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Project title: MazeMaster

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Project Type : Hardware

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Abstract:

This project aims to develop a robot that solves mazes using the flood fill algorithm, showcasing practical applications in fields such as search and rescue, automated navigation, and robotics education.

Key Aspects:

1. **Algorithm Implementation:** Ensuring accurate maze navigation with the flood fill algorithm.
2. **Hardware Integration:** Assembling the robot with sensors and actuators for maze interaction.
3. **Mode Functionality:** Developing operational modes for pathfinding, path following, and maze mapping.
4. **User Interface:** Creating an intuitive display and web interface for the shortest path, distances, and maze layout.

Objectives:

1. **Efficient Pathfinding:** Enable the robot to autonomously find the shortest path in a maze.
2. **Real-time Display:** Show the shortest path distance and air distance on a screen.
3. **Path Memory and Following:** Allow the robot to remember and follow the shortest path.
4. **Maze Mapping:** Scan the maze and send data to a web application for visualization.

Methodology:

1. **Design and Assembly:** Build the robot with motors, sensors, and a microcontroller.
2. **Algorithm Development:** Implement the flood fill algorithm for pathfinding.
3. **Mode Implementation:** Develop modes for pathfinding, path following, and maze mapping.
4. **Display Integration:** Add a screen to show the shortest path and distances.
5. **Web Application Development:** Create a web app to visualize maze data and the shortest path.

Existing Applications:

While many maze-solving robots exist, this project is unique in combining multiple operational modes with a web-based visualization component, unlike others that often focus on single-mode operation.