

Embedded System Design- Team Project

1. Introduction

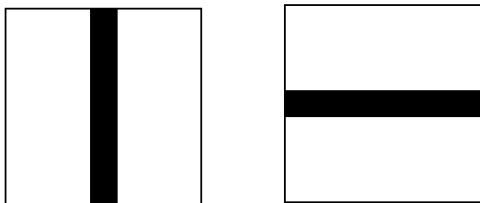
We will make a LineTracer Robot Based on what we learned in a class. The LineTracer is a robot that starts at the starting line and follows the black line to the finish line. Considering efficient shortest-path algorithms, motor control and etc, you have to arrive the finish line as fast as you can.

2. Maze

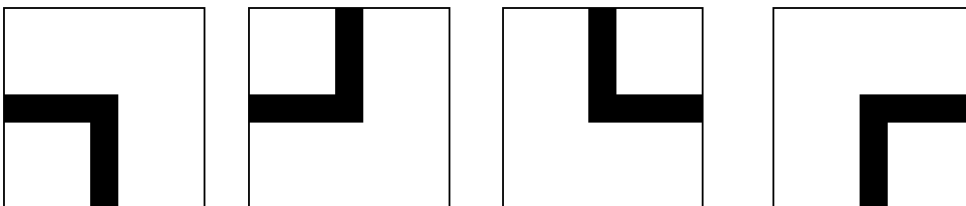
You have to go through two mazes. One is a really simple type of maze and the other is a complex type of maze. It takes a lot of time and effort to get through a random and very complex maze, but fortunately, there are rules.

The maze consists of small tiles. The tiles used in the maze are as follows.

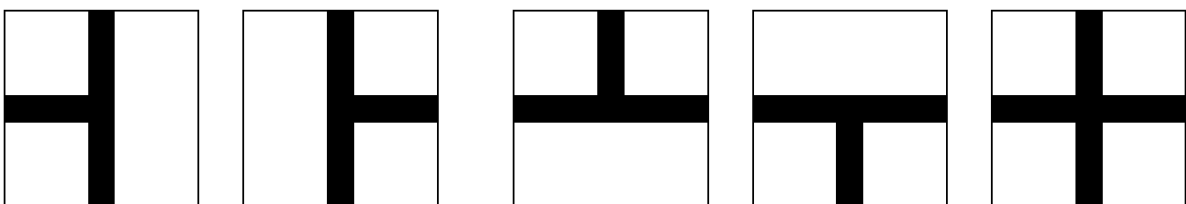
1) Straight



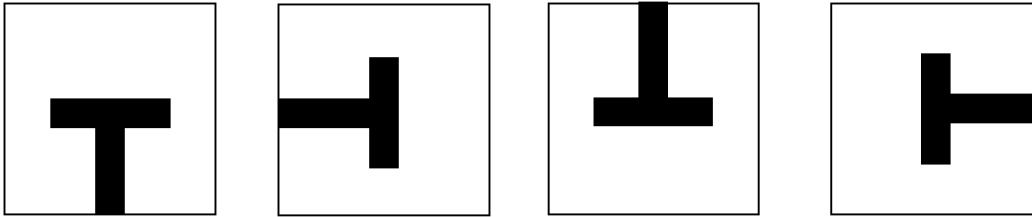
2) Curve



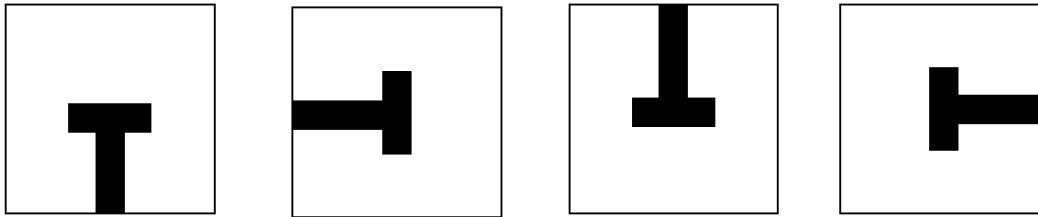
3) Intersection



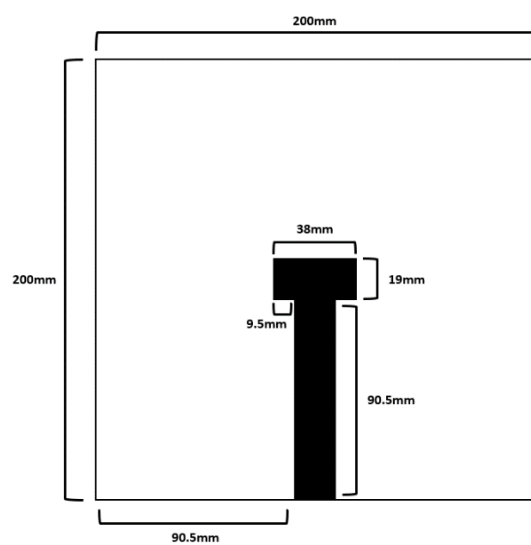
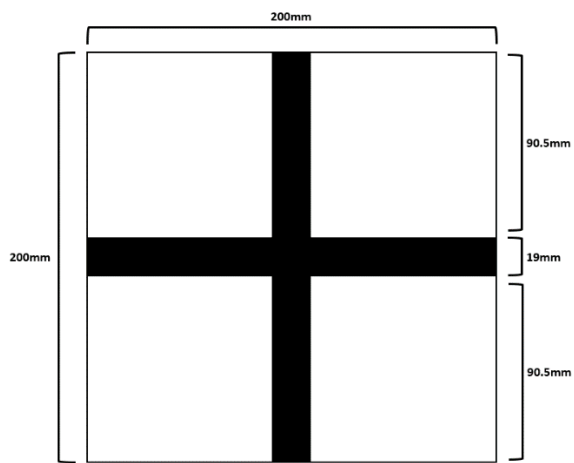
4) Starting Line

