



Microsoft presents

THE MARS COLONIZATION PROGRAM



PROJECT: NAVIGATE THE MARS ROVER

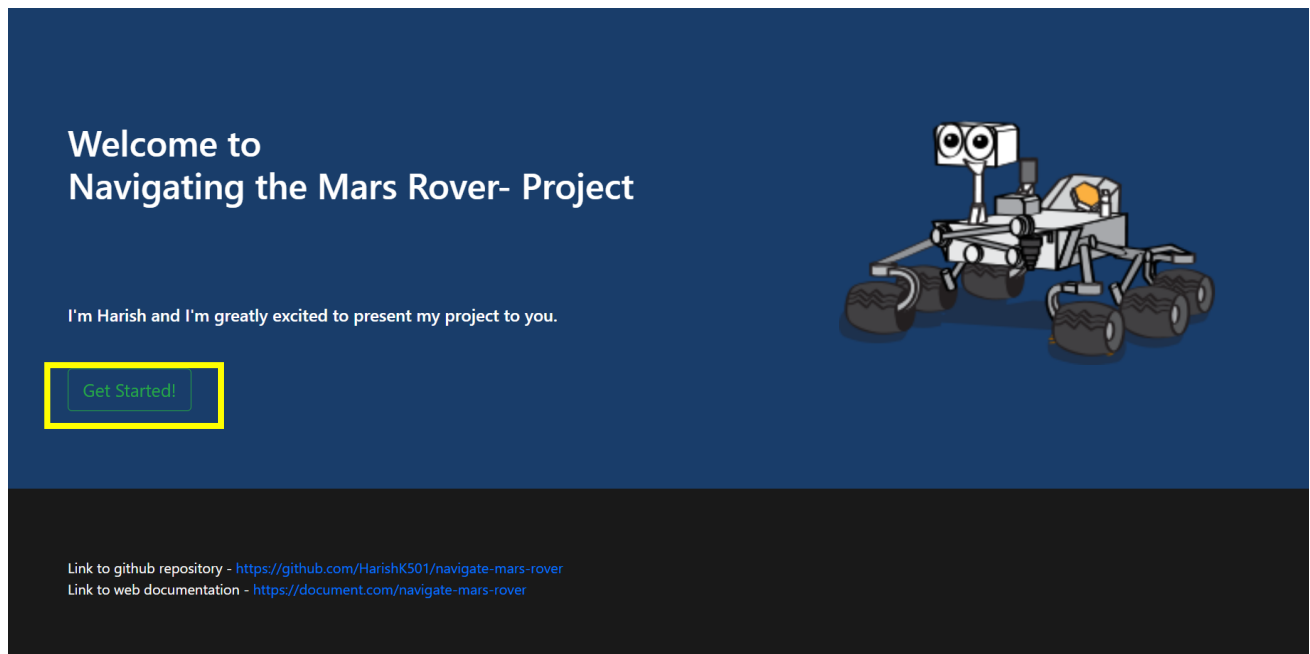
Done by: K. Harish, student at Amrita Vishwa Vidhyapeetham, CBE.

