

VOICE AND ACCELEROMETER CONTROLLED WHEEL CHAIR

S SANDHYA¹, D SWETHA², MD SHAMEEM³, D SOWMYA⁴

^{1, 2, 3, 4}Assistant Professor, Department of Electronics and Communication Engineering, AnuBose Institute of Technology for women's, KSP Road, New Paloncha, Bhadradri Kothagudem District, Telangana (TS), 507115

Abstract: wheelchair is an Android-integrated mobility aid designed to support individuals with disabilities. It incorporates a control unit (CU) that directs the wheelchair's movements based on commands issued from an Android device and sensors linked to the system. The setup includes an embedded system along with an Android application. A caregiver initially registers the wheelchair user into the system, allowing the user's uploaded location to be easily monitored by the caregiver. The Android device continuously transmits real-time location data to an online service, enabling straightforward live tracking. Operation is possible through voice commands processed by the Android device using a Bluetooth speech engine. Additionally, an accelerometer attached to the system can be utilized to steer the wheelchair. Movement of the powered wheelchair relies on a motor control and drive mechanism that comprises a microcontroller, motor drivers, and a solar panel mounted on the roof. When the voice recognition system identifies a spoken command by matching it against stored memory, corresponding coded electrical signals are sent to the microcontroller to activate the wheelchair. A roof structure is installed atop the wheelchair to provide shelter for the user. Mounted on this roof, a solar panel harnesses solar energy to assist in powering the wheelchair's motion, thereby

lowering extra operational costs—a feature that distinguishes this project from existing systems.

I. INTRODUCTION

Smart wheelchairs are designed to supply help touses in distinct ways. Its motive is to minimize or eliminatethe user's full duty on shifting the wheelchair. One disadvantage of the Smart wheelchairs is the greater fee ofthem evaluating with the guide or the easy electricalpowered wheelchairs. Manual or electrical wheelchairs are satisfying for most of the low and medium degree disabilitycase the place sufferers can use the wheelchair independently. However, in extreme cases, it is tough or not possible to usewheelchairs independently. In such instances wheelchair usersoften lack unbiased mobility and be counted on someone elseto deal with the wheelchair. A structured consumer consciousness voice device and ultrasonicsensor structures has been built-in in this wheelchair. In thisway we have acquired an computerized wheelchair which can bedriven the usage of voice commands. The Wheel chair has additionally beendevloped to work on movement of accelerometer which willhelp the man or woman whose limbs are no longer working. Accelerometercan be connected to any section of physique of bodily disabledperson which he can without difficulty go like head, hand etc. Electronic

device configuration, a sensor system, a mechanical model, voice focus control, and an accelerometer. Here, Accelerometer and Voice managed wheel chair we intend to discover a value fantastic layout to construct a wheel chair for disabled people, who would discover challenging to use their strength in moving the wheelchair for their displacement. In this project we are going to make a wheel chair which can be controlled automatically as properly as manually. He/ she simply want to move his/her hand into the route it wishes to cross by way of using accelerometer. The proposed Speech Recognition Based Wheelchair Operation lets in bodily disabled character to manipulate the wheelchair without problems except the want to use hands. The movement of the powered wheelchair relies upon on the motor control and force device which consists of microcontroller and motor driving. Once the voice cognizance system recognizes the voice instructions in evaluation to the stored memory, the respective coded digital alerts would be despatched to the microcontroller which then controls the wheelchair accordingly. A character develops self-capability thereby improving his/her existence and additionally motivates others to be independent. We make use of the acceleration facts to apprehend the hand gestures and then switch the gesture records which indicates sure action instructions into the wheelchair's smooth motions. It's a attempt to recognize the herbal interplay for the older and handicapped with the wheelchair thru the hand gestures. Our graph indicates that the action and voice controlled wheelchair can information the paraplegic. We have provided a layout that is environment friendly

in supporting the quadriplegic and paraplegic human beings besides inserting their strengths and efforts to pull the wheelchair, with the aid of commanding it on their voice

II. LITERATURE SURVEY

The current machine is the one which has a rolling switch and works hence with that. There is no unit for location sharing and voice based totally working. The navigation information is no longer knowledgeable to the user.

