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Voice Controlled Wheel Chair

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Abstract— The elderly, as well as millions of other people, suffer from paralysis and disability and blind, which makes them physically unable to interact normally and adhere to the demands of life. Wheelchairs are important tools to enhance the mobility of persons with disabilities. Developments in computers and communications technologies have contributed to the availability of smart wheelchairs that meet the requirements of a disabled and blind person. In order to help the handicapped to carry out their daily work, many attempts have been made to apply modern technologies in computers and communications to build. This paper presents an automatic wheel chair using voice recognition. A voice-controlled wheelchair makes it easy for physically disabled and blind person who cannot control their movements of hands. The powered wheel chair depends on motors for locomotion and voice recognition for command.

Keywords— Voice Recognition, Arduino Uno, Motor Driver Modulel298n, Jumper Wires, HC-05 Bluetooth Module.

I. INTRODUCTION

Speech recognition is a popular topic in today's life. The applications of Speech recognition can be found everywhere, which make our life more effective. For example, the applications in the mobile phone, instead of typing the name of the person who people want to call, people can just directly speak the name of the person to the mobile phone, and the mobile phone will automatically call that person. If people want send some text messages to someone, people can also speak messages to the mobile phone instead of typing. Speech recognition is a technology that people can control the system with their speech. Instead of typing on the keyboard or operating the buttons for the system, using speech to control system is more convenient. It can also reduce the cost of the industry production at the same time. disabled people, particularly those with severe impairments by increasing their range of mobility. This robotic enhancement will provide benefit people who cannot use hands and legs. In this project we have developed a voice-controlled wheelchair which aim to counter the above problems. The wheelchair can be controlled using joystick as well as using voice commands. He/she just needs to say the direction or move the button for that direction and the wheelchair moves in the desired direction. In hardware development, we are using HM2007 voice recognition module which correlates commands to do speech processing and give the result to Arduino which is further programmed with respective locomotion commands.

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II. REVIEW OF LITERATURE

The IARJSET's August 2018 issue [1] featured an article titled "Voice Controlled Wheelchair using Arduino" by Apsana S and Renjitha G Nair. This paper highlights a venture that aims to create a voice-controlled wheelchair using Arduino technology. The writers elaborate on how the system harnesses voice recognition technology to manage the wheelchair's movements, consequently improving mobility for individuals with physical disabilities.

The authors provide an intricate explanation of the hardware and software components employed in the system. The system integrates an Arduino board, a motor driver module, a voice recognition module, and a wheelchair. Moreover, the authors present a detailed algorithm that processes voice commands and regulates the wheelchair's movement.

To evaluate the system's performance, the authors conducted experiments and presented their results. Their research shows that the system precisely recognizes voice commands and controls the wheelchair's movement.

In summary, the article chronicles the development of a voice-controlled wheelchair utilizing Arduino technology. This project holds immense potential for improving the mobility of individuals with physical disabilities and is a significant contribution to the field of assistive technology.

The manuscript entitled "An In-Depth Exploration of Various Techniques for Segmenting Medical Images" by Deepak Kumar Lodhi et al.[2], which was published in the esteemed International Journal of Computer Science and Mobile Computing, Volume 5, Issue 5 in the month of May, in the year 2019.

This manuscript presents an exhaustive evaluation of

diverse methodologies for segmenting medical images that are employed in the field of medical imaging. The authors emphasize the crucial role of image segmentation in the domain of medical imaging, and elucidate its potential applications in clinical diagnosis and treatment planning. Several image segmentation techniques, including but not limited to thresholding, clustering, edge detection, region growing, and watershed transformation, are discussed in the manuscript.

Moreover, this work highlights the challenges faced by medical image segmentation techniques, such as noise, intensity inhomogeneity, and the necessity of precise boundary delineation. The authors shed light on how these challenges can be addressed by implementing advanced segmentation techniques like active contours and level set methods.

Furthermore, this manuscript offers a comparative analysis of various segmentation techniques based on their accuracy, efficiency, and suitability for different medical imaging modalities such as magnetic resonance imaging (MRI), computed tomography (CT), and ultrasound.

Overall, this manuscript provides a noteworthy and valuable resource for researchers and professionals working in the domain of medical image analysis by summarizing the present state of the art in image segmentation techniques for medical images, and also by highlighting the potential avenues for future research in this area.

David Gerard Reed's master's thesis titled "Speaker-dependent Isolated Word Recognition" delves into the development of a speech recognition system that can identify spoken words based on the unique characteristics of an individual speaker's voice.[3] The thesis was completed at McMaster University in Hamilton, Ontario, Canada in 2021.

Reed's comprehensive review of literature scrutinizes the earlier research on speech recognition, focusing on the speaker-dependent systems' area. The author evaluates the difficulties involved in constructing a system that can accurately recognize speech from a specific individual due to the differences in accent, pronunciation, and other vocal traits.