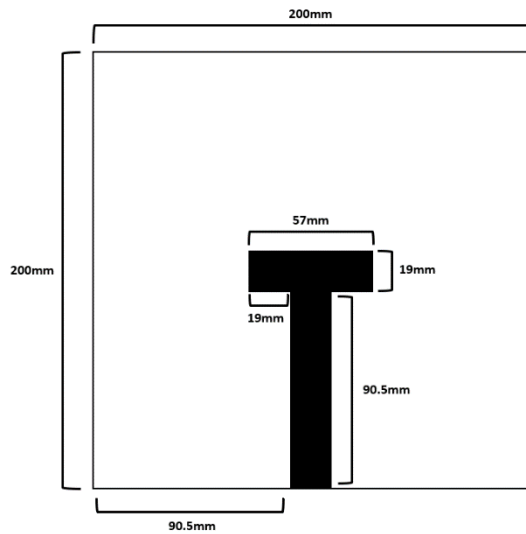


5) Finish Line



And the details of the tiles are as follows.

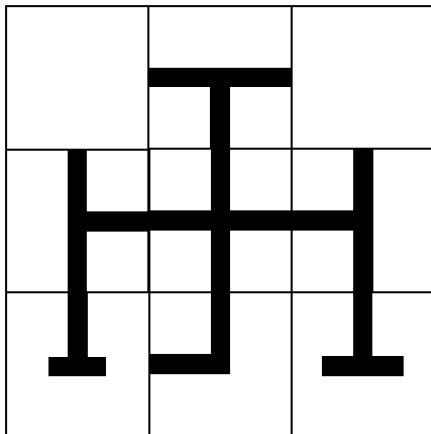




[Starting Line]

Each tile is all square and all the lines are in the center of the tile. Each line has a width of 19mm, allowing only two sensors in the middle of the QRTX sensor to be recognized. One thing to watch out is that the robot has to distinguish curves, starting line and finish line. So the starting point has a length of 57mm, 6 out of 8 sensors can recognize it. And the finish point has a length of 38mm, 4 out of 8 sensors can recognize it.

The maze consists of the tiles described above. The first simple maze that you have to pass through consists of 3x3. An example of 3x3 maze is shown below. And the second complex maze that we have to pass through has a size of 9x9.



[3x3 maze]

3. Evaluation

The assessment consists of the following topics:

1) 3x3 Simple Maze (20%)

In the Simple Maze, which accounts for 20% of the total score, all you have to do is just go through

the maze regardless of the time. In this test, we will present the easiest form of 3x3 maze because we simply evaluate whether you followed the class or not. Of course, you have to spend a little bit of time. Anyway, if you pass the maze, you will get 20 points, and if you don't pass, you will get 0 points. Simple maze will be evaluated on June 16 (Thur). If you don't pass the simple maze on 6/16, you can try until June 23 and you can get 16 points.

2) 9x9 Complex Maze (50%)

In the Complex Maze, which accounts for 50% of the total score, you have to pass the maze as fast as you can. Since we will present complex forms of roads and mazes, you have to design the path-finding algorithms and motor control algorithms carefully.

The tests of complex maze are done twice. The first test with five-minute time limit will not be evaluated. Instead, you should learn the maze as much as you can during the time limit and use it at the second test. The second test with also five-minute time limit will be evaluated based on your arrival time. If you don't pass the maze in the second test, you will get 0 points. If you pass the maze, you will get 20 points basically. And depending on the arrival time, you will get an additional point from 0 to 30. The test is scheduled to take place on June 17 (Fri), and there are no more chances.

3) Report (30%)

Finally, you have to submit a report describing the implementation of the robot. The report must include the following:

- Explanation of your path-finding algorithms
- Explanation of your motor control algorithms
- Explanation of the entire logic of the program
- Peer review
 - % of project contribution
 - What part of the project you engaged in

Report should not exceed 2 pages and should be written in a markdown format. And low-contribution participant will not get a good score (For example, A:20%, B:80%)

4. Summary (Important)

1) Simple Maze (20%)

- 3x3 Maze
- 6/16
- 20 points (pass on 6/16), 0 points (fail)
- additional chances until 6/23, 16points (pass)

2) Complex Maze (20%)

- 9x9 Maze
- 6/17
- two opportunities
 - On the first attempt, no score but learn the maze, 5 minute
 - On the second attempt, will be evaluated based on your arrival time, 5 minute
- 20 basic points (pass), 0 points (fail), 0~30 additional points based on your arrival time

3) Report (30%)

- **deadline : 6/23, 23:59**
- **upload your code on the gitlab**
- **upload your report on the gitlab written in markdown format**