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An Integration of Health Gesture Based Voice Assestive Device for Speech Impaired Peoples

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ABSTRACT: Speech impairment is a significant communication challenge affecting millions of individuals globally. Traditional assistive technologies have provided valuable solutions, but there is a growing need for more integrated and versatile approaches. In this Project concept of integrating health monitoring and gesture-based voice assistive technologies for individuals with speech impairments, utilizing the power of the Internet of Things (IoT). The proposed system combines two key components: a gesture- based voice generation interface and health monitoring sensors. The integration of health and gesture-based voice assistive devices presents a novel approach to address the communication challenges faced by speech-impaired individuals. The proposed system that combines Hardware system for gesture recognition and android application for identified sign language is converted to voice output. The proposed system aims to enhance the quality of life for speech-impaired individuals by providing an intuitive and efficient means of communication while also offering health monitoring features. This project presents an integrated system that combines health monitoring, gesture recognition, voice assistance, and mobile application technologies to enhance the communication capabilities and overall well- being of speech-impaired individuals. In this Proposed system is completely portable and focuses on two way communication. System is being proposed with the use of flex sensors and android technology. The proposed system includes two modules. First module is a hand glove with flex sensors and microcontroller to convert hand gestures to auditory speech. Second module is an Android App with Google Speech API to convert recognized hand gesture to voice signal via Bluetooth.

KEYWORDS: Internet of Things, Flex Sensor, Voice Module, Gesture Recognition.

I. INTRODUCTION

The language used by speech and hearing impaired to represent themselves is known as Sign Languages. But these languages vary from one country to other, as it is not common to all people. Some of the main challenges experienced by speech and hearing impaired people while communicating with normal people were social interaction, communication disparity, education, behavioural problems, mental health, and safety concerns. As a result of these obstacles, deaf and dumb people are discouraged to speak out about themselves or their situations in a public place or emergency cases or in a private conversation. Moreover the language diversify is very vast in India, from place to place hence a common mode of connection was needed for speech and hearing impaired people. This resulted in the usage of the Indian Sign Language symbols between deaf and dumb people to interact among them, but it cannot be understood by other normal people. In this paper, Indian Sign language [ISL] has been used. ISL has its own specific syntax, grammar, alphabets, words and numerals. Hand Gestures made by using these symbols are the effective way of communication by speech impaired people to express their idea or meaning. These gestures are made with the help of fingers, hands, wrist movements and elbow movements for different sequence of words. Here two aspects are being governed as one with only finger position without changing hand position and orientation and the other one is change in both finger and hand position and orientations. The main need arises when these sign language symbols are not understood by normal people, as most of them would not have studied ISL. As in real time image processing methods, only a single individual can be benefited by capturing his or her image and processing it into text or speech. But in this

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paper, any speech impaired people hand gesture movements can be captured by the flex sensors and accelerometers and produced as voice output through the voice module.

The method used in one of the research paper is the usage of sensor gloves for detecting hand gestures which uses British Sign Language system. Here only the normal hand gestures are depicted, but not to any sign language symbols pertaining to any country was captured. The outputs are produced in the text format using LCD and audio format using flex sensor. One of the researches was on the robust approach for recognition of bare-handed static American Sign Language using a novel combination of the Local Binary Pattern histogram and Linear Binary Support Vector Machine (SVM) classifiers. In one of the papers it was mentioned to use a device which detects and tracks hand and finger motions for Arabic Sign Language. It is done by the data acquisition using the Multilayer Perceptron networks using Naves Bayes classifier. In the research approach discussed for the American Sign Language uses glove with six colored markers and two cameras to extract the coordinate points .The detection of the alphabets is done by the Circle Hough Transform and back propagation of the Artificial neural network. One of the ways to detect American Sign Language was capable of recognizing hand gestures even when the fore arm was involved and also its rotation. It has been implemented using Principal component analysis to differentiate between two similar gestures. . Thus there were various limitations on the previous researches done so far in the field of Sign language interpretation system. Some of them were usage of the image processing method, as it will be restricted to only individual images being captured and processed, hence it can be dynamically loaded and calculated for different persons using it. Only finger gestures and alphabets have been obtained from the sign language movements and were produced as output for other country languages as British, American and Pakistan. Also the distance between the camera and the person may disturb the accuracy. Therefore in this project, the gestures for words in Indian sign languages have been used and eight commonly used words are produced as voice outputs. The movements are captured with the help of flex sensor and accelerometer and can be changed dynamically with the change in person and hand orientations.

