A SURVEY ON VOICE DIRECTED WHEELCHAIR FOR DIFFERENTLY ABLED PEOPLE

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***Abstract*—This survey paper explores the landscape of voice-controlled wheelchairs, focusing on advancements and trends in supportive technology intended for users with mobility challenges. The study reviews various voice recognition techniques and their integration into wheelchair systems, highlighting the evolution of user interfaces and control mechanisms. The incorporation of Bluetooth streamlines cordless connectivity between the voice control interface and the wheelchair, delivering a versatile and user-centric interaction. Additionally, the paper investigates the incorporation of obstacle detection technologies for enhanced safety during navigation. By summarizing key findings from existing research, this survey This endeavor seeks not only to elucidate the present advancements in voice-controlled wheelchairs but also to lay the foundation for upcoming breakthroughs that hold the potential to redefine the landscape of assistive technology.**

Keywords—Voice recognition module, Voice control, Bluetooth module, Obstacles detection.

I. INTRODUCTION

The advent of voice-controlled wheelchairs marks a significant breakthrough in the realm of assistive technology, particularly for individuals facing physical challenges. Survey papers in this field have played integral role in systematically documenting and analyzing the evolution of voice-controlled wheelchair technology. These innovative mobility solutions are designed to cater to the distinct requirements of individuals with physical disabilities', aiming to provide a more accessible and intuitive means of navigating their environments.

Voice-controlled wheelchairs leverage cutting-edge technologies, and survey papers have meticulously explored the incorporation of these advancements. One such pivotal aspect is the execution of advanced speech recognition systems. These systems are designed to interpret a diverse range of voice commands, enabling users to maneuver their wheelchairs with unparalleled ease. The synthesis of artificial intelligence and machine learning techniques in these systems, as outlined in survey papers, underscores the adaptability and responsiveness of voice-controlled wheelchairs to individual user needs.

Moreover, the incorporation of obstacle detection mechanisms has been a focal point in the evolution of these wheelchairs. Survey papers elaborate on the assimilation of detector and cameras that enable real-time detection of obstacles, contributing to a safer and more autonomous navigation experience. This critical feature not only enhances user safety but also fosters a greater sense of confidence and independence among individuals facing mobility challenges.

Wireless communication approaches, such as Bluetooth, Survey papers have extensively examined these technologies, fostering a smooth and intuitive connection between the voice control interface and the wheelchair. This wireless connectivity not only eliminates the requirement for cumbersome physical connections but also adds a layer of convenience, enabling users to remotely operate their wheelchairs.

As we delve into the insights derived from survey papers, a compelling narrative emerges—one of continual innovation and a collective commitment to enhancing the lives of mobility-impaired individuals. The synthesis of technologies in voice-controlled wheelchairs represents a harmonious convergence of engineering, artificial intelligence, and user-centric design. This introduction sets the stage for a deeper exploration of the survey papers, where we unravel the intricate details of the methodologies, findings, and future prospects that shape the landscape of voice-controlled wheelchairs for those in need.

II. LITERATURESURVEY

The smart system proposed in paper [1] addresses the requirements of disabled individuals by incorporating therapy facilities into a wheelchair. This paper is centered around the configuration of a solitary wheelchair equipped with various facilities. The system includes a therapy unit specifically tailored for limb rehabilitation, executed through the utilization of a vibrator. Powered by an ATmega328/P microcontroller, the system offers the capability to control its speed. This research underscores the

incorporation of multiple functionalities into a unified wheelchair system, demonstrating a commitment to providing a comprehensive solution to improve the maneuverability and well-being of disabled individuals.