Existing structures are :

The NavChair is a human-machine device in which the machine need to share manipulate with the user. VFH obstacle avoidance modifies the user's enter command to obtain safe travel. This method lets in the consumer superb manage while overriding dangerous maneuvers. Two kinds of issues were encountered in the utility of the VFH approach to a power wheelchair system. First, the electricity base is significantly different than usual cellular robots. In addition, the geometry and kinematics of the wheelchair are drastically more complicated than these of most cell robots. The second type of situation is associated to the software of obstacle avoidance to a human-machine system. The SPAM is a motorized wheelchair with sensors that detect limitations and software program that modifies the route of the wheelchair to keep away from obstacles. Unfortunately, the SPAM still does no longer provide the equal maneuverability as manual wheelchairs. It is additionally now not as mild as guide wheelchairs and thus is greater hard to transport in a car. In addition, if multiple boundaries are detected at once, the SPAM sometimes will now not go in any direction.

IIIMETHODOLOGY

The Wheelchair operates with hand movement, taking action as an input sign for the motion of wheelchair in a particular direction. An Accelerometer (Motion Sensor) is used to measure these movements. This sensor is tied as a band to hand/head. The wheelchair additionally operates primarily based on voice input given through the user. The voice focus package is used to recognize voice uttered with the aid of the user. The variants of the sensor are trapped and these alerts are fed as inputs to the signal conditioning circuit. Now primarily based on these editions the micro-controller is programmed to take selections which in turn manipulate the motion of wheelchair. When the person is sitting on the wheelchair with his hand in straight position, the end situation is being met and wheelchair suggests no response. Now if the person prefer to move in ahead path he has to tilt the hand downward. As long as the customer's hand orientation stays unchanged, the wheelchair will proceed to cross ahead except person moves the hand the place quit circumstance units true. Similarly is the case for left and proper conditions. The micro-controller, Arduino UNO, receives new values from the accelerometer after every 100ms. Arduino is additionally powered by means of the 24 V batteries source. The mechanical phase of the wheelchair is carried out first by means of attaching a motor at the returned of the wheelchair related to a battery which will be charged the usage of photo voltaic panels connected on pinnacle of the wheelchair. An accelerometer will be connected to monitor the actions of the chair. By detecting the hand movements using accelerometer, the instructions will be sensed. Voice can also be used

as enter to go the wheelchair the usage of predefined commands. A vicinity monitoring app is protected to sense the motion of the wheelchair, thereby stopping unauthorized access, for that reason ensuring security. Seats are made adjustable to enhance the alleviation of the user. The IMU sensor connected on the headset offers the motion instructions by means of detecting the orientation of the head

Following are the commanding alternatives reachable for patient:

- Forward command

By tilting his hand in ahead course at a certain angle.

- Backward Command

By tilting his hand in backward course at a certain angle.

- Stop Command

By retaining the hand in straight position.

- Right Command

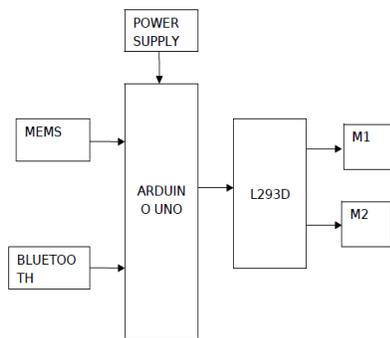
By tilting his hand in the direction of proper at a positive angle

- Left Command

By tilting his hand toward left at a positive angle.

Wheel chairs. It was once due to that purpose that we got here up with the notion of enforcing an computerized wheelchair that makes use of photo voltaic electricity from the solar and use it to cost the wheelchair. The device involves of two fundamental parts: Transmitter and Receiver. The predominant block is the wheelchair administration unit. Control block is coronary heart of this gadget although which controlling and monitoring of gadget is carried out. It consists of an emergency button and makes use of an accelerometer to make certain the smooth

functioning. The transmitter phase has the provision for speech recognition. The android app consists of person and caretaker interface. The registration is achieved by way of logging in. The aspects provided are Bluetooth speech, accelerometer movement, emergency switch, region share. After the use, the consumer can logout. The caretaker desires to login to view the person and song the location. The caretaker can add a new user. It's the caretaker who receives message from the person inclusive of location. There are use case diagrams that indicates the user's interplay with the system.



