle. As long as Dave reaches the precise goal coordinates that the emitter transmits, it will work)
- Location of the Robot.
- Direction the robot is facing. It will give the angle relative to some direction, in degrees. It will always give an angle between 0 and 360.

Deliverables

- You will need to submit the controller code of Dave. This is the only submission that will be accepted. You cannot make any changes to the robot.

- You need to code the controller in Python.

- You can use any 3rd party Python library you wish. But you must provide us with clear instructions on how to install that library in our computers where we test it,

Warnings

- DO NOT change the supervisor code. You can easily edit the supervisor code and change the rules of the challenge, but since we only accept the controller code of Dave, those changes will not be there when we run your code to evaluate.

- We will run your code on our computers to evaluate. If there are any errors we will let you know as we want all of your submissions to be valid.

- For the University category, we will be slightly changing the maze when we evaluate. So do not hardcode your solution for the maze we provide. Since almost all school students are new to programming, we will be a little less demanding on them.

Notes

- You are welcome to point out any mistakes we have made, as mistakes are inevitable. If you are correct we will update the challenge so that everyone has a fair chance.

- Although collectibles are generated randomly, they are generated pseudo-randomly, so that everyone will have the same challenge.

- Contact Oshanath (077 243 5654) to report any bugs or inconsistencies in the challenge.

- If you need help in completing the initial challenge, we are happy to assist you. Depending on the nature and frequency of your questions, we will be able to organise another workshop session where we discuss any problems you face.

Changelog

- In the version 2 of the challenge, all collectible nodes are generated at once at the start.

- You have a maximum time of 5 minutes until the timer starts automatically. If you collect some money before those 5 minutes have passed, the timer will start immediately. You can use the time until the timer starts, to do anything you require.

- In version 3 of the challenge, we have removed the green colour of the walls so now distance sensors work as expected. We have also removed paths that were too narrow for Dave to travel through.