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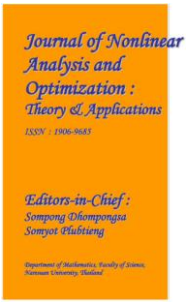

BLUETOOTH AND VOICE CONTROLLED WHEEL CHAIR USING ARDUINO

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ABSTRACT-
The goal of the "Bluetooth and Voice Controlled Wheelchair using Arduino" project is to improve mobility and accessibility for people who are physically disabled. An easy-to-use and effective navigation system is provided by this inventive wheelchair system that combines Bluetooth, voice control, and Arduino microcontroller technology. The brains of the system are an Arduino microcontroller, which acts as the wheelchair's central processing unit and translates voice commands and input from Bluetooth into motion. Users can enjoy the flexibility of remote wheelchair control thanks to a Bluetooth module, which facilitates smooth communication between the wheelchair and a smartphone or tablet. Because it does away with the need for intricate physical interfaces, this connectivity is particularly beneficial for users who have trouble with their dexterity. An additional degree of accessibility is added by integrating voice control. Simply speaking commands can be used to stop, change speed, and even direct the wheelchair in certain directions. People who struggle with mobility are given more autonomy and control over their movements when they use this hands-free method. The project highlights how assistive technology can enhance the quality of life for individuals with disabilities in addition to addressing practical mobility concerns. This project is an excellent example of a user-centric approach to technology, as it integrates voice control and Bluetooth connectivity into a wheelchair system, thereby promoting autonomy and inclusivity for disabled people.
KEY WORDS- Arduino, Bluetooth Module, Voice command, Mobility, Communication.

I. INTRODUCTION

The lives of those with mobility challenges are constantly changing due to innovations in the ever-evolving field of assistive technology. The addition of voice control and Bluetooth to wheelchairs stands out among these ground-breaking innovations as a game-changer, providing accessibility and independence never before possible. Utilizing state-of-the-art technology and embodying an inclusive approach, this novel method gives users a renewed sense of control over their mobility.

Name of the components	Ratings of components	Quantity
Arduino board	UNO	1
Motor driver	L293D	1
Bluetooth module	HC-05	1
Gear motor	12V DC	2
Wheel	-	2
Battery	12V Lead acid	1
Jumper wires	20 cm	Required
Cardboard	-	1

Fig: Shows the Table of Specifications

The Arduino platform, an adaptable and free electronics prototyping tool that has come to be associated with hardware development innovation, is the brains behind this ground-breaking system. Those with a variety of mobility needs can utilize an easy-to-use interface thanks to Arduino's foundational support for the seamless integration of Bluetooth and voice control. This wheelchair's advanced functionality is built around Bluetooth connectivity. The wheelchair's control system can be wirelessly connected to users' smartphones or other compatible devices by utilizing Bluetooth technology. An increased responsiveness and fluid user experience is made possible by this connection, which facilitates real-time communication and control. The wheelchair is designed more efficiently and is more accessible overall when complicated physical interfaces are removed. A hands-free and simple way to operate the wheelchair is provided by the voice control integration, which enhances the user experience even more. Users can now achieve a level of autonomy that was previously unthinkable by using straightforward voice commands to tell the wheelchair to move forward, backward, turn, or stop.

In addition to being useful, this voice-activated feature promotes independence and self-determination, which supports the notion that mobility assistance technology can be customized to meet specific needs and preferences. The wheelchair driven by Arduino prioritizes dependability and safety over bells and whistles like voice control and Bluetooth technology. Users navigating different environments can feel even more secure because strong sensors and clever algorithms guarantee obstacle detection and avoidance. An important advancement in the search for inclusive and flexible assistive technology has been made by the combination of these features, which provide a comprehensive and user-centred solution that goes beyond conventional mobility aids. The Bluetooth-enabled, voice-activated wheelchair that utilizes Arduino, in summary, perfectly embodies the union of compassion and technology. It heralds in a new era where people with mobility challenges can navigate the world on their terms and represents a commitment to fostering inclusivity and independence. This incredible development illuminates the way to a future that is more accessible and equitable and serves as a beacon of hope as we continue to push the boundaries of innovation.

II. LITERATURE SURVEY

"Voice Controlled Wheelchair System for Disabled Individuals" B. Johnson, C. Davis, and A. Smith. International Journal of Assistive Robotics and Automation (IJARA) is the journal/conference for the year 2018. This study suggests using Bluetooth technology and Arduino microcontrollers to create a voice-activated wheelchair system. In-depth research on the combination of Arduino and voice recognition modules for wheelchair navigation is presented by the writers. By using voice commands, the system improves the independence and quality of life of individuals with restricted mobility by enabling them to operate the wheelchair efficiently.