ABSTRACT

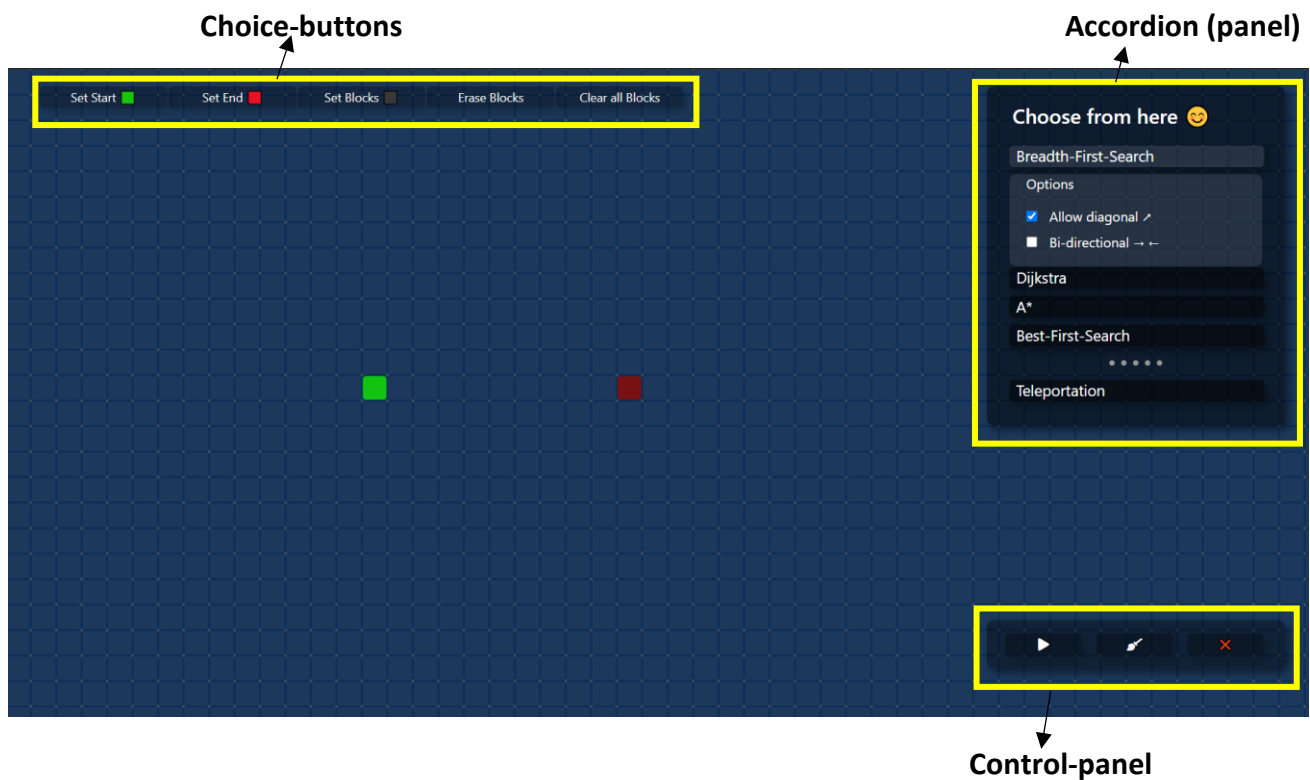
This project deals with the development of a web application, in which we find the shortest path between two points while avoiding obstacles on the way. This document gives a brief note on how to work with the web application and also, on the implementation of the project. Reading this document helps to explore and understand the implementation of the project. This project consists of implementation of 4 path-finding algorithms namely- A-star, Dijkstra, Breadth-First Search and Best-First Search. Moreover, I included the concept of [teleportation](#), which is discussed later in the document.

WORKING WITH THE WEB APPLICATION:

Initially, you'll be at this web-page(home) on clicking the given web application link.



Click on the “Get Started!” button. You'll be taken to the main part of the web application.



Choice buttons:

