Python Project

Subject

Final date : 17th January 2021

1 Final Project

For your final grade, you have to make a small project with Python.

1. You need to create a simulation of a battle between robots
2. For the interface, you can use any library that you want.
3. Create a README for the use of your program
4. A python file or a notebook can be accepted
5. Submit your file on Teams

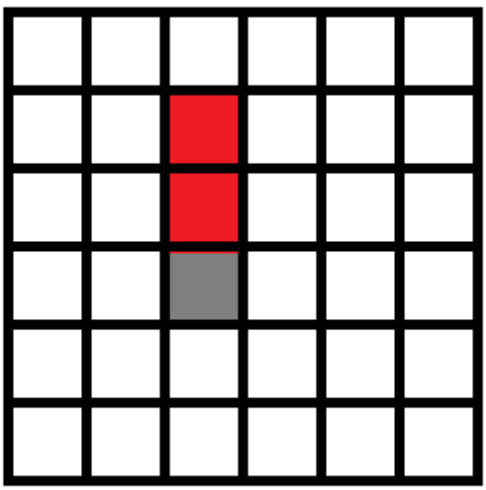
You can talk with your comrades and share your ideas, but cheating/copying is not allowed and will be punished.

2 Robots

The robots are separated in two teams: the blue team and the red team. Each robot starts with one **simple body** and one **basic weapon**. The different bodies are:

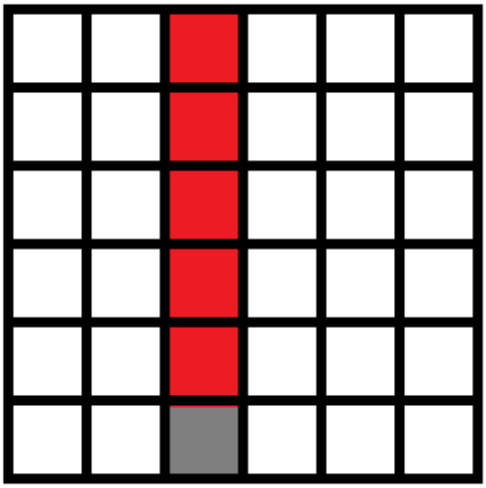
- Simple body: it gives 2HP to the robot
- Hard body: it gives 5HP to the robot
- Light body: it gives 3HP to the robot and gives +1 Mvt
- Battle body: it gives 2HP to the robot and adds +1 weapon slot