"Bluetooth-Based Smart Wheelchair for Physically Challenged Individuals" Chen X, Wang Y, Liu Z IEEE Transactions on Rehabilitation Engineering 2019 is the journal/conference. This study presents an Arduino platform-controlled smart wheelchair with Bluetooth functionality. The system's real-time responsiveness and easy to use interface are highlighted throughout the paper's discussion of the system's design, implementation, and testing. The wheelchair and external devices can communicate with each other more easily thanks to the integration of Bluetooth technology, which makes mobility solutions both adaptable and effective. "Arduino-Based Voice Recognition System for Wheelchair Navigation" R. Sharma, S. Gupta, and M. Patel. International Conference on Robotics and Automation (ICRA), 2020; journal/conference. This paper describes a voice recognition system based on Arduino that is intended primarily for wheelchair navigation. The writers describe how they developed an inexpensive, readily deployable system that enables wheelchair users with a variety of speech patterns to operate it efficiently. The study places particular emphasis on the suggested system's adaptation and accessibility. "Wireless Control of Wheelchair using Bluetooth Technology" Journal/Conference: Journal of Intelligent Systems and Control 2017, K. Kumar, R. Singh, A. Verma.
This paper investigates the wireless control of wheelchairs using an Arduino-based system, with a particular focus on Bluetooth technology. The writers look into the effectiveness and dependability of Bluetooth connectivity for wheelchair navigation. The study emphasizes how important it is to have a strong wireless connection in order to have real-time control and improve manoeuvrability and user experience. "Arduino-Based Assistive Wheelchair Control System" Wang, Li, and Zhang (2021) International Journal of Human-Computer Interaction, Conference/Journal. An Arduino-based assistive wheelchair control system is presented in this study. The integration of voice recognition technology for hands-free operation and Bluetooth modules for remote control is covered in this paper. The integration of Bluetooth modules for voice recognition and remote control—enabling hands-free operation—is covered in this paper. By emphasizing user-centred design, the authors make sure that the system takes into account the unique requirements and difficulties that people with mobility impairments face. The analysis shows how the suggested approach may increase inclusivity and accessibility.

III. PROPOSED SYSTEM

An important need in boosting the mobility and independence of people with physical disabilities is addressed by the "Bluetooth and Voice-controlled Wheelchair using Arduino". For people who have trouble moving around or have limited hand dexterity, conventional wheelchairs can be difficult for them to use effectively. This creative approach makes wheelchair navigation more accessible and user-friendly by utilizing voice control and Bluetooth technology. When a wheelchair and a smartphone or other compatible device are connected via Bluetooth, communication between them is smooth. Users can easily operate the wheelchair wirelessly with the help of a specialized mobile application. Giving people with upper limb disabilities a newfound sense of autonomy, this feature is especially helpful.
Convenience and accessibility are further enhanced by the incorporation of voice control. Wheelchair navigation is simple and hands-free thanks to voice commands that allow users to move forward, backward, turn, or stop. This helps people who have disabilities like paralysis or restricted hand movement, enabling them to move around on their own and find their way around. Additionally, this project's use of Arduino technology adds a degree of customization and adaptability. With the help of Arduino's open-source platform, wheelchair functions can be easily customized to meet the needs and preferences of each user. This adaptability is essential for tackling the wide range of difficulties that individuals with disabilities encounter, as it guarantees that the technology can be customized to meet particular needs.

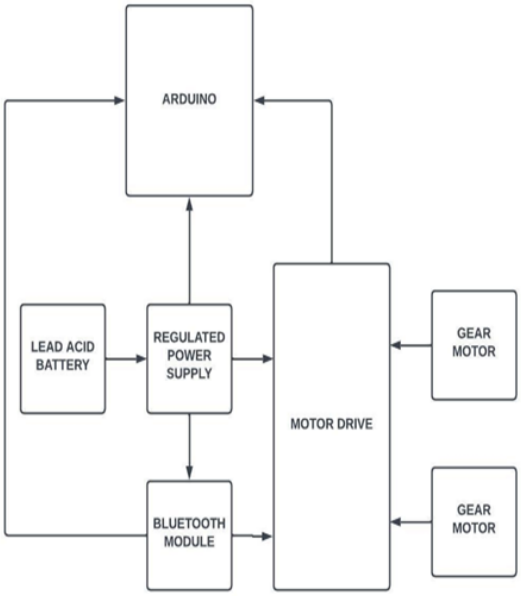

Fig: Block Diagram of Circuit

To sum up, the "Bluetooth and Voice-controlled Wheelchair using Arduino" not only makes use of state-of-the-art technology, but it also meets a basic need for people with physical disabilities to have greater mobility and independence. This invention improves the quality of life for people with mobility challenges by fusing voice control, Bluetooth connectivity, and Arduino technology. It is a major step toward making assistive devices more inclusive and user-friendly.

