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VOICE CONTROLLED WHEELCHAIR

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ABSTRACT: In this project Bluetooth-based wheelchair controller is used. The system is designed to control a wheelchair by using an Bluetooth device. The main objective of this project is to help the movement of disable people or handicapped and also the elder people who are not able to move well. The result of this design will allow the special people to live a life with less dependence on others. Bluetooth knowledge is a key which may provide a new approach of human communication with machines. Thus their problem can be solved by using Bluetooth technology to control the movement of a wheelchair. In this project, Basic 4 interfaces are considered to program the device that will be able to control the movement of wheelchair. This project integrated and direct current motor to create the movement of wheelchair. The results of this project showed that this project can be used for future research works and to design quality innovation that meets market need and public interest.

Keywords- *Bluetooth, Wheel chair, IR Sensors, , Micro-controller.*

1. INTRODUCTION

This paper is conceived as an idea to ease the lives of those among us who are unfortunate enough to have lost the ability to move their legs due to a significant amount of paralysis, accident or due to old age. Many differently abled people usually depend on others in their daily life especially in moving from one place to another. For the wheelchair users, they need continuously someone to help them in getting the wheelchair moving. Their lives are made difficult by the fact that there is lack of an intuitive control system for their wheelchairs that allows moving independently. Using an electrical wheelchair leads to a large amount of independence for persons with a physical disability who can neither walk nor operate a mechanical wheelchair alone as it requires great effort and help of the problem is that in some cases the disability causes someone to lose the ability to use his hands, therefore in this case, the way of controlling a power wheelchair can be done using speech commands for hands-free patients leading to an interesting and promising outcome. But, still the availability of the smart wheelchair solutions is often limited due to the high costs and not-so-friendly operation. By the proposed approach, described in this paper, the low-cost, simple and friendly solution for the voice controlled platform will be presented

that is user friendly, fully-customizable according to the language spoken by the user and will help in enhancement of user's independent mobility. Using a Smartphone as the "brain" of a robot is already an active research field with several open opportunities and promising possibilities. Another recent and very successful technology, Bluetooth has changed how people use digital device at home or office, and has transferred traditional wired digital devices into wireless devices. This research is based on Voice-controlled Wheelchair design based on mobile platforms, by means of Bluetooth technology, design and implementation of wireless remote control solutions. The project also incorporates use of ultrasonic sensors to detect obstacles within range of 4 meters and notifies the system and stop the wheelchair till further command.

2. LITERATURE REVIEW

2.1 Design and Development of Search and Rescue Robot:

Search and rescue robot is developed mainly to move through rubbles and debris. When a natural disaster such as an earthquake struck causing the building to collapsed, this robot can be used to search for victims and transfer to safe place. Search and rescue robot is equipped with a robotic arm to perform the evacuation process. With this robotic arm, robot can easily grab the victim in collapsed building and bring to safe place. Generally, there is a lot of robot like this used for rescue operation in collapsed building. But non of them is control by using mobile devices. So this paper is purposely designed to develop a prototype of robotic vehicle using mobile devices as controller by using Bluetooth transmission. The distance can vary from 10 meter to 100 meter depending on the type of Bluetooth module used. This robot is powered by Arduino Uno R3 board using 9V AA battery for power supply. In order to control this robot using mobile devices, an application was designed by using MIT Inventor to create an application interface between robot and mobile devices. While for the robotic arm will be design by using Autocad software. In addition, robotic arm will also use four servos to move.

2.2 Eye Controlled Wheelchair Based On Arduino Circuit:

Statistics suggests that there are around 40 cases per million of quadriplegia every year. Great people like Stephen Hawking have been suffering from this phenomenon. Our project attempts to make lives of the people suffering from this phenomenon simple by helping them move around on their own and not being a burden on others. The idea is to create an Eye Controlled System which enables the movement of the patient's wheelchair depending on the movements of eyeball. A person suffering from quadriplegia can move his eyes and partially tilt his head, thus giving is an opportunity for detecting these movements. There are various kinds of interfaces developed for powered wheelchair and also there are various new techniques invented but these are costly and not affordable to the poor and needy people. In this paper, we have proposed the simpler and cost effective method of developing wheelchair. We have created a system wherein a person sitting on this automated Wheel Chair with a camera mounted on it, is able to move in a direction just by looking in that direction by making eye movements. The captured camera signals are then send to PC and controlled MATLAB, which will then be send to the Arduino circuit over the Serial Interface which in turn will

control motors and allow the wheelchair to move in a particular direction. The system is affordable and hence can be used by patients spread over a large economy range. KeywordsAutomatic wheelchair, Iris Movement Detection, Servo Motor, Daugman's algorithm, Arduino.

2.3 Design and Develop-ment of Smart Wheelchair using Voice Recognition and Head Ges-ture Control System:

After several studies and survey it have shown that both children and adults benefit substantially from access to a means of independent mobility. Though many disabled people can satisfied with traditional manual or powered wheelchairs, there is a segment of disabled community find it difficult or impossible to use wheelchairs independently. Many researchers have used several technologies to make a wheelchair accessible to use for this population.Several wheelchairs have been developed with several control devices. The brain signal interfaces, vision based, head gesture based and many more controlled wheelchairs have been developed. The proposed work is to design and develop a smart wheelchair using a voice recognition and head gesture control system. It can be used efficiently with less effort by the users so that they can use it independently and easily.