Block diagram of Wheel chair system

IV. SOFTWARE AND HARDWARE

Arduino UNO:

The Arduino Uno is an open-source microcontroller board based totally on the Microchip ATmega328P microcontroller and developed by way of Arduino.cc.[2][3] The board is outfitted with units of digital and analog input/output (I/O) pins that can also be interfaced to a number growth boards (shields) and different circuits.[1] The board has 14 digital I/O pins (six succesful of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), by means of a kind B

USB cable.[4] It can be powered through the USB cable or with the aid of an exterior 9-volt battery, although it accepts voltages between 7 and 20 volts. It is comparable to the Arduino Nano and Leonardo.[5][6] The hardware reference sketch is dispensed below a Creative Commons Attribution Share-Alike 2.5 license and is accessible on the Arduino website. Layout and manufacturing documents for some variations of the hardware are additionally available.

The phrase "uno" ability "one" in Italian and was once chosen to mark the preliminary launch of Arduino Software.[1] The Uno board is the first in a collection of USB-based Arduino boards;[3] it and model 1.0 of the Arduino IDE have been the reference variations of Arduino, which have now advanced to more moderen releases.[4] The ATmega328 on the board comes preprogrammed with a bootloader that approves importing new code to it barring the use of an exterior hardware programmer.



Arduino UNO

BLUETOOTH:

The HC-05 has two running modes, one is the Data mode in which it can ship and acquire information from different Bluetooth units and the different is the AT Command mode the place the

default system settings can be changed. We can function the system in both of these two modes through the usage of the key pin as defined in the pin description. It is very effortless to pair the HC-05 module with microcontrollers due to the fact it operates the usage of the Serial Port Protocol (SPP). Simply electricity the module with +5V and join the Rx pin of the module to the Tx of MCU and Tx pin of module to Rx of MCU

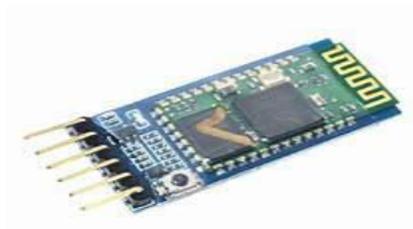
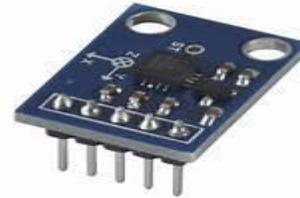


Diagram of Bluetooth

MEMS:

An accelerometer can be described as a gadget that is used to measure acceleration forces, the forces which are described by using this can be static, like the non-stop pressure of gravity or mild we have viewed in the case of cell phones and it can additionally be said in the case of dynamics to feel motion or vibrations. An accelerometer is a system that senses the extraordinary kinds of accelerations or vibrations. Acceleration is the exchange in speed precipitated by way of the moves of a body. An accelerometer absorbs the vibrations created by using the physique and makes use of it to be aware of the orientation of the body. A piezoelectric accelerometer has two sorts which are excessive impedance output accelerometer and low impedance output accelerometer. On the foundation of the working mode, it is usually of three types. The compression mode, the capacitive

mode, and the shear mode. All of them work on sensing the vibrations.



Mems

DC Motor:

Electric shock generator is an digital device that produces voltage round 1200mv & contemporary of 3microamp. Electronic shock generator is steady into the sandal. Whenever the rush button is added on the shock is generated on to the pinnacle of the sandal. In shock generator circuit the questioning of mosquito bat is used. It consists of AC to DC converter, oscillator and a net or Grid



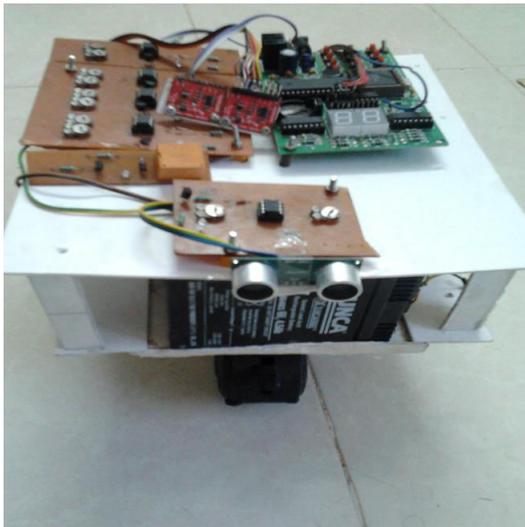
DC Motor

Arduino IDE:

Arduino is an open-source PC equipment and programming association. The Arduino Community is encouraged to the endeavor and purchaser mastermind that constructions and occupations microcontroller-based movement sheets. These alternate sheets are identified as Arduino Modules, which are open provide prototyping stages. The smoothed out

microcontroller board shows up in an assortment of boom board packs. The transcendent substantially perceived programming approach is to use the Arduino IDE, which firms the C programming vernacular. This provides you get to an Arduino Library that is industriously making grasp to open furnish network.

