Special Issue - 2022

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
ICONNECT– 2022 Conference Proceedings

Implementation of Advanced in Smart Wheel Chair Technology for Physically Challenged People

Aparna J
Department of Biomedical Engineering
Dhanalakshmi Srinivasan Engineering College Perambalur
Tamilnadu India

Gokila G
Department of Biomedical Engineering
Dhanalakshmi Srinivasan Engineering College Perambalur
Tamilnadu India

Keerthika K
Department of Biomedical Engineering
Dhanalakshmi Srinivasan Engineering College Perambalur
Tamilnadu India

Abstract—**This advanced system can be used by disabled people to move around conveniently. Patients with paralysis or leg disability face difficulties for reaching places. Some people try to use walker, in many cases the patient can lose balance and fall and be injured. In order to prevent from such circumstances our system can be used. This paper describes the design of a smart, motorized, voice controlled wheelchair using embedded system. Proposed design supports voice activation system for physically differently abled persons incorporating manual operation. This paper represents the "Voice-controlled Standing Wheel chair" for the physically differently abled person where the voice command controls the movements of the wheelchair. The voice command is given through a cellular device having Bluetooth and the command is transferred and converted to string by the BT Voice Control for Arduino and is transferred to the Bluetooth Module SR-04connected to the Arduino board for the control of the Wheelchair. For example, when the user says "Forward‟ then chair will move in forward direction and when he says "Backward‟ then the chair will move in backward direction and similarly "Left", "Right" for rotating it in left and right directions respectively and „Stop‟ for making it stop. The emergency situation is also alert through IoT with GPS location .This system was designed and developed to save cost, time and energy of the patient. Ultrasonic sensor is also made a part of the design and it helps to detect obstacles lying ahead in the way of the wheelchair that can hinder the passage of the wheelchair. This system can be used to help the paralysis or leg disable patient.**

Keywords - Voice control, bluetooth, ultrasonic sensor

INTRODUCTION

Wheelchair is the most widely used mechanical device all over the world, which is used by physically disabled patients or aged people to move. For normal wheelchair, the user needs an extra supporting person or self-assistance by hand to move on. Statistics show that around 650 million people which is about 15% of the world population are suffering from some sort of physical disability. With the growing number of population, the number of physically disabled and elderly patients is also increasing as well as the demand of automated wheelchair. Due to technological development, mostly joystick controlled automated electric motorized wheelchairs are widely available throughout the world. In developing and under developing countries, these wheelchairs are neither very much available nor much cost effective. Independent mobility is an aspiration for every person with some or the other physical disability especially in the case of quadriplegics and multiple sclerosis. These are the patients who are paralyzed below neck and people suffering from back bone problem and knee joint problem. People with disabilities meet barriers of all type. We know that technology is manual for wheelchair but as per survey more than 70 percent of manual wheelchair users will develop shoulder pain at some point in their life. But the quadriplegic and knee joint patients cannot move any of the limbs below the neck. Wheelchairs can be designed for various purpose like wheelchairs can be handled by hands, mouth, or any other functioning. Smart wheelchair is a combination of standard driver modules and collection of sensors with a user interface by using android app. This feature makes it useful for those disabled persons.This paper proposes an integrated approach to real time detection, tracking and direction recognition of hands, which is intended to be used as a human-robot interaction interface for the intelligent wheelchair. The most common image of disability is the people in wheelchairs. Wheelchairs are used by people who find themselves unequipped to move without external aid. The special needs of the elderly may differ from that of a physically challenged person or a large individual but they all have "special needs" and often require some assistance to perform their daily routine. The physically challenged people, who use a normal wheelchair for navigation, usually require an external person to move around. In this busy world, the elderly people may be left alone at home and also may not find an apt person for external help. Here comes the need of an automated home navigation system, which consists of a wheelchair which can be used by the elderly and the physically challenged people without the help of an external person. The proposed paper can be operated using the gestures of the provided android mobile phone. Patients involved in physical injuries and disabilities with good mental strength

Special Issue - 2022

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
ICONNECT– 2022 Conference Proceedings

struggle to get through places using the conventional hand powered wheelchair. 6 (3) conformity of style throughout a conference proceedings. Margins, column widths, line spacing, and type styles are built-in; examples of the type styles are provided throughout this document and are identified in italic type, within parentheses, following the example. Some components, such as multi-leveled equations, graphics, and tables are not prescribed, although the various table text styles are provided. The formatter will need to create these components, incorporating the applicable criteria that follow.

