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AUTOMATIC DANGER DETECTION WITH MULTIPLE SENSORS AND VOICE CONTROLLED ROBOT FOR PHYSICALLY CHALLENGED PEOPLE

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ABSTRACT

Physically challenged persons those who are suffering through different physical disabilities face many challenging problems in their day to day life for commutating from one place to another and even sometimes they need to have to be dependent on other person to move from one place to another. There have been many significant efforts over the past few years to develop smart wheel chair platforms that could enable the person for its ease of operation without any ambiguity. The main aim of our paper is to develop the smart wheel chair to make the life easier of physically challenged persons This voice-activated smart wheelchair has improved functions like voice control, electric power, queue following, obstacle avoidance, etc. The integrated AVR microprocessor ATmega328 smart wheel chair control unit also includes Bluetooth, GSM, ultrasonic, and infrared sensors, a temperature sensor LM35, and a motor driving circuit for managing the motor's speed.

I.INTRODUCTION

The wheelchair is the most frequently utilised piece of equipment among those who have lower limb disabled. Compared to people who have both upper and lower limb limitations, it gives them a certain amount of mobility freedom and independence. Nature with some available with motorized option. Anything beyond that is custom made which is costly and not within the reach of most people. People with severe lower and upper disabilities have to resort to costly electronic controlled wheelchairs or be totally dependent on another person to move them around in their manual wheelchairs. There are several expensive motorised wheelchairs on the market, however the majority of them do not accommodate those with upper limb disabilities. Instead, they are controlled by a joystick, softball, finger, tablet, chin, or head. The advances in speech recognition technology have made it possible to control any electronics-based device using voice command. This technology is capitalized for voice-controlled wheelchair to assist those with both upper and lower limb disabilities Another researcher has also created many voice-controlled wheelchairs.

II.LITERATURE SURVEY

Chin-Tuan Tan and Brian C. J. Moore, Perception of nonlinear distortion by hearing-impaired people, International Journal of Ideology 2008,Vol. 47, No. 5 , Pages 246-256.

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As the population of the elderly and the disabled grows, so does the demand for care and support equipment to enhance their quality of life. The most popular mobility aid for people with limited mobility for the past 20 years has been the electric powered wheelchair (EPW), and more recently, the intelligent EPW, also known as an intelligent wheelchair (IW), has attracted significant attention as a new technology to meet users' varied needs. Elderly people and disabled people face a lot of difficulties in performing the simplest day to day tasks. Many of them rely on others or utilizing conventional technologies such as wheelchairs to accomplish tasks. With the help of modern technology and the advent of voice-enabled applications and devices we can build tools to help them interact with society and smooth their mobility during everyday activities. A major problem that they face is to reach the wheelchair, hence, to curb this issue we propose a mobile application that enables the user to locate and navigate the wheelchair towards themselves whenever they need it. The primary goal of the interactive user operated wheelchair system project is to provide a user- friendly interface by employing two ways of interaction with the wheelchair that is entering choice of direction through touch screen (haptic) and voice recognition input using speech recognition module to operate a wheelchair. The project on using technology with wheelchair is an assistive technology that includes this initiative to make life more independent, fruitful, and joyful for dependent and disabled people. The primary goal of the interactive user operated wheelchair system project is to provide a userfriendly interface by employing two ways of interaction with the wheelchair that is entering choice of direction through touch screen (haptic) and voice recognition input using speech recognition module to operate a wheelchair. The device is made to allow a person to operate a wheelchair with their voice. This project aims to facilitate the movement of older persons who are unable to move well and disabled or handicapped people. It is hoped that this approach will enable certain folks to move around less frequently as a daily necessity. A crucial piece of technology that will enable new forms of human-machine connection is speech recognition. Therefore, by applying speech recognition technology for the movement of a wheelchair, the issues they confront can be resolved. The employment of the smart phone as a middleman or interface can actualize and maximize this. To create a program that can detect speech, control chair movement, and handle or manage graphical commands, interfaces have been built for this project. The wheelchair with a motor that can be moved using vocal commands. It is crucial for a motorized wheelchair to be able to avoid obstacles automatically and in real time, so it can go quickly. Through research and design wise, the wheelchair to control development along safe and effective use of the provision independence and self-use mobility.

Oberle, S., and Kaelin, A. "Recognition of acoustical alarm signals for the profoundly deaf using hidden Markov models," in IEEE International symposium on Circuits and Systems (Hong Kong), pp. 2285-2288., 1995.

A sound classification system for the automatic recognition of the acoustic environment in a hearing aid is discussed. The system distinguishes the four sound classes “clean speech,” “speech in noise,”

