EAS 110 Fundamentals of Smart Systems Engineering I
Team Projects

Project 1

You have a robot with perfect control, ensuring precise adherence to your commands. However, your ambition doesn't stop at flawless execution. You want to make the robot smart so that it autonomously makes decisions without constant guidance.

Imagine a scenario where the robot, demonstrating exceptional intelligence, can independently navigate and find the optimal path (minimum cost) to travel from the initial position (blue point) to the ending position (red point). The playground for the robot is shown in Fig. 1. Note that the number in each grid is the cost.

Figure 1

Task 1: Assuming that the robot can only move to right and down directions. Please write a code that can find the optimal path for the robot.

Task 2: Assuming that the robot can move to up, down, left and right. Please design an algorithm and can find the optimal path for the robot and roughly write a pseudo code.

Project 2

Assuming that the map is unknown to you. You only know that your robot is located at the start point ● (initial position), and there is an exit ● somewhere (see Fig. 2). There might some blocks ■. However, you don't know where they are. Your task is to make sure that the robot will reach the endpoint with minimum cost. You can train the robot by performing this task many times.
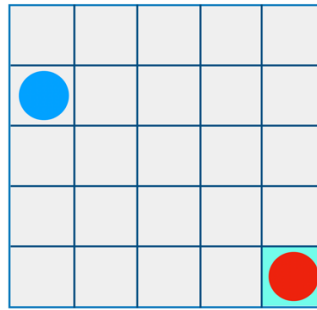

Figure 2

Task 1: Find some methods that can help achieve the goal. Explain why it (they) works (work).

Task 2: Pick up a method and roughly write a pseudo code.