

Literature Review of Electric Wheelchair

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Abstract: *There are some people who cannot walk on their own because of some problems such as accidents, handicapped issues, age factors, etc. So there must be some mechanism that can be used to restrain these defects. The proposed Android Controlled Wheel Chair is used to remove these defects and let the people live their life on their own, and survive in the environment easily. The android application is created and installed in the Smartphone and the connection is done using Bluetooth. This wheelchair can move in two modes, first is touch mode and the second is voice mode. In the touch mode when user want to change the direction, then by using the touch screen of the Smartphone the user has to choose the direction specified within the four quadrants on the screen. The user can move upward, downward, right and left according to the specific commands given by the user by the Smartphone.*

Keywords: *Arduino, IR Sensor, GSM, DC Motor Driver*

I. INTRODUCTION

People have disabilities with their hands, feet, lower extremities. So they are unable to perform the regular task in their daily lives. Most of the technologies are made available to overcome this problem. In this paper the Android Controlled mobile operated Wheel Chair is being developed to help the people with their disabilities and survive in the world independently. The Android application is made and is installed in the respective person's Smartphone. People use their Smartphones for doing the regular nominal tasks such as calling, texting, listening music and sending emails and other files. Now a days the Smartphone is not just used for talking purpose but many other works are based on Smartphone such as web browser, games, and online videos. So with the help of this Smartphone, the people with physical disabilities can use the wheelchair and give directions to it as they want.

The wheel chair can move in two different modes. The first mode is touch mode, as touch screen is available in every Smartphone so it will be easy for user to use it. On the screen, the touch panel consists of four different quadrants, which are given for LEFT, RIGHT, FORWARD and BACKWARD [1]. The users just have to move their fingers across the quadrant to select the appropriate direction and wheelchair will move accordingly. Another advantage of this is that sometimes the user may be busy in doing some work while driving, in that case accident may happen. To avoid such situations emergency switch button is there. The connection between android application and the wheel chair is done using Bluetooth. The HC-05 Bluetooth module is used for this purpose. The user commands is given first using application and then it is send to the microcontroller via Bluetooth. Bluetooth converts these commands in binary format and then send it to the microcontroller. Then microcontroller executes the command and send the digital values to the device motor driver and lastly device motor driver is used to move the wheel chair.

A. Manual Wheelchairs

These are the types of devices that can help a person to move from one place to another without any assistance of battery. There are three types of manual wheelchairs which are named as- self-propelled, attendant propelled, and wheelbase. A single-arm drive enables the user to turn either left or right while the two-armed drive enables the user to move forward or backward on a straight line. This type of wheelchair enables the user to move forward by pumping the lever back and forth.

B. Electric Wheelchairs

A power chair can be used by someone who haven't got the mobility. Perhaps, to drive a mobility scooter, due to arm, hand, shoulder or more general disabled conditions, and also do not have the leg strength to propel a manual chair with their feet. Powered wheelchair can offer various power elevation, and other useful or necessary to health function [1].

Functions such as tilt, recline, leg elevation, seat elevation, and other useful or necessary to health function.

C. Standing Wheelchair

'Redman Power Chair', it is one of the world's highest quality standing wheelchair. People with spinal cord injury can gather the health benefits of standing wheelchair. The physical benefits of standing wheelchairs involves:

Decrease urinary tract infection problem.

Improves blood circulation in the body.

Standing exercise helps in improving the bowel function.

Wheelchair helps to distribute your weight and improves healing bed sores.

Decreases the amount of muscle stiffness.

Increases the bone density.

D. Pediatric Wheelchair

These types of wheelchairs provide a key-enabling technology to young children who would not be able to travel independently in their environment. Standard powered wheelchairs are still mostly dependent on the thinking capabilities of users. Unfortunately, this does not involve disabled users who lack in the required problem-solving and spatial skills, especially young children. For these children, to be denied powered mobility is an important set-back; exploration is important for their cognitive, emotional and psychosocial development.

E. Stair Climbing Wheel Chair

The Stair-Climbing Wheelchair which is existing at present can be grouped into three categories: - Continuous stair climbing wheelchair, Intermittent-stair climbing wheelchair and Auxiliary stair climbing wheelchair. Continuous stair climbing wheelchair have only one set of supporting device. The wheelchair relies on this supporting device for the continuous motions. In Intermittent stair climbing wheelchair, the process of climbing stairs off is similar to the people climbing up and down stairs, it is also called Walking stair climbing wheelchair. Intermittent stair climbing wheelchair is one of the supporting devices that lifts the wheelchair and other set of support system. In auxiliary stair climbing wheelchair, the attachments rely on another device installed in the wheelchair and it needs assistance to help in realizing the function of climbing stairs. Stair lift needs wide stair way which is very expensive.