OBJECTIVES OF PROJECT

- In this project develop a comprehensive assistive technology solution that impairments.
- Main goal of the system is to convert hand gestures to auditory speech monitoring the user's health status in real-time.
- The primary objective is to provide speech-impaired individuals with a reliable and efficient means of communication.
- The device should allow users to express themselves clearly and effectively through gestures and voice commands. Integrate voice recognition technology to enable users to communicate via synthesized speech when gestures alone might not be sufficient.

II. LITERATURE SURVEY

2.1 POWER-EFFICIENT INTERRUPT-DRIVEN ALGORITHMS FOR FALL DETECTION AND CLASSIFICATION OF ACTIVITIES OF DAILY LIVING

Falls lead to major health problems for the elderly. Immediate help could lower the risk of complications and death and greatly increase the likelihood of returning to independent living. Automatic fall detectors are useful devices that can alert family members and caregivers at those life- critical moments. Traditional accelerometer-based fall studies focus on accuracies and largely neglect the fact that algorithms will mostly be implemented in microcontroller units (MCUs) with limited speed and random access memory. In addition, it is desirable for a fall detector to have a battery life of several weeks or months. This paper presents a fall detection algorithm and a classification algorithm for activities of daily living using a wrist-worn wearable device. Both algorithms are power efficient and can be implemented easily in an 8-bit MCU.

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2.2 IMPROVING COMPLIANCE IN REMOTE HEALTHCARE SYSTEMS THROUGH SMARTPHONE BATTERY OPTIMIZATION

Remote health monitoring (RHM) has emerged as a solution to help reduce the we deploy WANDA-CVD, an RHM system for patients at risk of cardiovascular cost burden of unhealthy lifestyles and aging populations. Enhancing compliance to prescribed medical regimens is an essential challenge to many systems, even those using smartphone technology. In this paper, we provide a technique to improve smartphone battery consumption and examine the effects of smartphone battery lifetime on compliance, in an attempt to enhance users' adherence to remote monitoring systems.

2.3 FALL DETECTION IN HOMES OF OLDER ADULTS USING THE MICROSOFT KINECT

A method for detecting falls in the homes of older adults using the Microsoft Kinect and a two-stage fall detection system is presented. The first stage of the detection system characterizes a person's vertical state in individual depth image frames, and then segments on ground events from the vertical state time series obtained by tracking the person over time. The second stage uses an ensemble of decision trees to compute a confidence that a fall preceded on a ground event. Evaluation was conducted in the actual homes of older adults, using a combined nine years of continuous data collected in 13 apartments. The dataset includes 454 falls, 445 falls performed by trained stunt actors and nine naturally occurring resident falls. The extensive data collection allows for characterization of system performance under real-world conditions to a degree that has not been shown in other studies.

EXISTING SYSTEM

Gesture detection, including vision-based, acoustic-based, passive infrared sensor-based and inertial sensor-based methods. Provided information for reasoning about the observed space were later on integrated into smart environments, aimed at delivering assistance services like continuous diagnosis of users' health. These smart environments also integrated assistive robotic technologies with sensing networks. A method to assess foot placement during walking using an ambulatory measurement system consisting of orthopaedic sandals equipped with force/moment sensors and inertial sensors. An inductive sensor for real time measurement of plantar normal and shear forces distribution on diabetes patient's foot that can provide useful information for physicians and diabetes patients to take actions in preventing foot ulceration.

DRAWBACKS OF EXISTING SYSTEM

- Up degree.
- Hard to keep up.
- Hard to take a back-up of implanted documents.
- You need to reset all setting, due to happen any issue in the framework.
- Investigating is Harder.

PROPOSED SYSTEM

In modern life, with the advent of technology, many difficulties are overcome to make life more convenient. But the situations are much more different for people who are physically impaired and still communication to the world is a challenging job for them. The support of sign language and its uses have extended helping hands toward speech-impaired persons but still it is difficult to understand for the common people. This proposed project aims toward implementation of a wearable electronic glove which serves as an electronics speaking system for the speech-impaired persons. The communication is done in the form of audio signals which can be understood by common people. There is also a provision of LCD display which helps the information to convey to be displayed for communication with the hearing-disabled persons. Using real-time operating systems and embedded systems, these technological advances are brought into reality. We also propose to update and track health related information like heartbeat and body temperature using cloud-based storage in Internet of Things (IoT).

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ADVANTAGES

- This will enable to establish an effective communication for those suffering from any kind of communication disorders.
- For the implementation, we need to depend on accelerometers and sensors so that the movements can be read accurately and transformed to the required audio or visual form.
- Using this approach, the hindrance of communication will be reduced.
- We also approach for a microcontroller-based reconfigurable smart device that can collect, process, and transmit data and store it into the cloud for further monitoring.
- IoT-based wireless communication systems with network devices that are connected to each other will communicate through open source internet access and establish connection between apps and devices for communication between the person under supervision and the medical supervisor.