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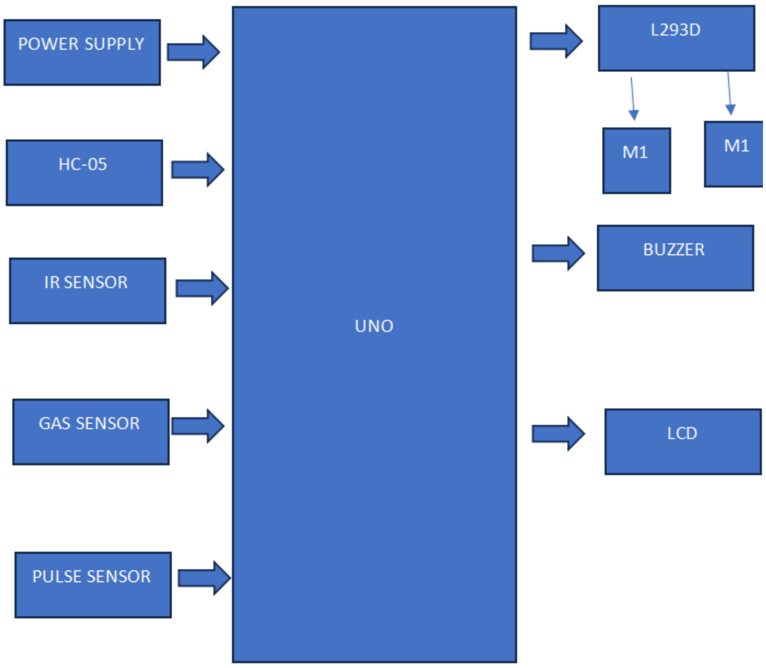
"noise," and "music." A number of features that are inspired by auditory scene analysis are extracted from the sound signal. These features describe amplitude modulations, spectral profile, harmonicity, amplitude onsets, and rhythm. They are evaluated together with different pattern classifiers. Simple classifiers, such as rule-based and minimum-distance classifiers, are compared with more complex approaches, such as Bayes classifier, neural network, and hidden Markov model. Sounds from a large database are employed for both training and testing of the system. The achieved recognition rates are very high except for the class "speech in noise." Problems arise in the classification of compressed pop music, strongly reverberated speech, and tonal or fluctuating noises. It was shown in the past that one single setting of the frequency response or of compression parameters in the hearing aid is not satisfying for the user. Kates [1] presented a summary of a number of studies where it was shown that different hearing aid characteristics are desired under different listening conditions. Therefore, modern hearing aids provide typically several hearing programs to account for different acoustic situations, such as quiet environment, noisy environment, music, and so forth. These hearing programs can be activated either by means of a switch at the hearing aid or with a remote control. The manual switching between difThis is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. ferent hearing programs is however annoying, as the user has the bothersome task of recognizing the acoustic environment and then switching to the program that best fits this situation. Automatic sensing of the current acoustic situation and automatic switching to the best fitting program would therefore greatly improve the utility of today's hearing aids. There exist already simple approaches to automatic sound classification in hearing aids, and even though today their performance is not faultless in every listening situation, a field study with one of these approaches has shown that an automatic program selection system in the hearing aid is appreciated very much by the user [2]. It was shown in this study that the automatic switching mode of the test instrument was deemed useful by a majority of test subjects (75%), even if its performance was not always perfect. These results were a strong motivation for the research described in this paper. There are several commercially available hearing aids which make use of sound classification techniques. Most existing techniques are employed to control noise cleaning means (i.e., noise canceller and/or beamformer). In an approach that is based on an algorithm by Ludvigsen [3], impulse-like sounds are distinguished from continuous sounds by means of amplitude statistics. Ludvigsen states that the amplitude histogram of more or less continuous signals, like background noise and certain kinds of music, shows a narrow and symmetrical distribution, whereas the distribution is broad and asymmetric for speech or knocking noises. Ostendorf et al. [4] propose a system in which the three sound classes "clean speech," "speech in noise," and "noise without speech" are distinguished by means of modulation frequency analysis. Due to the speech pauses, the modulation depth of speech is large, with a maximum at modulation frequencies between 2 and 8 Hz.

By way of contrast, noise shows often weaker but faster modulations and has therefore its maximum at higher modulation frequencies. Ostendorf found that clean speech is very well identified on the basis of the modulation spectra, while noise and speech in noise are confused more often. A sound classification is also described by Phonak [5]. The algorithm is based on the analysis of the temporal level fluctuations and the form of the spectrum as originally proposed by Kates [1]. Kates used the algorithm for the classification of some everyday background noises, whereas Phonak exploited it to reliably distinguish speech in noise signals from all other sound kinds.

Block diagram



III.PROPOSED SYSTEM

The proposed system aims to design a fully automated robot that assists physically challenged individuals by detecting potential dangers in their surroundings and responding to voice commands. The system integrates multiple sensors to monitor the environment continuously, ensuring user safety and enhancing mobility. The robot will be equipped with sensors like infrared (IR) sensors, ultrasonic sensors, and temperature sensors to detect obstacles, fire, or other environmental hazards. When a danger is detected, the system will trigger an alert and take appropriate action, such as stopping or rerouting the robot. The voice control mechanism will enable the physically challenged person to operate the robot easily using voice commands. This feature will allow the user to direct the robot to perform specific tasks, such as navigating to a particular location or avoiding obstacles. The system will employ a voice recognition module that can accurately interpret user commands and execute them in real-time. The voice commands will also control the speed, direction, and stop/start operations of the robot, providing users with full autonomy.

The robot's microcontroller will process data from the sensors and voice recognition module, making real-time decisions based on the input. The data will be processed to ensure seamless operation of the robot without requiring any physical intervention from the user. Furthermore, the system will include a safety protocol to ensure that the robot can identify dangerous situations (e.g., stairs, narrow spaces) and take appropriate actions to avoid accidents.

IV.CONCLUSION

With the aid of a Bluetooth module, this project elaborates on the design and building of a smart electronic wheelchair. The circuit works properly to move as the command given by the user. After designing the circuit that enables physically disabled to control their wheel using an android application in their smartphones and it has also been tested and validated. The microcontroller successfully manages the detection of any obstruction. Any barrier that is anticipated to be within a range of 4 metres will be recognised by the Ultrasonic sensor as soon as the person turns on the circuit and begins moving. This proposed system contributes to the self-dependency of differently abled and older people.

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