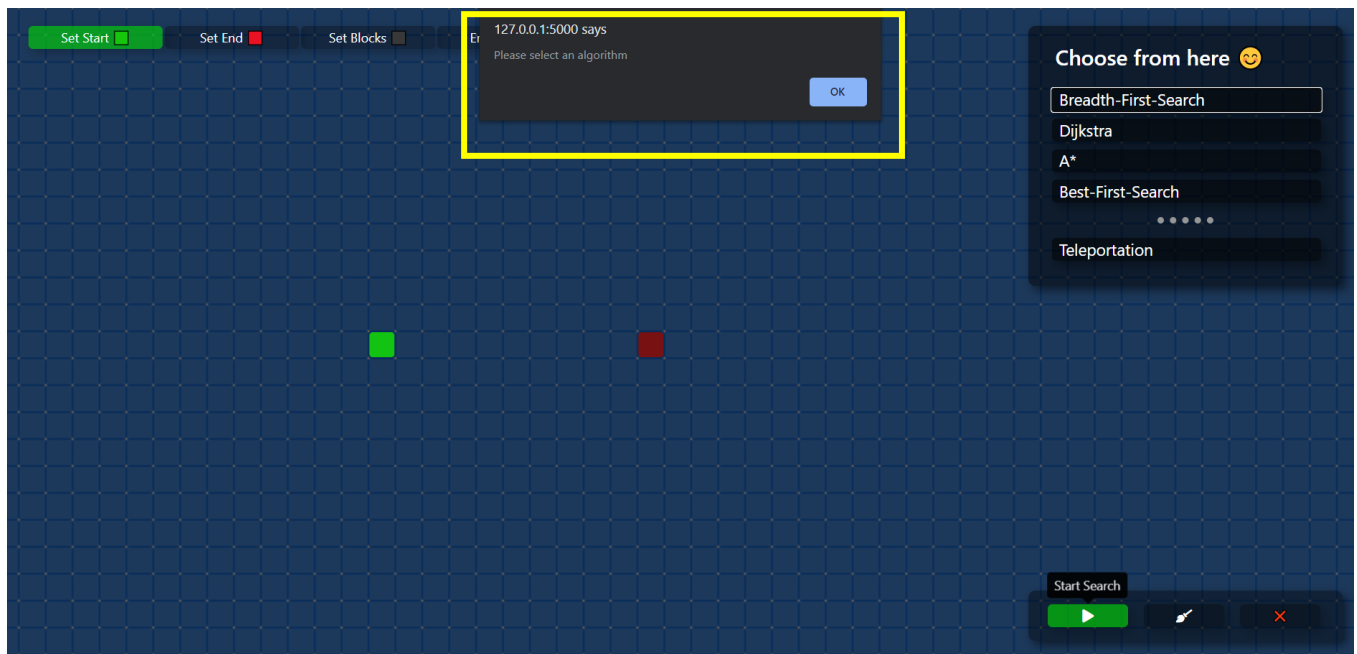
- The choice buttons allows us to set start and end positions, create blocks by clicking n' dragging over the grid, and erase blocks in the same way.
- At any time, the selected choice will be highlighted in green.



- Here, the selected choice is “Set Start”. Now if we click anywhere on the grid, we can set the start position.
- It might seem too hard for selecting a choice button each time to do a modification, but I think this practice reduces a lot of ambiguity.

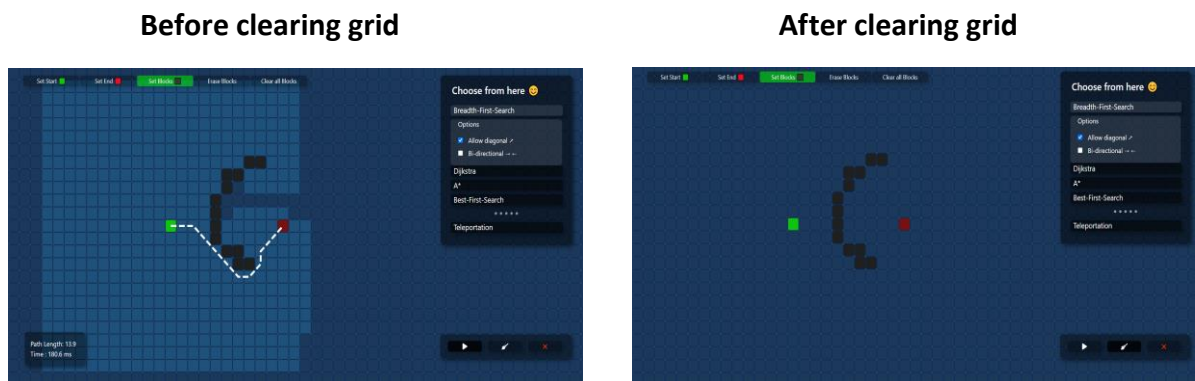
Accordion (panel):

- There are four algorithms and a tweak strategy, [Teleportation](#).
- An algorithm is considered to be selected if its body is not collapsed in the accordion. So at any time, if you want to start the search, any one of the accordion buttons (algorithms) should not be collapsed.
- If all the buttons in the panel are collapsed and you click on the “Start Search”, the web page will alert you to select an algorithm.



