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Paper Title: Smart Wheelchair for Disabled Person

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Abstract

Nowadays, people are affected by various diseases related to the body, including those that affect the lower body, making it difficult or impossible for patients to walk. The main goal of a wheelchair is to transport patients who cannot walk to their desired destination, either by themselves or with the help of a caregiver. The project's objective was to develop an effective solution for patients who are unable to operate the joystick on electronic wheelchairs. The smart wheelchair would be beneficial for patients who primarily reside in their room. This smart wheelchair will create a map of the room, allowing the patient to navigate it easily using only one finger to control it by simply clicking on the pre-created map.

This project developed an electronic wheelchair that could be controlled and driven autonomously using a ROS (Robot Operating System) platform. Additionally, it utilized the SLAM (Simultaneous Localization and Mapping) method, which enables the construction of a map of an unknown environment while simultaneously localizing the wheelchair for navigation purposes. To assess the accuracy of map creation in an unknown environment, calibration was performed with and without loading weight to measure the distance and angle of the wheelchair's movement.

The results of this project show that the developed electronic wheelchair successfully builds a map of an unknown environment and utilizes this map for navigation. Users can simply click on their desired destination on the map, and the wheelchair will autonomously navigate towards it. Moreover, the wheelchair can obstacle avoidance, while navigation. Although the smart wheelchair can perform well, there are some limitations due to the RPlidar. The RPlidar detects everything on the ground in parallel when creating the map and while navigating. Therefore, if any object is located below the RPlidar, it may not be able to detect it.