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VOICE TO VOICELESS

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ABSTRACT – This paper proposes an automated hand gesture speech recognition system to give voice to the voiceless, specifically targeting individuals who are unable to speak. Sign language, which uses hand movements , facial expressions, and body language to convey information is often used by individuals who are deaf or mute. In this system, flex sensors are attached to a glove and used to detect hand gestures.

The sensor data is processed by an AVR microcontroller and sent to an Android mobile application, which generates corresponding speech output. The proposed system to communicate more effectively and efficiently.

KEYWORDS: Hand Gesture,Embedded System, Flex Sensor, AVR Microcontroller, Android Mobile Application, ASL(American Sign Language).

I. INTRODUCTION

As the name suggests, this system gives voice to voiceless (Automated hand gesture speech recognition system) i.e., voice is given to the person who is not able to speak. Dumb/ mute people use sign language to communicate. Sign language uses gestures instead of sound to convey information. This language includes combining hand shapes, hand movements, facial expressions to express individual's thoughts. In this system flex sensors plays the major role.

Flex sensors are attached to the glove using needle and thread. Flex sensors are the sensors whose resistivity varies with the amount of bend. AVR microcontroller is used to take input from flex sensors and then this analogue data is converted to digital form by using micro controller. All the data from microcontroller is sent to android phone and accordingly the android mobile application will speak and present the corresponding character which has been sensed.

II. LITERATURE SURVEY

Voice to Voiceless is generally divided into static gesture recognition and dynamic gesture recognition, static gesture recognition is the recognition of hand shape, read out the meaning of

hand expression, and dynamic hand gesture recognition is the recognition of hand motion trajectory in space, and then perform the corresponding operation based on obtained trajectory parameters, such as for the playing courseware on the projection, hand gestured can be used to flip up and down, pause, start, etc.

The traditional gesture recognition was through the use of wearable technology, allowing users to do some hand gestures with special data gloves on, the data gloves would transfer user's gestures and location information to the computer and help it comprehend the gestures and behaviour of uses. Above figure shows a multi-function virtual reality device composed of many sensors on the glove called Immersion Cyber Grasp.

Through the software mapping, the virtual objects can be shifted, clutched and rotated by the glove with the ability of "reach into the computer".

The glove can transmit hand gesture to the computer in real time accurately, and then receives feedback from the virtual environment to the operator. It provides users with a direct and universal humancomputer interaction mode with advantages of high accuracy, simple data and fast processing speed, etc., but because of the shortcomings of expensive equipment, inconvenient operation, and not suitable for long-distance control, this kind of interaction model is hard to get promotion.

Voice to voiceless systems have become an important innovation in recent times, especially for those individuals who are unable to speak or communicate through traditional means. These systems provide an alternative way of communication that relies on sign language or gestures. One such system is the automated hand gesture speech

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recognition system which uses flex sensors to detect and interpret hand gestures, enabling the user to communicate with others. The significance of these voice to voiceless systems cannot be overstated, as they provide a voice to those who are unable to speak due to various reasons such as speech disorders, physical disabilities, or hearing impairments. This technology enables them to communicate their thoughts, ideas, and feelings effectively, breaking down barriers that prevent them from fully participating in society.

The voice to voiceless system is particularly important for individuals who use sign language as their primary mode of communication. This system converts the sign language gestures into audible speech, making it easier for others to understand the message being conveyed. This technology has the potential to revolutionize the way in which people with speech impairments communicate with others and could significantly enhance their quality of life. Moreover, the use of flex sensors in this system is a notable development as they allow for a more accurate interpretation of hand gestures. The sensors can detect even the slightest movements of the hand, making it easier for the system to recognize and interpret complex gestures accurately. This technology has the potential to be further developed and improved to cater to the specific needs of different individuals.

In conclusion, the voice to voiceless system is a significant innovation that provides a voice to the voiceless. This technology has the potential to improve the quality of life for individuals with speech impairments and promote inclusivity and accessibility for all. As we continue to advance technologically, it is essential to ensure that everyone has access to these life-changing innovations.

