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Voice-Based Controlled Design and Construction of an Automated Wheelchair

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ABSTRACT: A wheel chair is an autonomous mobility aid that is mechanically propelled by the user. This reduces the amount of force and human effort needed by the user to move the wheelchair wheels. Additionally, it makes it possible for people who are physically or visually impaired to go from one place to another. IOT has a brand-new concept for an automated, intelligent wheelchair system. With this technology, wheelchairs can be operated using buttons and voice commands. We created voice-controlled technology for people who are physically ill. The voice recognition module, Arduino, and microcontroller are present. The wheelchair's motion is supported by the use of left, right, top, button, front, and backwards, depending on the direction indicated in the orders.

In case of a fall, the wheelchair also has an emergency button that the user can click to summon immediate assistance or alert the caregiver. Applications for Android are used for all notification types. When a fall occurs, a GPS module is used to track the wheelchair's location in real time. All the information, including the location of the wheelchair, will be relayed to the mobile application when a fall event occurs. The IoT system will notify the registered person (caretaker) through notification that a fall incident has occurred and that assistance is required. Additionally, this system offers a prompt response and has lower deployment costs. It can be installed in a wheelchair that is currently in use. When the system detects a fall, a notification is sent to the guardian in order to provide immediate assistance to handicapped people in case of an emergency.

KEYWORDS: Arduino, smart wheelchair, GPS, Voice recognition module, Smart Phone, Button.

I. INTRODUCTION

According to the WHO World Report on Disability, disability is a complex, multidimensional experience that poses several challenges for measurement. It is estimated that approximately 10% of the global population, i.e., about 650 million people, have a disability, with research available indicating that some 10%, or 65 million people, of those living with a disability require the use of a wheelchair. In India, about 2.21% of the population has one or another kind of disability. 5.4% are wheelchair-worthy, which makes them depend on another person for movement and also to meet their basic needs.

In a manual wheelchair, the user either needs help pushing it or uses their hand to turn the wheel to move around. The patient may experience hand or shoulder pain from using their hands [1, 2]. A seriously crippled person finds it difficult to operate a manual wheelchair. While utilising a manual wheelchair, there is a possibility of falling. It is crucial to develop an electrically powered wheelchair as well as a fall detection system in order to address problems with the manual wheelchair. In order to overcome these people's challenges and provide them with wheelchair control, a voice-operated and provide button is built into smart wheelchairs [3].

The controller unit of a smart wheelchair enables the user to input data via an emergency button, voice commands, and other methods so that the wheelchair can move to the desired location automatically. The wheel chair has four wheels to ensure adequate balance. Four directions are used to makeover the wheelchair [4]. The user can direct the movement of the model by speaking commands like forward, reverse, left, right, and stop while utilising the voice recognition module. When a fall occurs in a smart wheelchair, the emergency button is available and can be used instead of the wheel. When the button is pressed, an automatic message is sent to the specific guardian. Additionally, it can detect barriers and edges, which will automatically regulate the wheels if an accident occurs. Using the Internet of Things (IoT) and a sensor that can assess the situation and update the system with real-time data, it is possible to build and construct a wheelchair that can detect falls [5].

OBJECTIVES

- The main aim of this paper is to facilitate and increase the abilities of disabled people who cannot function or move well.

- To develop a wheelchair with the help of a sensor to detect the fall of the user.
 - wheelchair navigation using multiple inputs, through
1. Voice commands are signals in which we are going to customise 5 commands that can lead directions of the wheelchair, such as FRONT, BACKWARD, RIGHT, LEFT, and STOP.
 2. Emergency button helps the user if any problems occur. Press the button to send a notification to the caretaker. This message is built into the Android phone.

III. METHODOLOGY

1. Voice recognition module:

Using the voice recognition module, voice recognition is a technique that promotes natural and practical human-machine interaction. It isolates and evaluates human voice characteristics transmitted to a device or computer via the microphone. [6]

A microphone is used to capture input, sending vocal commands for stop, left, right, forward, and reverse. Electrical signals are typically used to communicate with the wheelchair when commands are issued [7, 8]. Speech recognition software is used to process signals before sending them to the Arduino. These instructions are transformed by Arduino into commands that the motors can understand. Through the motor driver, this directs and moves the wheelchair. Wheelchair-mounted DC motors are in charge of steering the chair's wheels. One motor controls the two wheels on the wheelchair's left side, and the second motor controls the two wheels on the wheelchair's right side [9].