III. RESULT ANALYSIS

This data was mapped to a character set by implementing a Minimum Mean Square Error machine learning algorithm. The method used in one of the research paper is the usage of sensor gloves for detecting hand gestures which uses British Sign Language system. Here only the normal hand gestures are depicted, but not to any sign language symbols pertaining to any country was captured. The outputs are produced in the text format using LCD and audio format using flex sensor. One of the researches was on the robust approach for recognition of bare-handed static American Sign Language using a novel combination of the Local Binary Pattern histogram and Linear Binary Support Vector Machine (SVM) classifiers. In one of the papers it was mentioned to use a device which detects and tracks hand and finger motions for Arabic Sign Language. It is done by the data acquisition using the Multilayer Perceptron networks using Naves Bayes classifier. In the research approach discussed for the American Sign Language uses glove with six colored markers and two cameras to extract the coordinate points .The detection of the alphabets is done by the Circle Hough Transform and back propagation of the Artificial neural network. One of the ways to detect American Sign Language was capable of recognizing hand gestures even when the fore arm was involved and also its rotation. It has been implemented using Principal component analysis to differentiate between two similar gestures.

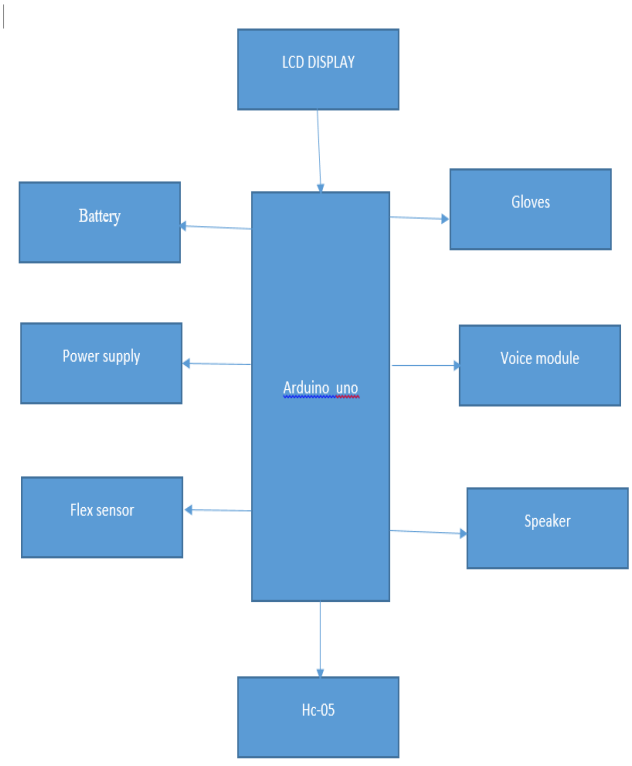

Fig1-Block Diagram

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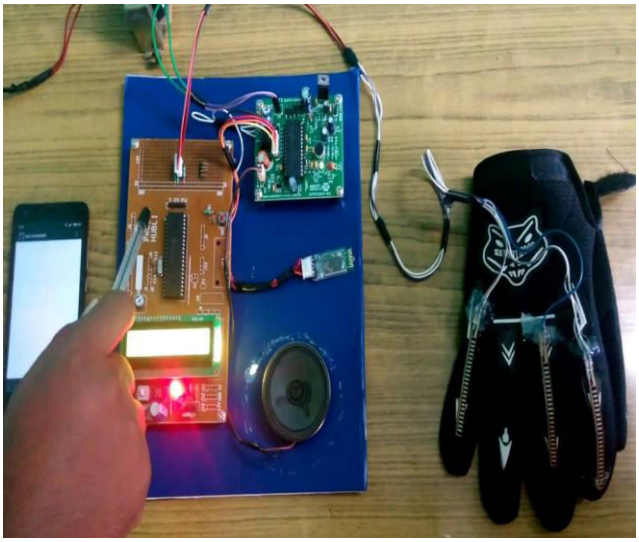

Fig2-Output Screen

IV. CONCLUSIONS

In this paper, the usages of the hand gesture made by speech and hearing impaired people have been made successful to interpret their expression of words. Hence the gesture for each word was acquired with the help of the flex sensors and accelerometers. Their corresponding distinct voltages were fed serially to the setup. The data on processing by the microcontroller and voice module would generate the consonant words which can be heard by normal people with the help of the speaker. Thus, the communication gap between normal and speech and hearing impaired people is reduced. The discussions of the Indian sign language have been made and the symbols of the eight commonly used words was captured and produced as voice output. Hence this research provides an elucidation for all the obstacles faced by all speech impaired people, as from this they will be satisfied, motivated and gain self confidence that their feelings will also be understood by other people.

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