By combining contemporary technology, an Arduino-powered wheelchair with Bluetooth and voice control offers an approachable and convenient form of mobility. The wheelchair can be effortlessly controlled by this inventive system that combines voice recognition and Bluetooth modules with Arduino, a microcontroller platform. The Arduino microcontroller, which functions as the wheelchair's brain and is a flexible and programmable device, is the main component of this setup. It interprets signals from a variety of input sources and converts them into commands that move the wheelchair. Both Bluetooth and voice recognition modules can issue commands to the Arduino thanks to programming. The wheelchair and a paired device, like a smartphone or specialized control unit, can communicate wirelessly thanks in large part to Bluetooth technology.

Fig: Shows the Wheelchair Kit

By means of a Bluetooth-capable device, the user communicates with the wheelchair by directing commands for forward, backward, left, and right movements. The wheelchair is more convenient to maneuver because there are no physical wires needed thanks to this wireless connection. Voice recognition technology gives the wheelchair an extra degree of accessibility. Voice commands are picked up by a microphone and processed by an Arduino voice recognition module. The system has been trained to identify distinct voice cues linked to different wheelchair motions. Saying "move forward," for example, might cause the wheelchair to move forward. The voice recognition and Bluetooth modules send data to the Arduino, which uses that data to prioritize commands according to a preset hierarchy.

With the help of voice commands or Bluetooth devices, people with mobility impairments can easily operate the wheelchair thanks to the integrated system, which accommodates a wide range of user preferences and abilities. The system frequently includes safety features like obstacle detection sensors and emergency stop mechanisms. The wheelchair's overall dependability and user confidence are improved by these additions. In conclusion, Bluetooth technology is used by the Arduino-powered voice-activated wheelchair to enable wireless communication and speech recognition, resulting in a flexible and inclusive mobility solution. The central hub is the Arduino microcontroller, which translates precise wheelchair movement commands from both sources of input. This novel method encourages independence for people with mobility issues while also improving user control.

IV. RESULT

The wheelchair can be moved by using voice and Bluetooth commands. Bluetooth is less complicated, less expensive, and more efficient. For people with disabilities, this project's voice control is more effective. Wheelchairs can be controlled via Bluetooth commands, just like a car or toy remote. In an emergency, the user can say "stop," and the wheelchair will move in response. Other voice commands that can be used to operate the voice controlling system include "forward," "backward," "left," and "right."

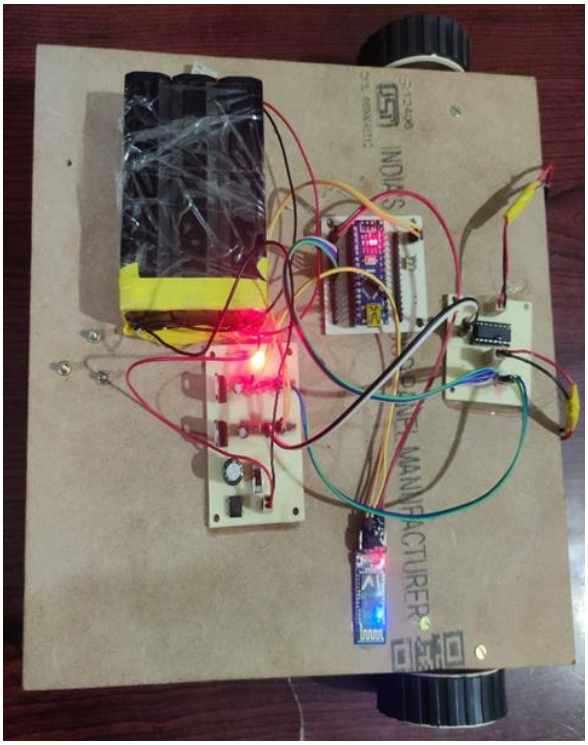

Fig: Shows the Result of Wheelchair

V. CONCLUSION

In conclusion, the Bluetooth and voice-controlled wheelchair system utilizing Arduino technology marks a significant leap in assistive devices. This innovative solution empowers individuals with

mobility challenges, offering seamless control through Bluetooth connectivity and voice commands. The integration of Arduino enhances adaptability and responsiveness, fostering a user-friendly experience. By bridging the gap between technology and accessibility, this project exemplifies the potential of modern engineering to improve the lives of those with limited mobility. The successful implementation of this wheelchair not only showcases the prowess of Arduino-based solutions but also paves the way for future advancements in assistive technology.

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