The Voice-Operated Assistive Wheelchair for Quadriplegics [2] proposes a system engineered to support people who face mobility challenges and are capable of move independently. The system introduces a voice-controlled wheelchair, employing the A-Star algorithm to overcome these limitations. The setup includes a microcontroller interfaced with a wheelchair. A microphone is provided for users to issue voice commands, and the HM2007 registers these commands, transmitting to the microcontroller. The motor driver, in turn, propels the wheelchair in accordance with the received commands. This groundbreaking method holds the potential to significantly improve the maneuverability and autonomy of individuals facing physical challenges, utilizing cutting-edge speech recognition approaches and pioneering solutions and algorithmic control through a microcontroller-driven wheelchair.

The Voice Operated Wheelchair with Obstacle Identification [3] introduces a system engineered to function based on users' voice commands, empowering them to manage the wheelchair autonomously. Responding to simple vocal instructions, this wheelchair operates through voice control initiated by the user, facilitating a user-friendly interface. Moreover, the mobility device is outfitted with a camera mounted on its frame, strategically positioned to supervise the surroundings.

The Optic Controlled Wheelchair Using Transfer Learning[4] the wheelchair is operated through a combination of eye movement and voice commands, providing an inclusive and accessible solution. To enable precise eye control, researchers introduced a Recursive Circular Hough Transform (RCHT) scheme for pupil detection. Pupil images, captured using a low-resolution cell phone camera, underwent sophisticated image processing procedures to accurately detect visual tracking. The system, running on Raspberry Pi computer, interprets the corresponding output signals and directs the wheelchair's movement through motor control. Furthermore, voice assistance enhances user interaction, allowing for additional control through vocal commands. This all-encompassing approach not only attends to the mobility requirements of people with physical impairments but also exemplifies the capacity of cutting-edge technology to forge inclusive solutions, fostering enhanced accessibility and autonomy.

The Smart Wheelchair Controlled by Head Gesture Based on Vision [5] introduces a pioneering system designed to control a wheelchair through voice recognition and head movements. The system utilizes a MEM sensor to detect and interpret head movements, providing a streamlined and intuitive interface for users. The MEM sensor adeptly captures nuanced gestures, transmitting corresponding signals to a microcontroller and providing meticulous control over the wheelchair's movements.

III. METHODOLOGY

The methodology employed in developing the voice-controlled wheelchair, as revealed in the survey paper, entails a multi-faceted approach. Initially, the implementation centres on deploying an advanced speech recognition system capable of interpreting diverse vocalization commands. The incorporation of a sophisticated motor control mechanism follows, allowing seamless translation of recognized voice commands into precise wheelchair movements. The wheelchair's hardware configuration involves a careful setup with four wheels independently controlled by DC motors to maintain steadiness and efficient maneuverability. Additionally, the incorporation of an obstacle detection system, customizable voice commands, and wireless communication approaches, such as Bluetooth, contributes to the overall functionality.

Upon recognizing voice commands, the wheelchair responds by aligning itself according to the user's instructions. Electric signals are employed to transmit these commands, regulating the activity of the mobility aid’s left or right motors. To maintain stability, four wheels are employed, each governed by DC motors linked to the mobility aid. One motor oversees the left wheels, andan-other controls the right wheels. The parallel ports, specifically the communication port, enable the precise transmission of electrical commands to the motors, ensuring accurate regulation over the mobility aid's movement in accordance with the user's spoken instructions.

IV. CONCLUSION

In conclusion, the survey paper highlights the evolving landscape of voice-controlled wheelchairs, emphasizing their potential to significantly Augmenting both mobility and autonomy for individuals facing physical challenges. The synthesis of various technologies, including advanced speech recognition, obstacle detection, and wireless communication, underscores a promising trajectory in assistive technology. The reviewed literature indicates a growing trend toward user-centric designs, incorporating customizable voice commands and safety features. As thefield progresses, it becomes evident that voice-controlled wheelchairs not only offer practical solutions for users but also embody a symbol of empowerment and inclusivity. The insights gathered from this survey pave the path for continued innovation and development in the quest to provide accessible and personalized mobility solutions for persons with diverse mobility needs.

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