III. PROPOSED SYSTEM

3.1Architecture

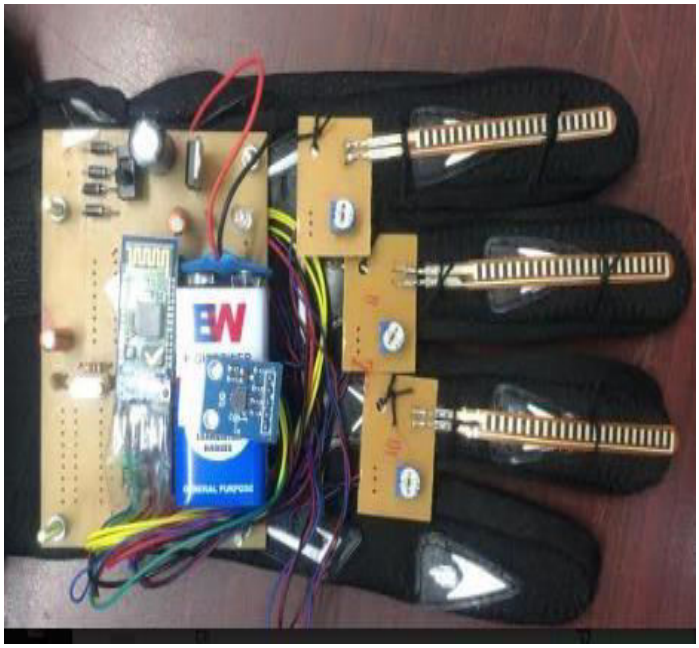

Fig. 3.1:Gesture generator

The proposed model will be consisting of combination of hardware and software. Hardware part will include flex sensors on each finger, microcontroller, power supply, and android phone and Bluetooth module. Software part will include programming for android phone application. Hardware part will be consisting of flex sensors to take input from different gestures through gloves, microcontroller to convert input analogue data to digital data and for further processing, power supply to provide voltages to specific units, and finally Bluetooth module to send the data from controller to android mobile. Here HC05 Bluetooth module will be used.

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Architecture refers to the overall structure or design of a system. For the "voice to voiceless" project topic you provided, there are several architectures involved in the system. Here are some possible architectures:

1. **Automated Hand Gesture Speech Recognition System Architecture:** This architecture includes the physical components of the system, such as the flex sensors, glove, AVR microcontroller, and Android mobile application. It also includes the software components, such as the algorithms used to convert the analogy data from the flex sensors to digital data, and the speech synthesis software used to generate audible speech from the digital data.

2. **Flex Sensor Architecture:** This architecture includes the physical and electrical properties of the flex sensors. It includes the materials used to construct the sensors, the design of the sensors, and the way the sensors are wired to the AVR microcontroller.

3. **AVR Microcontroller Architecture:** This architecture includes the internal structure of the AVR microcontroller. It includes the memory organization, the way data is processed and stored, and the communication protocols used to interface with other components of the system.

4. **Android Mobile Application Architecture:** This architecture includes the software components of the Android mobile application. It includes the user interface design, the programming languages used to write the application, and the way the application communicates with the AVR microcontroller.

5. **Speech Synthesis Architecture:** This architecture includes the algorithms and software used to generate audible speech from the digital data produced by the AVR microcontroller. It includes the way the speech is synthesized, the voice used for speech synthesis, and the quality of the speech output.

3.2 Requirement Analysis

3.2.1Hardware Requirements

- Flex Sensers
- Accelerometer
- Microcontroller
- Power Supply
- Android Phone
- Bluetooth Module

3.2.2Software Requirements

For Embedded system

- Embedded Technology
- AVR Based Controller
- Embedded C programming
- Proteus Software for PCB Designing
- Dip Trace for PCB Layout

For Android Mobile

- SQL Server Based Database
- BASCOM AVR Compiler
- Android Application

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IV. RESULTS

The resultswas tested on a group of individuals who were unable to speak, and it was found that they were able to communicate more effectively using the hand gesture speech recognition system. The system accurately recognized hand gestures and generated corresponding speech output in real-time.

The project is mainly divided in hardware and software module. In this the glove has one microcontroller which has 40 piflex sensor and ns and four ports named as A,B,C and D. The main role is performed by the sensor ie, flex sensor and accelerometer.

