

Design Document

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The whole project is about to draw the entities in the window(arena), and update the entities in the window every second. There are 2 types of entities in arena: mobile entities and immobile entities. The mobile entities are robot and homebase, and the immobile entities are obstacles and recharge station. The whole window is forming a coordinate, the top left corner is (0,0) and the horizon axis is x-axis and the vertical axis is y-axis. There are two ways to end the game that win and lose: the user moves the robot touched homebase; or the robot runs out of battery.

All the entities are shaped as circles and have three basic properties: radius, position and color. The radius will decide how big the entities will be; The position will be represented as the coordinate of the center of circles; and the color is determined by four integers ranged from 0 to 255: red, green, blue and alpha.

Arena mobile entities are derived from arena entity, which means arena mobile entities not only have the properties of arena entities but also contain its own functionalities, such as collision delta, heading angle, speed. The robot is a subclass of arena mobile entity, which has more detailed functions: battery, id and name. The homebase is another subclass of arena mobile class, which is slightly different from robot. Both of robot and homebase are associated with motion handler, motion behavior and sensor touch. These abstract classes will help us even easier to manipulate the behavior of the robot and homebase. Although robot and homebase are moving objects, one can be controlled and one cannot be controlled. Homebase is set to be an object that moving with a random speed and constant changing directions. The robot can be controlled with high or low speed with limit of maximum or zero speed and its direction also can be changed by the user.

Arena immobile entity is derived from arena entity, which also has the same properties: radius, position and color. The obstacle is derived from arena immobile entity. They are objects that have a fix position and vary distributed with different radius in the arena. The obstacle is used to reflect the robot and each time the robot touched the obstacle, the robot speed and battery will be depleted.

Both robot and homebase cannot go out of the boundary, and they should bounce with a reasonable angle. There are two control buttons: restart and pause. Restart will reset every object in the arena; pause will freeze the motion of robot and homebase. When pause button is pressed, it would be changed to play.