2.4 Voice Controlled Intelli-gent Wheelchair:

In order to assist physically handicapped persons, we developed a voice controlled wheelchair. The user can control the wheelchair by voice commands, such as "susume (run forward)" in Japanese. A grammar-based recognition parser named "Julian" is used in our system. Three type commands, the basic reaction command, the short moving reaction command, and the verification command, are given. We experimented speech recognition by Julian, and obtained a successful recognition rate 98.3%, 97.0% of the movement command and the verification command, respectively. The running experiment with three persons was carried out in the campus room and the utility of our system is shown..

3. EXISTING SYSTEM

Wheelchair is a gadget utilized by crippled and elderly individuals for their transportation reason and sometimes young people unfortunately. A few sorts of smart wheelchairs are available in market which depend close by motion, eye position, voice acknowledgement, and mind waves and so forth. Voice controlled posture change and driving was realized, the hardware circuit and software program are tested and debugged, the recognition rates of voice control of the wheelchair for the same person are acceptable. But it can't be applicable in crowded place due to it recognize numerous number of voices.

Disadvantages Of Existing System are:

Eye position :

In order to move, the person should concentrate in a particular direction continuously which increases the stress levels of eye. [2]The capturing of eye ball movement is not accurately done by the system. The receiving of ambiguous eyes gestures is a threat to the person in the wheel chair.

Fig 1: A man operating wheel chair using eye movement with a great difficulty

Voice Based :

The system only responds accurately only to the individual who trained the system and the speaker independent is a system trained to respond to a word regardless of who speaks. [3]Some voice based Wheelchairs receive the commands not only from the owner but from the anonymous person who has same voice frequency as the user.[4] Thus, it will create a problem to the person in the wheelchair. [5]It is difficult to use in rush places and noisy places.

Fig 2: A complexly operated voice controlled wheel chair

Joystick based:

The cost of repairing and maintaining power wheelchair can be higher than a normal wheelchair and difficulty to move. The rapid movement given to the joystick will make the joystick weak and broken. High concentration needed and effort to move the joystick.

Fig 3: A person operating a heavy joystick based wheel chair

3. PROPOSED SYSTEM

In accordance to the era of technology advancement, it is necessary to provide best solution especially for the disabled person. This project can used for making even a disabled person to reach his needs independently. These people often need a special care done by the community and it result in different difficulties like human power. In some cases, pushing wheelchair for a long distance can require a huge amount of power for people in charge of disabled person. Through all these difficulties we can combine technology and healthcare to produce a new system called "BLUETOOTH BASED COMMUNICATION WHEELCHAIR".[6] Living independently is the most basic wish of every human being. This might be

a wish for disabled person too. [7] Our wheelchair would definitely fulfill this wish in the case of disabled person.

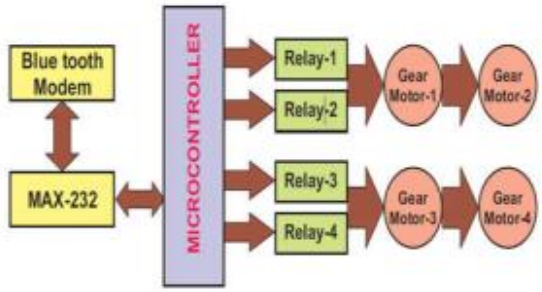

Fig 4: Block diagram of the system

The microcontroller converts the sequence into ASCI code and then this code is decoded and according to it the motors are given supply and turned to have linear motion of the wheelchair. Bluetooth module is used for wireless transmission of data, operated on 5V. Single Battery of 12V is used to drive the wheelchair. Battery is used for the purpose of mobility. DC motors are driven by driver IC. The driver IC is a dual bridge IC. For forward movement the motors are moved forward and for reverse movement the motors are moved in backward direction. For left movement the left motor is stopped and right motor in forward direction and for right movement the right motor is stopped and left motors are moved in forward direction.

BLUETOOTH:

Bluetooth is an open wireless technology standard for exchanging data over short distances (using short wavelength radio transmissions) from fixed and mobile devices, creating personal area networks (PANs) with high levels of security. Created by telecoms vendor Ericsson in 1994 it was originally conceived as a wireless alternative to RS-232 data cables. It can connect several devices, overcoming problems of synchronization.

