CMP\_SC 3050

Final Project Report

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*Abstract*

The purpose of this project is to utilize and build upon our knowledge in graph searching algorithms. In robotics, it is common to traverse through rooms or building and gather data.

Let a robot traverses through the room in the shape of a n \* n grid surrounded by wall all around.

The robot starts at starting point F and to travel to exit location L.

*Analysis and Design*

For to do this project, we are planning use D star algorithms which is easy way to explore the way for robots. The original D\* by Anthony Stentz, is an informed incremental search algorithm.

We want to write the program by using java that is an easy way to make a nice graphical user interface. For the time complexity of D star is n\*n. We are planning design 6 buttons which are Move step by step, Set starting location, Set exit location, Reset everything, Reset everything, Show result and Read file to help user execute our program. We also searched a lot of different algorithms to solve this problem. Finally, we found the D\* algorithm is a better way to do.

We want to achieve another way to show user can add as many obstacles as you want. Then, we want to use two different ways to show the result to user.

*Implementation*

For the program, we use D\* as the core algorithm to achieve dynamic robot pathfinder. We use Java to achieve visualizing. We use two programs to complete the project. One of the program is checking read file for user. Another program is the main program for executing our task. For the checking file program, you can make sure the input file whether is a correct file. For each part, our all group members work together to finish the project. For the reading part, we were trying to let user read the input file by using an easy way, but we did not finish this part, so we tried another way to read the input file, we used the command line to read file. After checking file process, use need to run the main program first, and on the write the absolute file path for reading input file command line. Inside the D\_applet, we created six buttons to execute each step. Set staring location button to set the starting position, set exit location button to set the end position, reset everything button to reset all objects which are you already set previously. Reading file button read an input file from outside, showing result to perform automatic obstacle movement. The move step by step button displays the robot movement position for each step. We allow you to add any obstacle on the map after clicking the move step by step button. The new shortest route will change as the newly added obstacle changes. D\_ applet mainly to finish the button operation and obstacle add operation. Dstar is our main function which can call the various parts of others functions. We use Key class to show the robot in the algorithm where it could arrive. Maze class used to write the main algorithm and robot to achieve each step of the mobile and how to display on the map. In this Draw\_robot represents the robot to calculate and display his path and walking routes. Draw\_maze is drawn the right part of map and Draw\_maze is drawn the left part of map. Mark\_path is used to show walking and walking routes. Update\_cell is used to update the cell’s location and route. Reach goal used to see if the specified position is reached. Calculate\_path is used to calculate the path and find the shortest path. Move is used to display the results of each walk. Mycanvas used to call our classes to achieve maze initialization original objects and follow-up results.