The different weapons are:
Basic weapon: it does a basic shoot for 1HP



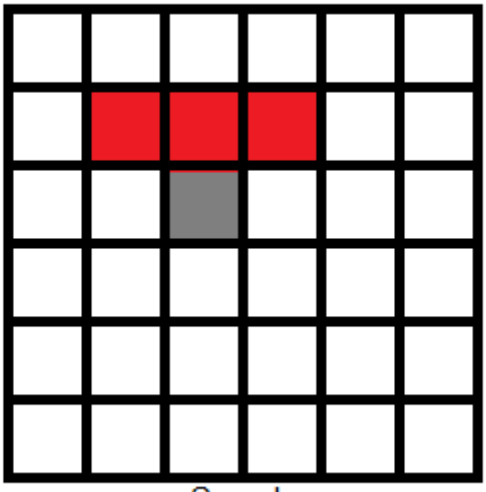
Basic shoot

Laser: it shoots all the cells in front of the robot for 1HP



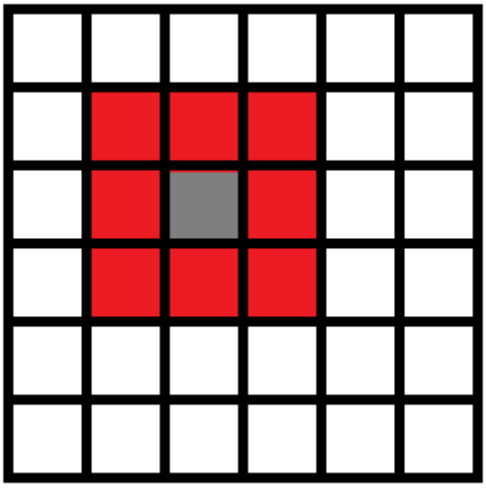
Laser

Sword: it slashes in front of the robot for 2HP



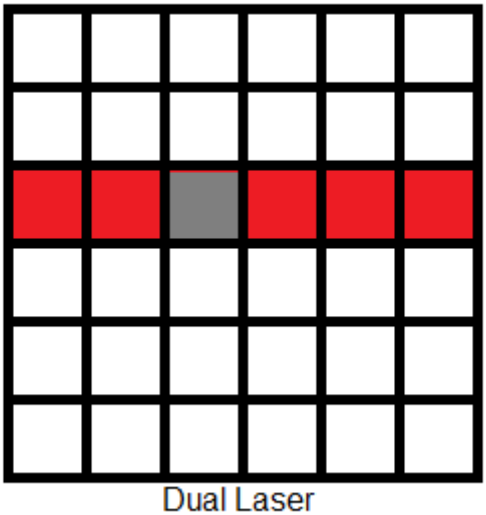
Sword

Explosion: it explodes for 1HP in an area around the robot



Explosion

Dual Laser: it shoots all the cells on the sides of the robot for 1HP



Dual Laser

Twin weapon: it adds +2 weapon slot to the robot

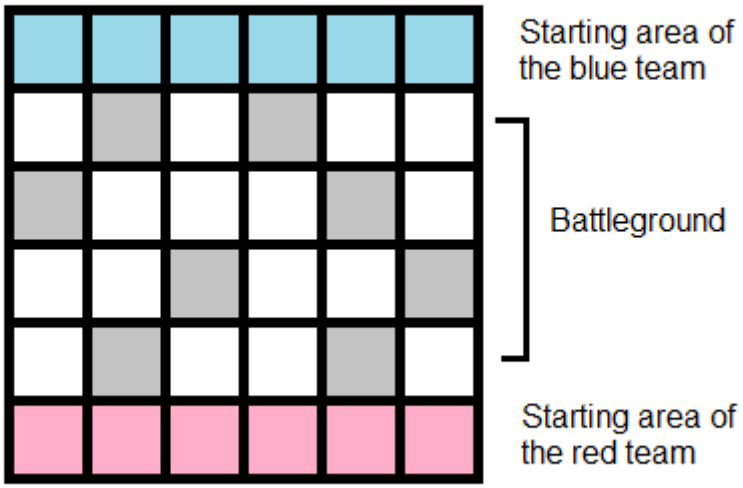
The different area of effects of each weapon is shown on the picture below each description. The grey cell represent the robot and the red line on this cell represent the direction the robot is facing.
Each robot starts with a **simple body**, a **basic weapon**, **1 weapon slot** and **1 Mvt**. When a robot is destroyed, it drops a random weapon or a random body (not necessarily one that the robot possess).

3 The battle

At the beginning of its turn, each robot move from 1 cell for each of its Mvt. It can move up, down, right or left. After that, it can change the direction its facing, then use all of its weapons equipped.
If a robot moves on a cell where a weapon or a body has been dropped, it takes it. 2 robots cannot share the same cell. If a robot try to move on a cell where there is an obstacle, like another robot, or the side of the board, nothing happens and the movement is lost.
A robot can have 1 body equipped and 1 weapon equipped for each weapon slot. A robot can have multiple bodies, but only one can be equipped at the same time. It is the same for the weapons, a robot can have more weapons than weapon slots, but will only be able to use the equipped weapons.
A robot can change its body and weapons at the end of each turn.
Each robot has a behavior. The basic behavior is to do everything randomly, but you can create specific behaviors (this will give you bonus points) like "aggressive" or "defensive" for example.
It could be a good idea to create an object for the robot, another for the weapons and another for the bodies.
The battle ends when all the robots of a team are destroyed.

4 Arena

The robots are fighting in a square arena of 6x6 cells.
The robots of the blue team start in the first line and the those of the red team in the last line.
The position of the robots is random at each new battle.
The first team to play is also random.
The arena also changes at each new battle with 8 deactivated robots randomly placed on the battleground (and not on the starting area of each team). Those robots are represented by grey cells on the picture below. Deactivated robots are obstacles with 1HP and they drop a weapon or a body when they die.



5 Interface

The interface needs to have at least a menu with the option to quit and create a new battle. The board needs to be visible and a button should be present to pass to the new turn of the game. The interface should also give the possibility to decide the number of robots present on each side. When the battle ends, a message should show the winning team.

6 Bonus

It is possible to add more options to the battle like:

- The option to have a bigger board
- Replace deactivated robots by neutral robots
- Smarter behaviors for robots
- Teleportation of new neutral robots on the board when the time pass
- etc

Bonus points will be granted if more options are added to the project.