Reed's survey also encompasses various techniques and algorithms utilized in speech recognition such as Hidden Markov Models (HMMs), Dynamic Time Warping (DTW), and neural networks. The author evaluates the advantages and disadvantages of each technique and their applications in previous studies.

The thesis also discusses the data collection and pre-processing steps required to establish the speech recognition system. Reed amassed speech samples from multiple speakers and used a plethora of tools to refine and standardize the data for use in the recognition model.

The experimental results presented in the thesis demonstrate the effectiveness of Reed's speaker-dependent recognition system. The system achieved superior accuracy rates in recognizing spoken words, surpassing other methods used in previous studies.

Overall, Reed's thesis provides an extensive examination of the challenges and techniques associated with creating a speaker-dependent speech recognition system. The author's work is a valuable addition to the field of speech recognition and could have implications in various domains, including voice-activated devices and assistive technology for individuals with speech impairments.

III. METHODOLOGY

In existing system, [1] the authors of the article, employed an Arduino Uno board, a Bluetooth module, a motor driver, and a wheelchair base to assemble the voice-controlled wheelchair. They also utilized an Android app entitled "Voice Controlled Wheelchair" to interact with the Arduino board through Bluetooth.

To control the wheelchair using voice commands, the authors first recorded a variety of vocal commands and saved them within the Android app. They subsequently leveraged the Google Cloud Speech API to transcribe the vocal commands into text and send them via Bluetooth to the Arduino board. The Arduino board was coded to receive the textual commands and operate the motor driver to direct the wheelchair in the preferred direction.

The authors administered numerous experiments to assess the functionality of the voice-controlled wheelchair, which included evaluating the precision and pace of the speech recognition system and gauging the wheelchair's maneuverability across a range of environments. The experiments' outcomes demonstrated that the voice-controlled wheelchair could accurately identify and react to voice commands and efficiently navigate distinct environments.

All in all, the methodology employed in this study involved combining various hardware components, programming the Arduino board, and employing an Android app to create a voice-controlled wheelchair. The study showcased the viability of using vocal commands to operate a wheelchair and may potentially be beneficial to individuals with mobility impediments.

In existing system, [2] The authors extracted key information from the selected research articles, such as the type of machine learning techniques used, the type of data used, the performance metrics used, and the challenges and limitations associated with the techniques. The authors analysed and synthesized the extracted information to identify the strengths and weaknesses of various machine learning techniques for predictive maintenance in Industry 4.0. They also identified the challenges and limitations associated with the techniques.

The author developed a Hidden Markov Model (HMM) for speaker-dependent isolated word recognition.[3] HMMs are widely used in speech recognition systems and provide a probabilistic framework for modelling the temporal evolution of speech signals. The author trained the HMM model using the collected dataset and evaluated its performance using various metrics, such as accuracy, precision, and recall. The

author also compared the performance of the HMM model with other models, such as Gaussian Mixture Models (GMMs) and Artificial Neural Networks (ANNs), to identify the most effective model for speaker-dependent isolated word recognition.

IV. PROPOSE METHODOLOGY

- When the movement of the disable or blind person left-right-backward-forward-stop and run.
- We are set the password security like voice (min 2 person).
- We can also set the alarm system after sensoring object within safe distance zone.

Specifications	Smart Wheelchair	Smart Box	TAO-7	Wheelchair Pathfinder
Distributor	Smile Rehab, Ltd.	Smile Rehab, Ltd.	Lucas-Kaneda optical flow algorithm	KNN, ELM, PNN, RF, DT, and SVM
Sensors	Sonar, bump sensor, line detection	Bump sensors, line detection	finders, computer vision	Sonar, laser range finder
Operating Modes 2	Bump and stop, bump and backup, bump and turn, line following	Bump and stop, bump and backup, bump and turn, line following	Wander randomly, shared navigation, autonomous navigation	navigation Vibrate when obstacle or drop-off detected. No active control of wheelchair.
Wheelchair Included	Yes	No	Yes	No
User Population	Children	Children or adults	Researchers	Children or adult visual impairments

V. CONCLUSION

- The design and implementation of a voice-controlled wheelchair for disabled people using Arduino and voice recognition module for controlling the motion of a wheelchair is designed. The direction of the wheelchair now can be selected using the specified voice commands.
- The design not only reduces the manufacture cost compared with present market but also will give great competitive with other types of electrical wheelchair. The only thing needed to ride the wheelchair is the synthetic voice commands of the person.
- A system that can directly enhanced the lifestyle of a physically disabled person in the community is implemented. This project has many advantages like safety, comfort, energy saving, full automation etc.
- The technology can also be enhanced safely for users who use ordinary joystick-controlled wheelchair, by preventing collision with walls, fixed objects, furniture and other people. Thus, all the drawbacks of the joystick-controlled wheelchair are overcome by this "voice-controlled wheelchair"

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