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Dual Controlled Smart Wheelchair for Physically Disabled

G. Shanmugasundar, A. Aravindha krishna, A. Yamini, S. M. Anand, P. Kishore Kanna
Department of Mechanical Engineering, Sri Sai Ram Institute of Technology, Chennai, Tamil Nadu, India
Email: Shanmugasundar.mech@sairamit.edu.in

Abstract

There are many different types of wheel chairs on the market, some of which are manual, some of which are semi-automatic, and some of which are totally automatic. The development of the wheel chair system is carried out on a daily basis in order to provide support to differently abled people. In this regard, our smart wheel chair system is likewise a work in progress. Provide assistance to this group of people. The goal of this project is to create a Smart Wheel Chair System for the physically challenged. Handicapped persons at a reasonable price. An Android messenger application controls the system, which consists of for navigating aid, use the HC-06 Bluetooth module and proximity sensor. Our wheel chair system is linked to a Bluetooth module, which allows it to automatically move to the desired horizontal position. The system is controlled by an Android application. We used G-chat to link the Wheel Chair to the Bluetooth module at work, but any Bluetooth messenger application can be utilized. Two proximity sensors are installed at the back and front of the system to safeguard it from collisions. Our wheel chair assembly has a dual password security system, with the first password needed to connect the Bluetooth device and the second password used to control the wheel chair's movement.

Keyword: Mind control, quadriplegic, cerebral palsy, multiple sclerosis, arduino

Introduction

Wheeled mobile robots outfitted with sensors and a data processing unit are referred to as "smart wheelchairs" in general literature overviews . Aside from general scientific fields of work like autonomous navigation approaches or mapping and self-localization algorithms, the shared spatial reference system between the operator and the smart wheelchair raises some user interface and shared control issues. Simpson et al., for example, demonstrated how to combine discrete driving commands from voice control with navigation aid supplied by reactive navigation techniques in . In our work, we've created a unique wheel chair with a Bluetooth module that allows users to manoeuvre in the horizontal plane without the need for external support. The command to drive the Wheel Chair is sent through an Android-based chat application. A wireless charging outlet and proximity sensors are also included in the Wheel Chair's autonomous navigation system. Depicts the conventional wheel chair on the market, while depicts the automatic wheel chair on the market. Speech recognition is a technology that people can control the system with their speech. Instead of typing on the keyboard or operating the buttons for the system, using speech to control system is more convenient The following is a breakdown of the project work: - First, we provide a typical overview of the Smart wheel chairs currently on the market, as well as a description of how they work. Second, in order to develop the Smart Wheel Chair system, we define the use of the Bluetooth module in a system in general terms. Finally, we debate, analyse, and forecast the future of research in this topic.

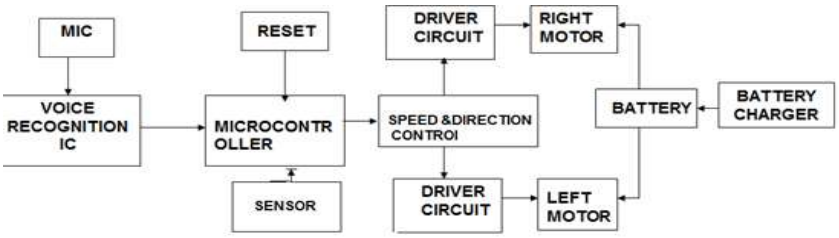
Review of Literature

People have disabilities with their hands, foot and lower extremities because of which they are unable to perform regular tasks. Many technologies are available to overcome this problem. To overcome this problem, there are several applications in the market which help handicapped people to perform their tasks. Proposed design supports voice activation system for physically disabled persons incorporating manual operation. If a person is handicapped, they are dependent upon others for their day to day operations such as orientation etc. Several studies have shown that the independent mobility, which includes power wheelchair, manual wheelchair and walker access the benefit to both children and adults. Independent mobility reduces dependence on caregivers and family members and promotes feelings of self-reliance. Impaired mobility often results in decreased opportunities to socialize, which leads to social isolation, anxiety and depression. While the needs of many individuals with disabilities can be satisfied with traditional manual or power wheelchair, a segment of the disabled community finds it difficult or impossible to use wheelchairs independently. This population includes individuals with low vision, cognitive deficits, etc. The proposed voice-controlled wheelchair would bring more convenience for the disabled people. The technology can also enhance safety for users who use ordinary joystick-controlled powered wheelchairs, by preventing collisions with walls, fixed objects, furniture and other people. There are many advantages to such a system like: It reduces human efforts. This is helpful to physically handicapped people who could not able to operate home appliances with their hand. This will help to save energy to some extent, since some people feels lazy to go and switch off the appliances manually. It is easy to operate for the people who are tried and does not need to operate the home appliance manually by hands. It reduces risk. The proposed system has certain limitations too such as: It requires extra supply to