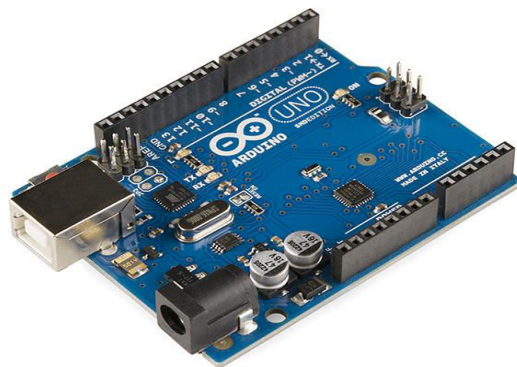
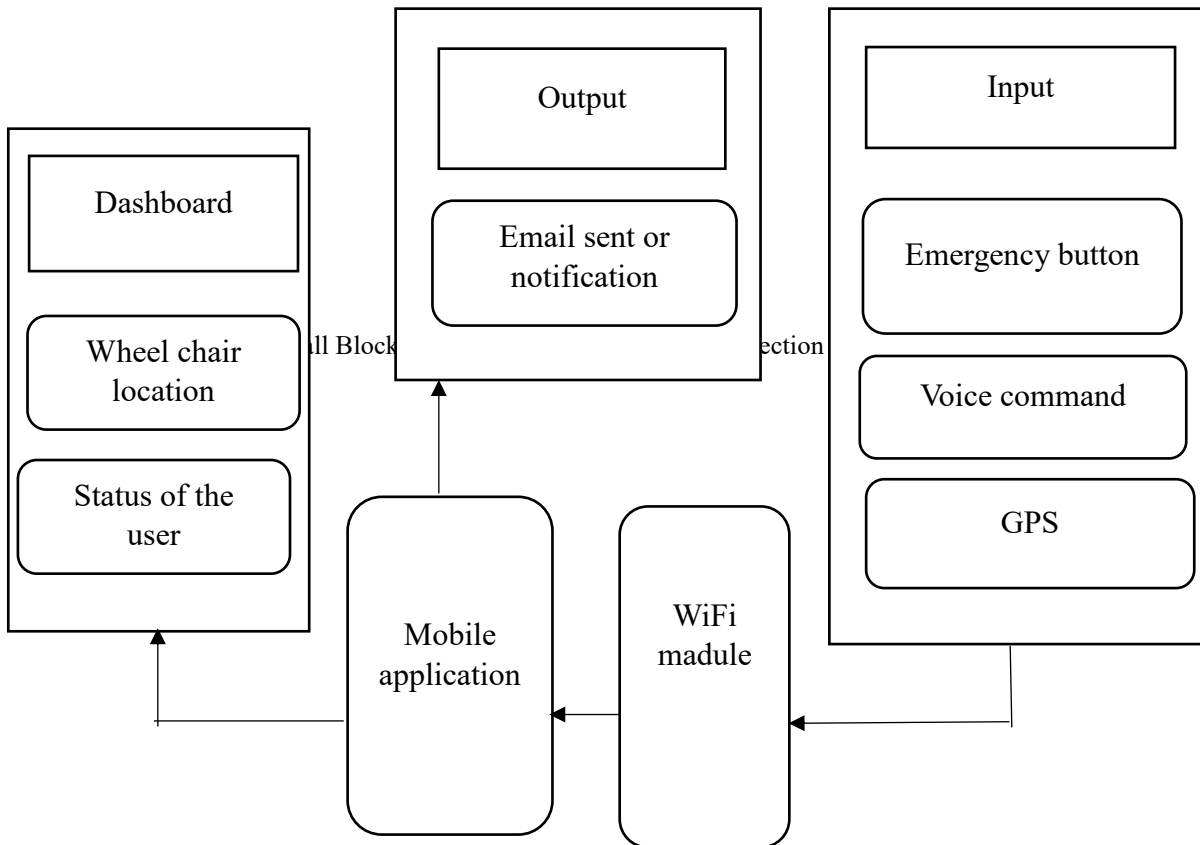


Fig: working voice recognition module

2. Smart wheel chair with Emergency Button:

A secure button will be provided by the smart wheelchair's fall detection system; this button helps to prevent user injury. When a fall is detected by the wheelchair system, the carer is notified, and the wheelchair's position's longitude and latitude will be recorded with the aid of a GPS module [10]. These details will be forwarded to a specific caregiver. Using a mobile application, the guardian registered and logged in using the proper username and password. Due to the IoT platform's inclusion of the wheelchair's location information, the registered user can locate the wheelchair using it [11, 12].

IOT components:



Arduino is an initiative, an open-source hardware platform, and a software environment for creating electronic gadgets. It creates and produces single-board interfaces and microcontroller kits for use in electronics projects.

Technical specifications

- Microcontroller: AT Mega 328
- Operating voltage: 5V
- Input voltage (Recommended): 7-12 V
- Input voltage (Limits): 6-20 V

- Digital I/O pins: 14
- Analog input pin :6

GPS:

- GPS receivers are generally used in smartphones, fleet management systems, the military, etc. for tracking or finding locations. The Global Positioning System (GPS) is a satellite-based system that uses satellites and ground stations to measure and compute its position on Earth.
- GPS is also known as Navigation System with Time and Ranging (NAVSTAR) GPS. A GPS receiver needs to receive data from at least four satellites for accuracy purposes.
- The GPS receiver does not transmit any information to the satellites. This GPS receiver is used in many applications, like smartphones, cabs, fleet management, etc.
- Using the Google Maps API, Google Maps is integrated into the mobile application. The built-in GPS of the Android device will give a patient's location using the map.

IV. CONCLUSION

Elderly people are increasingly using wheelchairs for daily tasks. Additionally, one of the primary causes of death among them is falling. A severely disabled individual who uses a manual wheelchair can benefit from an electrically operated wheelchair and a fall detection system. Our suggested technique enhances the quality of life for those who are physically unable and helps save lives in an emergency. Compared to other techniques, the proposed prototype's effectiveness and control flexibility are sufficient. While seated in a smart wheelchair, the user can operate the wheelchair using a combination of speech system commands and a secure system button that they can press in the event that the system detects a fall. If a message is detected, it is sent to the guardian using The wheelchair's location was found using a Google map. This prototype is more dependable thanks to the base control and mobile application. To be effective, this system needs certain improvements.

REFERENCES

- [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.



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