International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 06 Issue: 07 | July - 2022 Impact Factor: 7.185 ISSN: 2582-3930

DESIGN AND CONSTRUCTION OF AUTOMATED WHEEL CHAIR

[1]Preethi K P , [2]Mohammed Sadiq B

[1] Student, Department Of Master Of Computer Application,BIET, Davangere.

[2]Assistant Professor,Department Of Master Of Computer Application,BIET, Davangere

[1]preethikp072@gmail.com

[2]sadiqbmd@gmail.com

---***---

Abstract: While the needs of many individuals with disabilities can be satisfied with power wheelchairs, some members of the disabled community find it difficult or impossible to operate a standard power wheelchair. To accommodate this population, several researchers have used technologies originally developed for mobile robots to create “smart wheelchairs” that reduce the physical, perceptual, and cognitive skills necessary to operate a power wheelchair. We are developing a Smart Wheelchair Component System (SWCS) that can be added to a variety of commercial power wheelchairs with minimal modification. This paper describes the design of a prototype of the SWCS, which has been evaluated on wheelchairs from four different manufacturers.

Keywords: GPS module, obstacle detection, Ultrasonic sensor, joystick control.

Introduction: In the country having differently-abled persons constituting 8.3% of total households having disabled persons, about 99% homes are normal homes, 0.4% are institutional and 0.2% are house-less households. The wheelchair is one of the most commonly used assistive devices for enhancing personal mobility, which is a precondition for enjoying human rights and living in dignity. Wheelchairs assist people with disabilities to become productive members of their communities Some of the diseases like Alzheimer’s, congestive heart failure, osteoporosis, Glaucoma, crystic fibrosis are mostly affected to the humans who requires wheel chair Providing appropriate wheelchairs not only enhances mobility but begins a process of opening up a world of education, work and social life. In addition to providing mobility, an appropriate wheelchair benefits the physical health and quality of life of the users by helping in reducing common problems such as pressure sores, progression of deformities and improve respiration and digestion.

Literature Survey

Different papers portraying to recognizing the infections and strategies proposing the execution routes as represented what's more, talked about here.

[1] Ashutosh M. Bhatt. (2018) “Gesture controlled wheelchair”, Electronics for you. The wheelchair moves as per user’s finger gestures. The user has to simply bend his fingers to move the wheelchair.

[2] Javier M. Antelis, Andrea Kubler, and Javier Minguez. (2012) “A Noninvasive Brain-Actuated Wheelchair Based on a P300 Neurophysiological Protocol and Automated Navigation”, IEEE transactions on robotics. . In this project, Basic4android interface is designed to program the android device that will be able to control the movement of wheelchair. This project integrated IOIO board and direct current motor to create the movement of wheelchair

[3] Fayeem Aziz, Hamzah Arof, Norrima Mokhtar, MarizanMubin. (2014) “HMM based automated wheelchair navigation using EOG traces in EEG”, Journal of neural engineering. The EOG traces originate from eyeball and eyelid movements and they are embedded in EEG signals collected from the scalp of the user at three different locations. Features extracted from the EOG traces are used to determine whether the eyes are open or closed, and whether the eyes are gazing to the right, center, or left.

[4] N.Viswanath, M.Anbarasan and S.Jaisiva. (2017) "Android based automated wheel chair control for physically challenged person", Asian journal of applied science and technology (AJAST).used beagle bone black, GSM technology, colour convertion, HSV conversion, morphological image processing, Bhattacharyya distance algorithms, relay. The SIAMO project began at the end of 1996 as a continuation of a previous project financed by the ONCE Foundation (National Organization for the Blind of Spain), user-chair interfaces based on oral commands (isolated words with a user-dependent engine), a joystick, and a sensory system composed of ultrasonic and infrared sensors that allowed the detection of obstacles and abrupt unevenness (such as stairs, etc.)

[5] Mohammed Asgar, Mirza Badra, Khan Irshad and Shaikh Aftab. (2013) "Automated innovative wheelchair", International Journal of Information Technology Convergence and Services (IJITCS) In modern technology, the HMI based techniques include joysticks controller, finger movement, voice recognition, eye-gaze tracking, electromyography, etc.

The wheel chair can be communicated via joy stick in which the user will control the wheel chair using built in parameters for forward, backward, left and right command. Also, the speed of the wheel can also be adjusted through this joystick. The purpose of this feature is to allow the user to exert less effort and more safety [6].

A new complex feature which is known as Head controlled wheel chair uses V frame and SPDT switch. SPDT switch or single pole double throw switch and 4 SPDT type relays of 12 V and 10 Amps are used for directions left, right, forward and reverse. These switches are attached with the V-frame and will help the user to move in the desired position [7].

