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A SMART OMNIDIRECTIONAL CONTROLLED WHEELCHAIR

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Abstract. Wheelchair is used by individuals that find it challenging to walk. Various methods have been adopted in developing wheelchairs to suit the needs of the physically disabled using the available technologies. Problems associated with the already existing wheelchairs are difficulty in maneuvering them in a confined and constrained space and limitation in degree of movement they can achieve. The aim of this project is to develop a smart omnidirectional controlled wheelchair. The system is not only applicable for domestic use, it can also be used for sports and in the hospital. The movement of the wheelchair is controlled from a web application via Wireless Fidelity communication. The methodology employed includes designing the web application interface using Hypertext markup language and JavaScript programming language, the hardware part consists of the Raspberry Pi 3 Model B, programmed with python programming language. Then, the software and hardware part were integrated together to form a complete system. The main advantage of the system is that it allows the user of a wheelchair to maneuver through a confined and constrained space and control the wheelchair remotely. The performance measure considered were the accuracy of the obstacle detection unit in detecting brick wall, metal and wood, and the response time of the wheelchair to movement commands from the web application. The average detection accuracies for the brick wall, metal, and wood were 87.37%, 94.43%, and 83.57% respectively. The average response time of the wheelchair to movement commands from the web application was 1.04 seconds.

Keywords: *Omnidirectional, Wireless Fidelity, JavaScript, Raspberry Pi 3 Model B.*

Introduction

Wheelchair is simply a chair that has wheels, used by individuals that find it challenging or impossible to walk due to injuries, disabilities and other health related problems [1]. There are different types of wheelchairs, which are categorized based on their specific features. These features may range from configuration of the wheels which can be four caster wheels, two motorized wheels with two caster wheels, two motorized wheels