II. LITERATURE SURVEY

Smart Electronic Wheelchair Using Arduino, International Journal of Computer Science and Mobile Computing, Vol.5 Issue.5, May- 2016. This paper describes the design of a smart, motorized, voice controlled wheelchair using embedded system. Proposed design supports mobile activation system for physically disabled persons incorporating manual operation. This paper represents the “Voice-controlled Wheel chair” for the physically disabled persons 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 then it is transferred to the Bluetooth Module.

ANDROID BASED AUTOMATED WHEEL CHAIR, Global Journal of Advanced Engineering Technologies Volume 4, Issue 4- 2015 This project is related to the Android phone controlled wheel chair system by using Android App and voice recognition system. This System is designed to control a wheel chair by using the android app and voice recognition. The main objective of this project is to facilitate and increase the movement of people who are handicapped and elderly people who are not able to move well because of their disabilities. The result of this project will allow handicapped people to live a life with less dependency and on their own.

III. DRAW BACKS OF PRESENTLY AVAILABLE WHEELCHAIRS

Most common technical issue in the current availability of wheelchairs is the cost versus its accuracy. Unavailability of wheelchairs for a particular disability is also an issue to be considered. There is also unavailability of wheelchair for the bed lying patient till date. There are zero wheelchair available for mentally challenged people also. All the above important aspects to consider is the physical barrier that plays additional requirement on strength and durability of wheelchairs.

IV. DISADVANTAGES OF ELECTRIC WHEELCHAIR

The new electric wheelchair may help the user to recover from some mobility, this is not for everyone. They do have limitations, which needs to be taken into consideration.

A. Maintenance & Repair

The cost of maintaining and repairing an electric wheelchair can be remarkably higher than a manual wheelchair.

B. Initial Expense

Electric wheelchairs are usually more expensive than that of the manual wheelchairs.

C. Size

Electric wheelchairs are larger in size than manual wheelchairs and may not be suitable in every house.

D. Weight

Electric wheelchairs are much heavier than manual wheelchairs. The size and weight makes them less portable than manual chairs and perhaps much heavier for some lifts.

E. Limited Power

If the battery packs are not recharged properly, users might face a battery problem like a dead battery before reaching home.

F. Difficult for others to Move

If the person becomes unable to move user's electric wheelchair on their own, then pushing it is very difficult because of its weight and its size.

G. Shouldn't be only Chair

If user has an electric wheelchair, he or she still needs to have a manual chair on standby.

V. CONCLUSION

In this study, we have concluded that there are different ways of control systems used to control the movements of wheelchair. No single method is suitable for all types of physical disability. The controls of the system depends on environment also. Voice operated control system cannot be used in noisy environment. Multiple control systems implemented in a wheelchair is quite suitable to get over this disadvantage. But as the control system increases the cost also increases a lot. So there is also limitation on implementing a number of control systems. There is not a single system which makes physical disabled people fully independent. Different control system should be used for various types of physical disabilities. This paper presents a summary of current state-of-the-art smart wheelchairs. Various technologies are available to operate and control the wheel mechanism of wheelchair. Some of the operating mechanisms of wheelchairs have been specified here. This information is gathered to spread awareness of different types of existing smart powered wheelchair, so that the improvement can be installed into it.

REFERENCES

- [1] ANDROID BASED APPLICATION FOR WIRELESS CONTROL OF WHEELCHAIR, IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163 | pISSN: 2321-7308
- [2] IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163 | pISSN: 2321-7308, IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163 | pISSN: 2321-7308
- [3] Ms. S. D. Suryawanshi, Mr. J. S. Chitode, Ms. S. S. Pethakar, "Voice Operated Intelligent Wheelchair", International Journal of Advanced Research in Computer Science and Software Engg. 3(5), May - 2013, pp. 487-490.
- [4] Mohammed Asgar, Mirza Badra, Khan Irshad and Shaikh Aftab," AUTOMATED INNOVATIVE WHEELCHAIR", International Journal of Information Technology Convergence and Services (IJITCS) Vol.3, No.6, December 2013.
- [5] Srishti, Prateeksha Jain, Shalu, Swati Singh," Design and Development of Smart Wheelchair using Voice Recognition and Head Gesture Control System", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 4, Issue 5, May 2015.