ROS 2 VIRTUAL ROBOT NAVIGATION

TEAM: WAY_FINDERS

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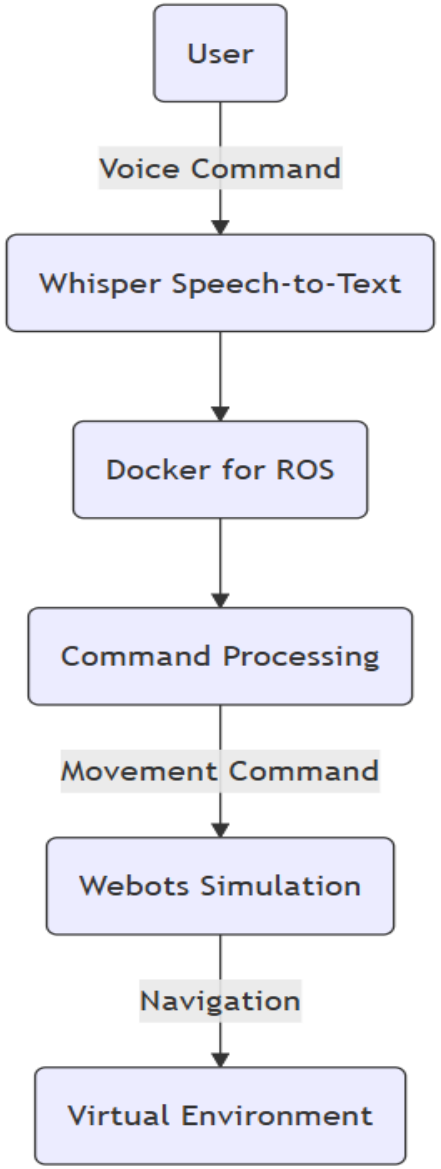
ARCHITECTURE DIAGRAM



IMPROVEMENT OVER EXISTING SOLUTION

•**Enhanced Command Interpretation**: Leverages advanced LLMs like GPT-4 for dynamic path planning, surpassing traditional rule-based systems that are less adaptive to varying commands.

•**Real-Time Voice Navigation**: Integrates Whisper and wav2vec for seamless speech-to-text, enabling hands-free control, which enhances usability in healthcare and smart home environments.

•**Advanced Obstacle Avoidance**: Uses real-time sensor-based localization and obstacle avoidance, providing safer and more accurate navigation than standard robot navigation systems.

•**Comprehensive Simulation**: Utilizes ROS Noetic and Gazebo for realistic simulations, enabling robust testing and training in complex indoor scenarios.

UNIQUE SELLING POINT (USP)

The unique selling point (USP) of this solution is its ability to provide a hands-free, speech-guided autonomous navigation system for robots, specifically designed for complex indoor environments like healthcare facilities and smart homes. Key differentiators include:

1.Voice-Guided Navigation: Real-time command interpretation using advanced Speech-to-Text models (e.g., Whisper or wav2vec) and Large Language Models (e.g., GPT-4), allowing the robot to respond accurately to voice commands.
2.Dynamic Path Planning and Obstacle Avoidance: Utilizes advanced path-planning algorithms A* and real-time sensor-based localization, enabling the robot to navigate safely and flexibly around obstacles.
3.Comprehensive Simulation: Uses ROS Noetic and the Gazebo Simulator for robust testing, ensuring reliable performance in dynamic environments.
4.Enhanced Accessibility and Efficiency: The system's voice-guided, autonomous navigation provides an intuitive interface, making it accessible for users with limited technical knowledge.