II PROPOSED SYSTEM

This proposed system designed by of an Arduino based voice controlled automated standing wheelchair. This system is powered by Arduino Uno, it is equipped with the LCD display and Bluetooth module, a GSM and GPS module, DC motor and Standing wheel chair mechanism. The system is designed to control a wheel chair using the voice of person. The objective of this project is to facilitate the movement of people who are disable or handicapped and elderly people who are not able to move well. The goal of this system will allow certain people to live a life with less dependence on others for their movement as a daily need. Speech recognition technology is a key technology which will provide a new way of human interaction with machine or tools. Therefore the problems that they face can be solved by using speech recognition technology for the movement of wheel chair. This can be realized and optimized with use the smart phone device as an intermediary or interface. In this project interfaces has been designed therefore to develop a program for recognize speech also controls the movement of chair and an application which can handle or manage the graphical commands. This project uses arduino kit Microcontroller circuit and DC motors to create the movement of wheel chair The user can input command to operate a wheel chair to achieve a desire movement. This system also has an emergency feature, the user needs to press the help button to for an emergency. This system automatically senses the GPS coordinate to the care taker The design is developed with a voice recognition system, which allows the physically disabled person to control the standing wheelchair by voice command who have issues in hand movement due to ageing or paralysis for joystick controlled wheelchairs. After powering the system on, the phone number gets configured. Then patient can move by using voice commands. Patient can use forward and backward voice commands to move in front or back direction and to stop on some certain place they can press stop button, and to turn left or right there are left right button and to make the chair stand, the patient can press stand button and to come back to the same position patient can repress the same button. The design also provide some additional features such as fall detection for the safe movement and a GPS based navigation system for tracking and sending notifications to the caretakers increase the usability of the automated wheelchair system. In case of emergency patient can press help button. As the patient will press the help button the system will send the GPS location to the care taker. In this way, tis system can be used to help the paralysis or leg disable patient.

III BLOCK DIAGRAM
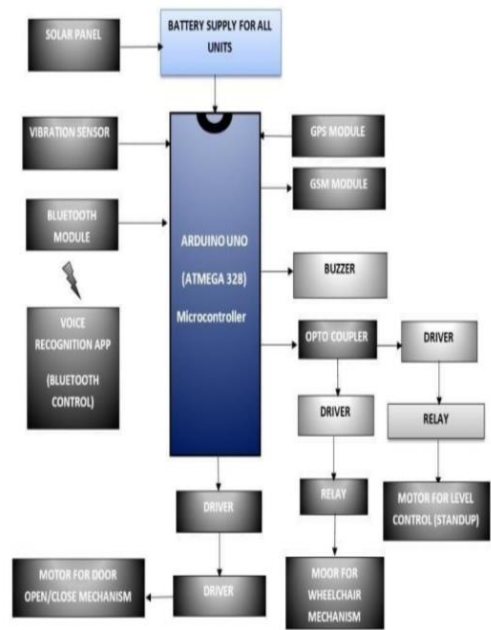
Input is given in the form of battery in volts from solar panel . vibration sensor is used for fall detection As our project contain voice recognition , bluetooth module begin used the. Controller used here Arduino the mechanical setup wheelchair is made up with motors fixed in two legs backposition when the power supplied in the patient is lifted 30 if there is any problem the buzzer indicate and its send through GSM/GPS module.

IV HARDWARE IMPLEMENTATION

A.Ardiuno

Arduino is an open source electronics platform based on easy to easy hardware and software it's having 14 digital input/output pins

B.Battery cells

Battery cells are the most basic individual component of a battery they consist of a contai in which the electrolyte and the plates can interact .each lead acid cell fluctuates in voltage from 2.12 volts

C.lead Acid battery

A lead acid battery is an electrical storage device that use a reversible chemical reaction to store energy

D.GPS

The global positioning system that provides reliable location and time information the GPS system find the patient location

E. GSM modem

Global system for Mobile communication is an open and digital cellular technology used for transmitting mobile voice and data services

Special Issue - 2022

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
ICONNECT– 2022 Conference Proceedings

F.HC05 Bluetooth

Hc-05 module is easy to use blue thooth app (serial port protocol) module it is a transparent wireless serial connection

G.DC motor

The DC motor is the part of the electric motor using dc power as energy source the device transform electrical energy into mechanical energy

H.vibration sensor

The vibration sensor is used for fall detection the recongizes movement or vibration it send a signal to control panel

V RESULT AND DISCUSSION

Standing wheelchStanding wheelchairs are Abbreused by people with mild to severe disabilities including: spinal cord injury, traumatic brain injury, cerebral palsy, spina bifida, muscular dystrophy, multiple sclerosis, stroke, rett syndrome, post-polio syndrome and more. Standing chairs are used by people with both paraplegia and quadriplegia, since a variety of standing options are available to accommodate for mild-to-severe disabilities. Designing a simple and efficient automatic speech recognition system for isolated command words to satisfy the motion control of an electric motorized standing wheelchair for differently abled persons is the interest of this project. The processing units (the speech kit and the microcontroller) are directly attached to the wheelchair in one package that made the design representing a complete autonomous and smart wheelchair. The speech recognizer is tested to prove its performance to generate exact movement of the chair. It proved a recognition rate of above 90%. This project elaborates the design and construction of Smart Standing Wheelchair with the help of Bluetooth Module. The circuit works properly to move as the command given by the user. After designing the circuit that enables physically disabled to control their wheel and standing mode using an android application in their smartphones and it has also been tested and validated. The detection of any obstacle is successfully controlled by the microcontroller. As the person switches on the circuit and starts moving. This proposed system contributes to the selfdependency of differently abled and older people. Voice control method through Bluetooth module also implemented for the person having upper limb injury. This wheel chair is more efficient and cost effective compared to other methods of control. Different types of therapy facility create a new revolution with this automated system. Our proposed design have shown evidence that standing wheelchairs may provide specific health benefits. Some of these health benefits include improved circulation, urinary health, bowel function and bone density. Standing wheelchairs may also improve overall quality of life and independence among users. The aim of the project is to help handicapped and elderly people. To attain this we use voice recognition techniques. The voice recognition and gesture methods work very quickly whenever user use these features the sensors reacts fast and follow the commands immediately.