A smart wheelchair, as described earlier in this article, may be identified as a mobile robot with seats or as a uniquely modified powered wheelchair fitted with a control system and variant sensors. But smart navigation approaches are important smart chair features. In 2010 Christina Tsalicoglou and Xavier Perrin performed a study on mobility aids for people with disabilities [8]. Many initiatives are researching how a smart wheelchair can be of full assistance to its operator according to this report. Methods of navigation are classified into three groups according to help rate. The three key types are: mutual control, semi-autonomous control and entirely decentralized power. The benefit of autonomous and semi-autonomous systems is that just once in a while the consumer has to send a order and can relax until the order is provided, as the control is automatic. Shared ownership allows the user more freedom, since the user may manage the flow and schedule the road. The smart chair only offers rescue or mitigating measures such as stopping accidents, removing barriers and following partitions [9].

It's clear from the names "semi-autonomous control" and "autonomous control" that machine assistance is increasing. Therefore, wheelchairs are more interested in route planning, in addition to prevention of accidents, avoiding obstacles and approaching walls. Semi-autonomous systems wait for user commands that provide a local target for the short term. The wheelchair then starts moving until the navigation system alerts an external fl ag that the order has been completed. Semiautonomous devices could be useful in cases such as people with visual impairments. They aid them with the versatility benefit of freedom, as in the "Support Star" system [10]. The "Support Star" role may be triggered when the consumer encounters an unexpected situation. It enables a remote user to use augmented reality technology to offer valuable steering guidance or to explicitly transmit orders to the wheelchair [8].

Methodology:

The device architecture consists of an Arduino Uno microcontroller which serves as the Wheel Chair bot 's brain, motor driver circuitry which is responsible for controlling the 24-volt DC motors attached to the wheels, and a remote controller which controls the bot 's motion. The microcontroller communicates through transmitter and receiver. The hardware is designed in such a way that the wheel chair easily moves on a plane surface. The two DC motors provide necessary torque required to move flawlessly with 80kg patient. The motors are synced such that they both rotate at equal rpm to move the wheelchair in a straight line. To move the wheelchair to the right or left their respective motor rotates the wheel and the direction is easily and safely changed by the user. The motors are powered by a single DC LINO 12-volt 26Ah rechargeable battery. The battery also provides necessary power to the electronics of the project. A single Arduino mega is the brain of the smart wheel chair. It connects the Bluetooth, the motor drive circuits, the MPU sensor and the buck boost circuits.

Conclusion

Our wheelchair can be made which can be operated by a Joystick. Output of sensor can be applied to wire transmitter circuit and can received at wheelchair circuit by receiver circuitry. So, GPS module operation can arrange and display the information. Instead of using acceleration motion (eyebrow Movement), in futurewe can use IOTbased human machine interface to move wheelchair in different direction. Using retina movement, we would be able to drive a wheelchair. We can use voice command IC to interface our voice signals with microcontroller.

Reference

[1] Ashutosh M. Bhatt. (2018) "Gesture controlled wheelchair", Electronics for you.

[2] Javier M. Antelis, Andrea Kubler, and Javier Minguez. (2012) "A Noninvasive Brain-Actuated Wheelchair Based on a P300 Neurophysiological Protocol and Automated Navigation", IEEE transactions on robotics.

[3] Fayeem Aziz, Hamzah Arof, Norrima Mokhtar, MarizanMubin. (2014) "HMM based automated wheelchair navigation using EOG traces in EEG", Journal of neural engineering. [4] N.Viswanath, M.Anbarasan and S.Jaisiva. (2017) "Android based automated wheel chair control for physically challenged person", Asian journal of applied science and technology (AJAST).

[5] Mohammed Asgar, Mirza Badra, Khan Irshad and Shaikh Aftab. (2013) "Automated innovative wheelchair", International Journal of Information Technology Convergence and Services (IJITCS).

[6] Akar Jain, Dhaval Petiwala, Prakash Narayan, Shantanu Shobhit. (2017) "Automated wheel-chair on eyebrow movements using brain wave sensor by EEG" international journal of multidisciplinary research and development.

[7] Utkarsh Sinha, Kanthi.M. (2016) "Mind controlled wheelchair", International science press.

[8] Rajavenkatesan.T, Nagalakshmi.S. (2015) "Innautomatic wheelchair using eyeball sensor", international journal of advanced technology in engineering and science.

[9] Chin-Tuan Tan and Brian C. J. Moore. (2008) "Perception of nonlinear distortion by hearing-impaired people", International Journal of Ideology.

[10] Oberle, S., and Kaelin. (1995) "Recognition of acoustical alarm signals for the profoundly deaf using hidden Markov models", IEEE International symposium on Circuits and Systems (Hong Kong).

[11] Shawki and Z. J. (2001) "smart reconfigurable visual system for the blind", Proceedings of the Tunisian-German Conference on: Smart Systems and.

[12] M. Higgins and V. Pant. (2004) "Biomimetic VLSI sensor for visual tracking of small moving targets" , IEEE Transactions on Circuits and Systems.

[13] Daerden and D. Lefeber. (2001) "The concept and design of pleated pneumatic artificial muscles", International Journal of Fluid Power.

[14] K. R. Castle man. (1996) "Digital Image Processing", Pearson Education.