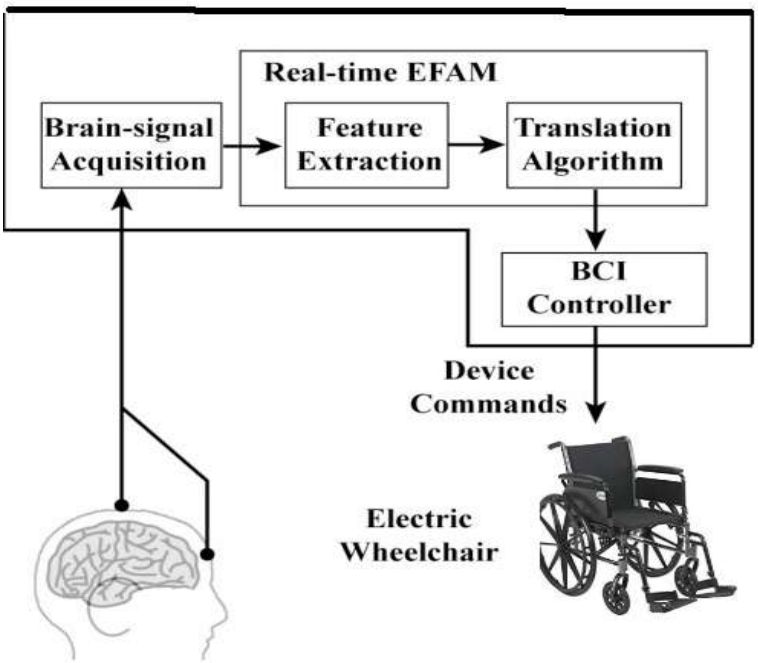
operate the model. Only the installed voice is recognized by the module. The cost of the module is quite higher. This kind of system reduces the manual effort for acquiring and distinguishing the command for controlling the motion of a wheelchair. The speed and direction of the wheelchair can be selected using the specified commands. Thus the only thing needed to ride the wheelchair is to have a trained voice. Besides that, the development of this project can be done with less cost and affordable. However this system requires some improvements to make it more reliable. This design could be improved by implementing wireless communication in the wheelchair. By developing this system, we can directly enhance the life style of the disabled people in the community. Lastly, we hope that this kind of system could contribute to the evolution of the wheelchair technology. The motor drive and control system of the intelligent wheelchair has been presented. The proposed microcontroller based voice operated intelligent wheelchair would bring more convenience for the disabled people. The technology can also enhance safety for users who use ordinary joystick-controlled powered wheelchairs, by preventing collisions with walls, fixed objects, furniture and other people.

Proposed System

Based on the user's decision, the Mind controlled wheelchair regulates the wheelchair's direction and motion. In order to pick up EEG signals from the brain, the mind wave headset is employed in the mind controlled wheelchair. These signals are analysed by a microprocessor, which then makes a judgement about the wheelchair's velocity and direction and controls the motor appropriately. Human power is used to propel manual wheelchairs. The user steers the manual wheelchair by spinning the rear wheels with additional rims known as the "Push Ring" for forward or backward movement. The conversion of a manual wheelchair to an electric wheelchair is accomplished by mechanically attaching motors to the back wheels. Motors move the active rear wheels in the direction that corresponds to the present driving direction; differential drive is used. The proposed gadget has been shown to be effective for persons suffering from paralysis, in which the patient loses control of numerous bodily parts, as well as for elderly people. It is a more cost-effective alternative than the pricey powered wheelchairs that are currently employed in most existing products due to electrical and mechanical modifications. shows a hypothetical block diagram of a mind-controlled wheel chair. The microcontroller interfaced with the various components to control the wheel chair.



