Introduction

This project represents my **first practical experience with a multi-map navigation system** in ROS. The goal was to implement a navigation architecture that can operate across multiple maps using a concept referred to as **“wormholes”**, enabling the robot to transition between distinct environments efficiently.

Project Objective

To create a **ROS-based multi-map navigation system** that:

- Supports seamless map transitions using a *wormhole mechanism*.
- Includes an **SQLite database** to store wormhole positions.
- Provides a **C++ action server** to manage navigation between maps.

Project Structure

As seen in the attached screenshot (`multi_map_navigation.launch`), the project includes the following core components:

- **Navigation Server**: A C++ node handling multi-map goals.
- **Wormhole Manager**: Manages transitions between maps.
- **Map Saver**: Allows saving of generated maps.
- **RViz Integration**: For visualization and debugging.
- **SQLite Database**: Used to store and retrieve wormhole coordinates.

Folder structure reflects modularity:

arduino
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```
multi_map_nav_final/
├── multi_map_nav/
│   ├── action/
```

```
|   ├── config/
|   ├── launch/
|   ├── maps/
|   ├── rviz/
|   ├── scripts/
|   ├── sql/
|   ├── src/
```

Time Constraints and Limitations

While I gained valuable insights during this task, I must clarify:

- This was my **first time implementing multi-map navigation**.
- Due to **limited time**, I was unable to complete all modules fully or test all edge cases.
- I **did not have the opportunity to record** a demo or video, as most of the time was spent understanding and building the architecture.
- Despite time constraints, I ensured the launch file and node structure reflect a **scalable and modular design**, suitable for future extension.

Conclusion

Although I couldn't complete the entire functionality due to time limitations, this task has significantly expanded my understanding of complex navigation systems in ROS. I am confident that with more time, I can further enhance and test this system thoroughly.

Thank you for the opportunity to challenge myself in a new domain.