Fig 5: Bluetooth

Bluetooth is a short-range radio link intended to replace the cable(s) connecting portable and/or fixed electronic devices. Key features are robustness, low complexity, low power and low cost. There are already similar standards in this market, such as IrDA, Home RF and IEEE 802.11 family. Bluetooth is designed to offer some unique advantages that none of the others can provide. For example, IrDA uses infrared as medium, so its range is limited to around 1 meter, and it requires a line-of-sight communication. In comparison, Bluetooth can operate at a range up to 10 meters, or even 100 meters with enhanced transmitters. RF signals goes through walls, so a Bluetooth network can span several rooms. Compared with Home RF and IEEE 802.11 family, Bluetooth has much lower data rate and transmission range (10 meter). While Home RF supports 1.6 ~ 10 Mbps data rate and IEEE 802.11a/b supports 54/11 Mbps, Bluetooth supports only 780 Kbps, which can be used for 721 kbps downstream and 57.6 kbps upstream asymmetric data transfer, or

432.6 kbps symmetric data transfer. Both Home RF and IEEE 802.11 operate at 100 meter range, while Bluetooth operates at up to 10 meter. However, as a result of the lower data rate and transmission range, Bluetooth offers much lower cost per node (approximately 5 ~ 10% of Home RF and IEEE 802.11). So it is more suitable for applications involving low data rate (data and voice), small number of devices (8 at maximum), low power consumption and short range (up to 10 meter), such as PC-to-peripheral networking, home networking, hidden computing, data synchronization (such as between PC and PDA), mobile phone devices, and future smart devices or entertainment equipment.

RF Transmitter and RF Receiver:

RF transmitter have to turn ON the section when data transmit and turn OFF after done transmit the data. This is because when the RF transmitter always ON, new data will not send to the RF receiver. To make this happen, the interface for switch button need a separate program. When the application is opened at that time an application is generated if the Bluetooth is not turned on. Connect virtual button is present which is used to connect the Android mobile phone with the hardware Bluetooth for wireless transmission of data. When the Bluetooth is switched on the application scans the input when the user touches the virtual button. If the requirement is forward then all the dc motors are supplied with 5V and moved in forward directions for linear movement. If the requirement is reverse then all the dc motors are supplied with 5V and moved in backward directions for linear movement. If the requirement is to turn left then the left dc motors are stopped and the right dc motors are supplied with 5V and the wheelchair moves in left direction. If the requirement is to turn right then the right dc motors are stopped and the left dc motors are supplied with 5V and the wheelchair moves in right direction. If the stop virtual button is touched then all the dc motors are stopped. A help virtual button is also present in order to send an SOS message to the concern person in case of any help. When the person reaches his/her destination at that time disconnect virtual button needs to be touched so that the wireless connection is turned off.

Table.1: Movement of the Wheelchair

Button Command	Left Wheel	Right Wheel	Condition Of Wheelchair
⬆	Forward	Forward	Move Forward
⬇	Reverse	Reverse	Reverse
➡	Forward	Reverse	Turning To The Right
⬅	Reverse	Forward	Turning To The Left
---	Stop	Stop	Stop

5. EXPERIMENTAL RESULTS

The project was tested for the movement of the wheelchair using Bluetooth and development of the self-automated wheel chair with its various interfacing units. For the controller wheelchair, user is provided with 4 buttons to move according to the direction required. There are total 4 buttons are present to control wheelchair which are forward (Fwd), Right, Reverse (Rev) and left. The restriction of this project is user only can touch one button at one time. When users discharge the button, wheelchair will automatically stop.

Fig.6: Model of Bluetooth based communication Wheelchair

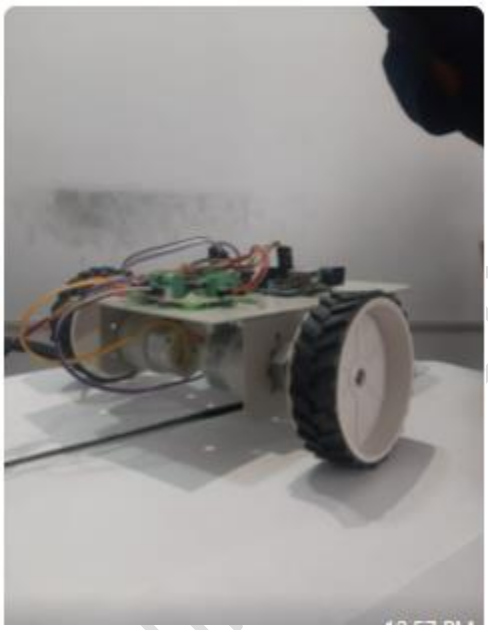

Fig.6: Output screen

Fig.7: Output screen

6. CONCLUSION

The main aim of this project implementation is to help all the people who are dependent on wheelchair for their mobility. Wheelchair is simple to operate and does not need any external help. The objectives of this project have been achieved successfully. This project was able to develop an system that can control the movement of the wheelchair. The application built can be useful for many android phones.

7. FUTURE SCOPE

For future work, it is suggested to use a more powerful and lighter weight motor to support various weights of users. This project elaborates the design and construction of Smart Electronic Wheelchair with the help of Bluetooth Module. The wheelchair works properly to move as the command given by the user. After this design the physically disabled to control their wheel using an android application in their

Smartphone's and it also reduces human effort. The detection of any obstacle may be the future scope. As the person switches on it starts moving in all the four directions which also helps the disabled person to do their works independently.

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