V. EXPERIMENTAL RESULTS



Connections of Wheel chairsystem

VI CONCLUSION

By the usage of the proposed gadget of Voice & Accelerometer Controlled Wheel Chair, physically challenged human beings finds handy way to navigate inside the home the usage of wheelchair except any exterior aid. This provides ease of operation as the device is consumer pleasant and size is small. Voice instructions will be acquired through microphone and for gesture focus small IC will be placed at finger tips. By utilising the acceleration records to recognize the hand gestures and then switch the gesture information which suggests sure action instructions into the

wheelchair's easy motions. It's a attempt to realise the natural interplay for the older and handicapped with the wheelchair thru the hand gestures. The proposed system utilize the acceleration records to understand the hand gestures and then switch the gesture statistics (motion commands) into wheelchair's clean motions. This computerized wheelchair has a voice attention device, microcontroller, accelerometer and an android app for area monitoring which are simpler to interface with every different and their use is not very difficult. We consider that human beings who are socially isolated due to their bodily incapacity will have the opportunity to cross freely barring any help through using voice instructions and hand movements. In the future work, we will center of attention on these issues and do extra experiments to improve and affirm the technique in actual surroundings further.

FUTURE SCOPE

The wheelchair is wholly successful of carrying the load upto 110Kg, and shifting in accordance to the gesture given by the man or woman who is the usage of the wheel chair. Certain improvisation and enhancement can be carried out to make the wheelchair extra reachable to these whose entire physique is paralyzed. Certain eyes gesture or intelligence alerts reader can be imparted on the wheelchair gadget so as to make it better. The hand gesture wheelchair has the capability to bridge the gap between man and machine. Further this hand gesture can be changed to intelligence sign detection the use of EMG (Electromyography). EMG alerts have to be analysed and translated into multi-directional manage instructions that can also be used to manage the velocity of the wheelchair.

Further security points can be brought into the wheelchair like implementation of ultrasonic sensor for the object detection. A photo voltaic panel can be brought on pinnacle of the wheelchair as a refuge and power conservation. A fingerprint protection device can be carried out to prevent unauthorised access. Currently there is no mechanism for obstacle detection, on the other hand a device can be delivered in such a way that if some impediment is detected the wheelchair should cease to keep away from any collision or incident. Presently our wheelchair is transferring with a regular speed. The speed cannot be assorted by means of customers or sufferers desire. So two kinds of modifications can be finished i.e. both by means of PWM pins in the Arduino code or via presenting variable voltage to the motor of the wheelchair. A fitness monitoring device ought to be introduced in the wheelchair such that it can measure basic information about health, such as temperature, blood pressure and pulse etc. Upper and decrease levels need to be described and immediate emergency indication must be supplied to the care taker on crossing these ranges.

REFERENCES

- [1] Manuel Mazo, Francisco J. Rodríguez, José L. Lázaro, Jesús Ureña, Juan C. García, Enrique Santiso, Pedro Revenga, J. Jesús García, Wheelchair for physically disabled people with voice, ultrasonic and infrared sensor control.
- [2] Gunda Gautam, Gunda Sumanth, Karthikeyan K C, Shyam Sundar, D.Venkataraman , “Eye Movement Based Electronic Wheel Chair For Physically Challenged Persons”.
- [3] Prof. Vishal V. Pande, Nikita S. Ubale, Darshana P. Masurkar, Nikita R. Ingole, Pragati

P,” Hand Gesture Based Wheelchair Movement Control for Disabled Person Using MEMS”.

[4] Mohammed Asgar, Mirza Badra, Khan Irshad and Shaikh Aftab, “Automated Innovative Wheelchair.”

[5] Mahaboob Ali Shaik M. Prathyusha, K. S. Roy, “Voice and touch screen based direction and speed control of wheel chair for physically challenged using arduino,”

[6] Prof. Vishal V. Pande, ”Hand Gesture Based Wheelchair Movement Control for Disabled Person Using MEMS” et al Int. Journal of Engineering Research and Applications Vol. 4, Issue 4(Version 4), April 2014, pp.152-158

[7] Takeshi Saitoh Masato Nishimori and Ryosuke Konishi, “Voice controlled intelligent wheelchair,” SICE Annual Conference , Kagawa University, Japan, 2007