So, we can say that the system we make is a life changer for handicapped and elderly people.

VI CONCLUSION

We conclude that the developed voice based control of standing wheel chair is tested and works satisfactorily in an indoor environment with minimum assistance to the person suffering with Quadriplegia or Paraplegia. It has a good response with voice recognition activating the motors connected to the wheels of the chair. This paper presents a new voice controlled wheelchair with many advantages such as reduced complexity, easy controlling, low cost and great reliability compared to other conventional wheelchairs. The proposed wheelchair can be used in many applications such as hospitals, old age homes and airports etc.

The main objective of this product is to make the helper life easy and to make sure the patient is not hurt during the process of treatment. This product eliminates the step of standing patient from wheelchair and vice versa as handling of old age people is very difficult. It makes the patient comfortable when sitting for a long time. This will reduce the effort of the caretaker and provide a safer transfer for the patients in hospitals. Our most modern day technologies use sensors such as vibration and voice recognition to take interactive input and in this project we also have tried to make the interactive wheelchair and close to human.

REFERENCES

[1] Smart Wheelchair with Electric Bike Nair, Vivek; Jadhav, Manoj. International Research Journal of Innovations in Engineering and Technology; Dharmapuri Vol. 5, Iss. 7, (Jul 2021): 62-65. DOI:10.47001/IRJIET/2021.507011

[2] Fall Detection System for the Elderly Using RFID Tags with Sensing Capability. Koichi Toda and Norihiko Shinomiya, Graduate School of Engineering, Soka University, Tokyo, Japan. -2018 IEEE Seventh global conference on consumer electronics (GCCE 2018)

[3] Mobility assistance robot for disabled person using EMG sensor. Syed Faiz Ahmed , Athar Ali , M. Kamran Joyo M. Rehan , Fahad A. Siddiqui , Jawad A. Bhatti ,Aatika Liaquat M. M. S. Dezfouli Universiti Kuala Lumpur, British Malaysian Institute, Malaysia 2 Electronic Engineering Department, Sir Syed University of Engineering & Technology, Karachi, Pakistan Universiti Kuala Lumpur Institute of Product Design and Manufacturing (UniKL IPROM), Kuala Lumpur,Malaysia.- 2018 IEEE International Conference on Innovative Research and Development (ICIRD)

[4] A Self-care Assistive Robot for the People with Lower Extremity Dyskinesia Juzhong Zhang; Yuyi Chu; Zhisen Wang; Liming Cai; Hongbo Yang- 2020 IEEE International Conference on Mechatronics and Automation (ICMA)

[5] A novel design of the intelligent stair-climbing wheelchair Jingcheng Sun- 2020 6th International Conference on Mechanical Engineering and Automation Science (ICMEAS)

[6] Surface electromyography activity of trunk muscles during conventional and non-conventional wheelchair propulsion Hassan Khalil; Ahmad Diab; Tarek Atallah; Alaa Daher; Ahmad Rifai Sarraj -2019 Fifth International Conference on Advances in Biomedical Engineering (ICABME)

[7] Experimental Investigation of an Attachment to Self-Propel a Manual Conventional Wheelchair. Arnold Fernandez; Amritha Behanan; Allwyn Francis; Ahmed Harris; Vishnu Sankar; John M George-2021 International Conference on Advances in Electrical, Computing, Communication and Sustainable Technologies (ICAECT)

[8] Joystick Grip for Electric Wheelchair for Tension-Athetosis-Type Cerebral Palsy Yuto ogata; Motoyu katsumura; ken'ichi yano; tomoyuki nakao; Atsushi HAMADA; Katsuhiko torii- 2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) .

Special Issue - 2022

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
ICONNECT– 2022 Conference Proceedings

[9] Smart Assistance Library System for the Disabled : An IOT based User-Friendly Wheelchair. P. Ranjith Kumar; K. Sumathi; V. Sri Prithi; S. Saravana Suriya - 2019 5th Internatio nal Conference on Advanced Computing & Communication Systems (ICACCS)

[10] Modelling of Brushless DC Hub Motor to Control the Speed of Indigenous Powered Wheelchair Sateesh Reddy Avutu; Sudip Paul; V.V.B. Anjaneya Prasad; Jitendra Kumar Verma -2020 International Conference on Computational Performance Evaluation (ComPE)