

Abstract— from
caregivers for their
daily activities.

[Design](#)



Abstract— This study has been conducted to reduce the physical and cognitive requirements of people with wide ranging disabilities that limit their independent mobility.

A prototype of the smart wheelchair system has been developed based on a conventional wheelchair that is commonly available in the market, with the addition of related electrical and mechanical advancements. Voice and gesture controlling interfaces are deployed on this system in addition to the conventional joystick controlling interface to enhance its' natural interaction with the user. Moreover, an obstacle avoiding system is used to ensure the safety of the user.

This paper describes our design and discusses the current status of the developed system prototype. Keywords—Power wheelchair, Smart wheelchair, voice control, Gesture control, Obstacle avoiding system

I. Introduction The degradation of mobility is one of the major issues that degrade the independent living ability of elderly/disabled people. They need assistance from caregivers for their daily activities.

But today the gap between the supply and demand of caregivers is widening and developing of devices that can support the elderly/disabled people in their day-to-day life has a great importance. According to several studies that have carried out previously, both children and adults get benefit from achieving access to a means of independent mobility [1, 2]. Independent mobility increases vocational and educational opportunities for people while

reducing dependence on caregivers and promotes feelings of self-reliance. For children, independent mobility acts as the foundation for their early learning. Non-ambulatory children lack access to the wealth of stimuli afforded self-ambulating children. This causes deprivation and reduced motivation that may lead to learned helplessness. For adults, independent mobility is an important aspect of self-esteem. Due to these facts, mobility assistive devices such as robotic wheelchairs are being developed recently [3, 4, 5, 6, 7].

Most of the commercially existing robotic wheelchairs are equipped with controlling interfaces like joystick. However, human friendly interactive interfaces are preferred by elderly/disabled people instead of low level controlling interfaces with limited abilities because of their ability to maintain natural interaction with the users [8]. Further, people with restricted muscle movements may not be able to command the conventional joystick controlled wheelchairs. Due to these reasons, smart wheelchairs with more interactive features and alternative controlling interfaces for conventional joystick, has been a topic for many research projects in recent years. But few researches have been successfully transformed into a commercial product. Furthermore, none has integrated more than one controlling interfaces on a single power wheelchair. Our aim is to develop a commercially viable smart wheelchair system with voice and gesture interface for controlling in addition to the conventional joystick.

This system will reduce the physical and cognitive requirements of people with wide ranging disabilities that limit their independent mobility. This smart wheelchair is based on a most common commercially available conventional <https://assignbuster.com/abstract-from-caregivers-for-their-daily-activities/>

wheelchair transferred into a powerwheelchair system with the addition of three control modes and an interfacemodule interposed between the different control modes and power module of the wheelchair. Since this wheelchair will be used by elderly/disabled people, a safety concern is provided by deploying an obstacle avoiding system using a set of ultrasonic sensors attached to the wheelchair which will detect any obstacle and stop the wheelchair movements at a given distance despite of any user command. So it can be believed that, this smart wheelchair will eventually enhance the rapport between the human users and the assistive robotic aid in order to uplift the lifequality of elderly/ disabled people.