

Lab 2 Writeup

CSCI 3302

1. With line following, the robot only needs to depend on the readings from each of the three line sensors. In the lab, the robot cannot rely on line following, so a grid system has to be used, in which respective grid blocks are either traversable as free space, or non-traversable (obstacles).
2. The path planning utilizes Dijkstra's algorithm to index a set of nodes and vertices. This happens by first creating the matrix bound with the desired destination path, then we index and map these values that we want sparki to follow by setting each value to a node, and use Dijkstra's algorithm to evaluate the shortest path to the destination. These nodes are then translated into a grid system, so that the robot can follow the path to the destination.

Finding the shortest path using the provided map yields a time of 32.34sec, which was found by taking the difference of times set using `millis()` at the beginning and end of the path navigation.

To deal with dynamic obstacles, the mapping algorithm would need to consider the added dimension of time: the presence/configuration of dynamic obstacles are subject to change over time, so that would need to be taken into consideration by the robot by

including a time keeping implementation. Additionally, more sensors may be needed, such as the ultra-sound sensor or light sensor, in order to detect the dynamic obstacles.

In order to plan for the desired orientation, a heading (θ) will need to be considered by the algorithm. That way, the robot can differentiate between the relative direction, and true direction when navigating the map.