Control-Panel:

- This panel allows you to either start the search, clear the grid or cancel the search.
- Before pressing “Start-Search” button, ensure that there is at least one button in the accordion that is not collapsed.
- The “Clear-grid” button- clears the grid from the patch made by the search.

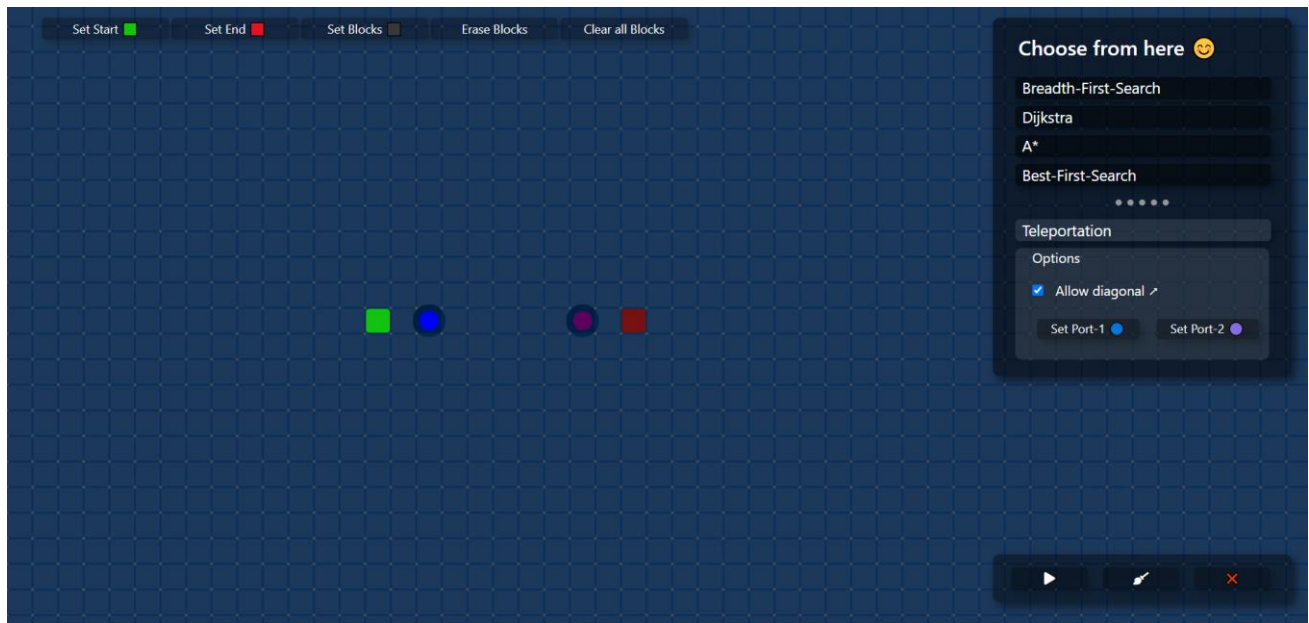


- **Note:** The “Clear-grid” button will not clear BLOCKS. You can use “Clear all blocks” button in order to clear all the blocks on the Grid.
- Make sure you press “Clear-Grid” button before choosing another algorithm in the accordion, to eliminate ambiguity.
- The “Cancel-Search” button can be pressed in the middle of the search process in order to cancel the search process.