Mode 01 : Voice Controlled



Mode 02 : Brain Controlled

Figure 1. System Architecture

Hardware Description: The Neurosky Mindwave Headset, a portable EEG mobile headset that picks up EEG signals from the user's brain and transmits them to the microcontroller unit via Bluetooth, is part of the electronics and embedded subsystem. BlueSMiRF (RN-42) is the Bluetooth module that receives the signals transmitted by the headset and is connected to the microcontroller through USART. Illustrates the RN-42 (BlueSMiRF) data gathering algorithm from the mind wave. Motors are driven by H-Bridge MOSFET drivers. The microcontroller is an important component of the processing system. In response to the signals picked up by EEG sensors, the microcontroller computes the motion direction. The processed data is sent to the user interface and motion control systems by the microcontroller. MCU (micro controller unit): The Micro Controller Unit is a compact integrated circuit design to give specific operation in embedded system. Micro controller unit is key component in this project the input voice commands gives the output signal to the micro controller unit based on the command output of the Dc Motor is controlled by the Micro Controller unit. The Micro Controller used in this project is Arduino UNO micro controller. Motor driver: The motors are connected to the driver and power supply is given. This driver gets input from mcu and thereby controls the motion of the wheels according to the voice commands. Software and data processing subsystem: Individuals require graphic user development to deliver Neuro feedback in the form of visual stimulation so that they may better control their brainwave output and enable a more efficient control system.. Before allowing the individual to use the wheelchair, a training programmed for controlling the wheelchair's direction and speed is developed. Java is used to create custom software. On the computer screen, this software simulates a wheelchair world. The Java program's algorithm is depicted. The user issues orders such as right, left, forward, and stop.

Scope of The Project: The main goal of this project is to create an intelligent low-cost brain and eye controlled wheel chair with a communication interface system that allows users to interact by blinking their eyes and controlling the wheel chair using The main goal of this project is to create an intelligent low-cost brain and eye controlled wheel chair with a communication interface system that allows users to interact by blinking their eyes and controlling the wheel chair using brain waves. Wireless connectivity should be employed as much as feasible to provide optimum reliability and minimal expense. It is proposed to develop an Android OS or Embedded Windows based human machine interface to deliver a user-friendly solution. The wheel chair, as well as the entire system, is battery operated and can be recharged and utilised indoors. The following objectives will be met by the end of the project. To create an EEG-based blink detection system for wheelchair control. Create a user interface keyboard that allows the user to pick keys and type with his Blink to interact with his caregiver. To create a text-to-speech converter that will send whatever keys are written to a speaker or an SMS to the caregiver. To use brainwaves to create an emergency alert. To design and construct an Omni-directional Wheel Chair that can recharge and carry a payload of 120 kilogram’s. Develop a Lidar and Camera-based Obstacle Avoidance and Computer Vision system for easy wheelchair navigation. GPS-based Neural Network-based Path Learning System It should be mentioned that the project's major goal is to assess people's ability to actively control a wheelchair using their brain and eye activity, which is required to verify that commands are carried out correctly. The overall goal is to create a low-cost, easily deployable intelligent wheel chair that allows users to operate and communicate with it. Advantages: The advantages of thought-controlled wheelchairs are that they respond to commands much faster and that patients who have lost the ability to speak may utilize them. Users wear an EEG cap, which monitors their brain activity.

Conclusion

As a result, the project's objectives were met, and the Wheel Chair was automatically controlled by the G-Chat messenger. The development of an android-based wheelchair controller was entirely functional based on the goals set out before the project began. Finally, the DC motor and all of the combination circuits were integrated into the wheelchair prototype. This project demonstrates how to integrate all of the circuit board, DC motor, and electronics components into a single system. Our work is the initial step in offering assistance and support to the differently abled, thus there is obviously a lot of work to be done in this subject. The GPS module will be integrated with the Bluetooth module in future work. At a relatively low cost, it will add particular path tracing capability and a far more advanced system to the Wheel Chair system. The project will also include a wireless charging facility for the wheelchair system, which will provide a boost to the field of autonomous

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