BASIC IMPLEMENTATION:

- I have used **Flask** framework for this web application.
- I have used HTML5, CSS and JS to build the front end.
- All the algorithms are implemented using python in the backend. You can checkout the implementation of the algorithms by clicking on the link to my GitHub repository.
- With the help of AJAX, the data from the grid is passed to python.
- The python code works with the provided data and sends the results as a response to JavaScript.
- JS uses the response data and does the UI part.
- The link for the GitHub repository is here:
<https://github.com/HarishK501/navigate-mars-rover>

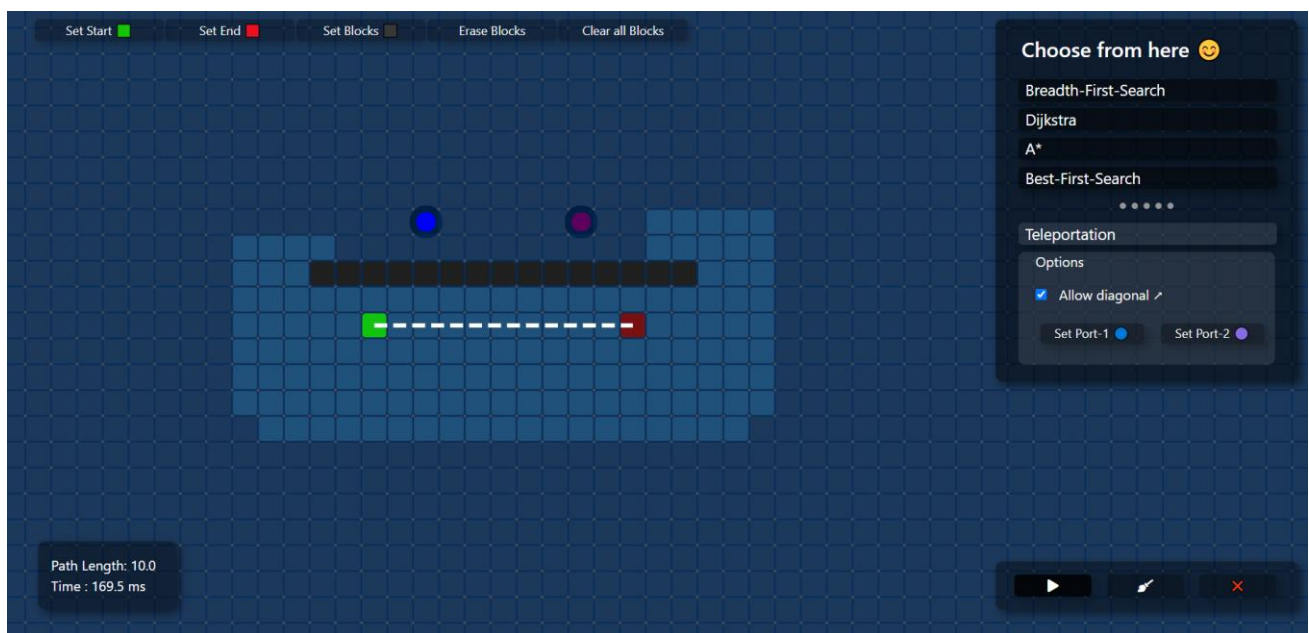
Teleportation:



- This is an interesting method.
- When you select this option, you'll be provided with two portals, port-1(blue) and port-2(purple).
- The ports can be placed anywhere on the grid, using the “Set Port-1” and “Set Port-2” buttons.
- The idea of using ports here is that, if we enter one port, we can exit from the other port, without any cost.
- Note: The connection between the ports can by-pass the blocks.



- The connection between the portals is represented by orange dashed line.
- Note: The portals can be used interchangeably.
- There are cases where we can find the shortest path from start to end, without the help of the portals. In those cases, the path from start to end will not include the portals.
- To indicate the above situation, the connection between the portals is not shown.



For any doubts regarding my project, you can mail me.

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Thank you.