SCREENSHOTS

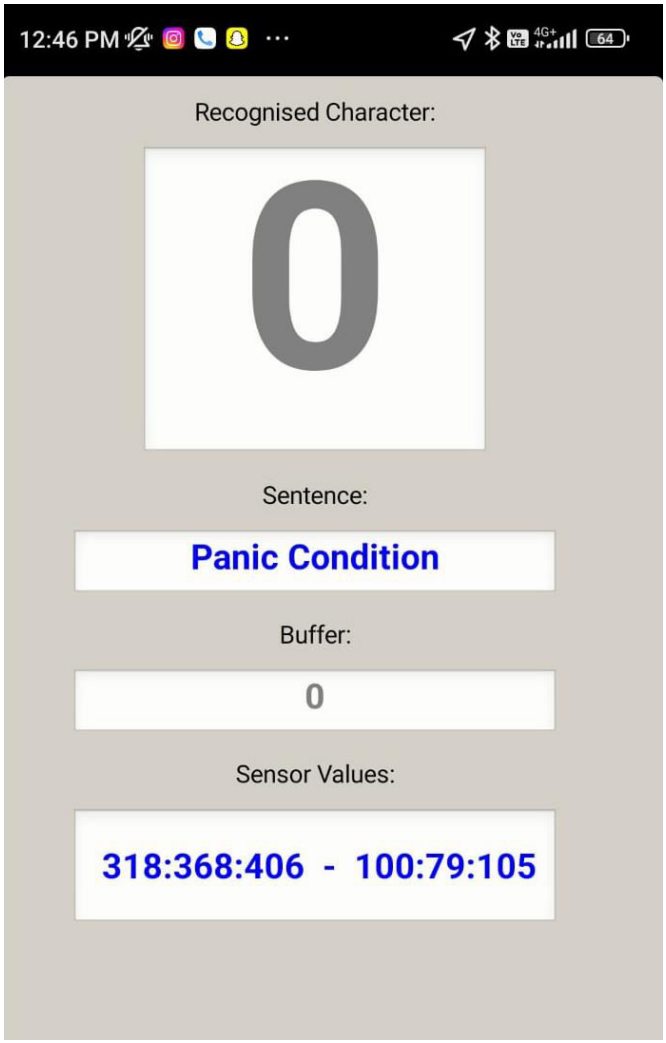

Fig. 1 PANIC CONDITION

In Fig.1 With the help of this glove if a person is in panic condition then by making the movement of the hand in the proper manner the text message will be sent to mentioned number in the application. Through which the person with the mentioned number will get to know about the situation of the dumb person. Due to which the normal person can easily contact with the dumb person.

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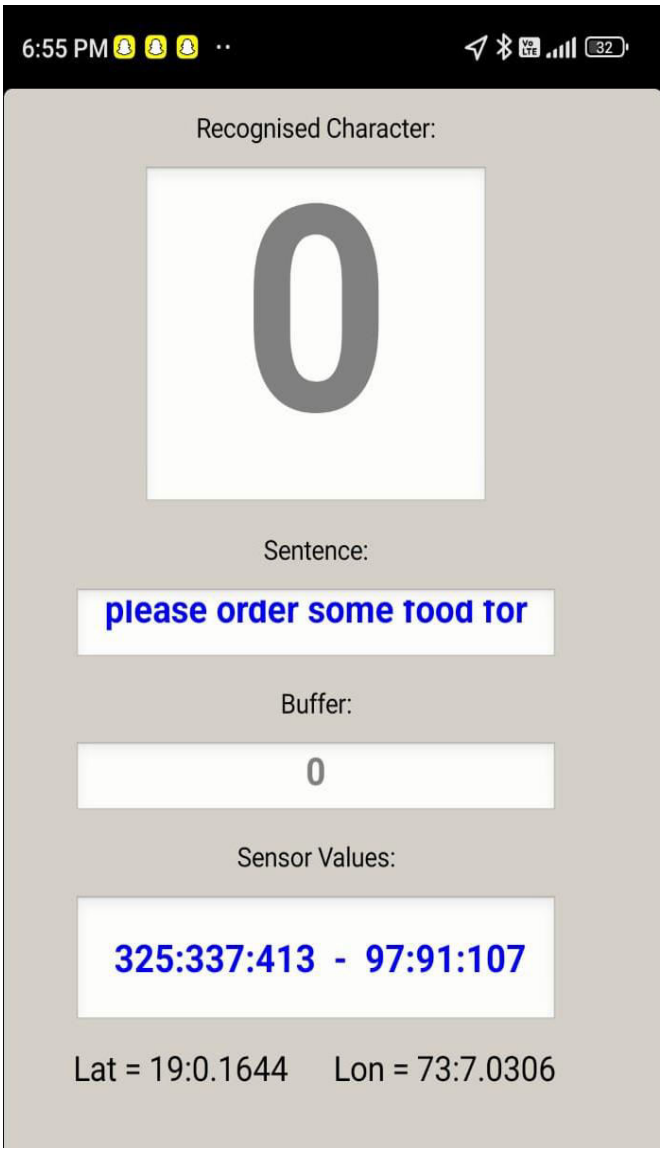

Fig.2 SYSTEM MESSAGE

In Fig.2 the system message define to order some food. If the dumb person wants to order some food then with the help of the glove he will communicate with the normal person & with the help of the application the sentence will appear on the mobile for easy communication.

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Fig. 3 SYSTEM MESSAGE

In Fig.3 the system define the sentence for asking for the medicine. Through this glove the sentence will be displayed on the mobile application. So that the normal person can easily get to know what the dumb person is trying to communicate.

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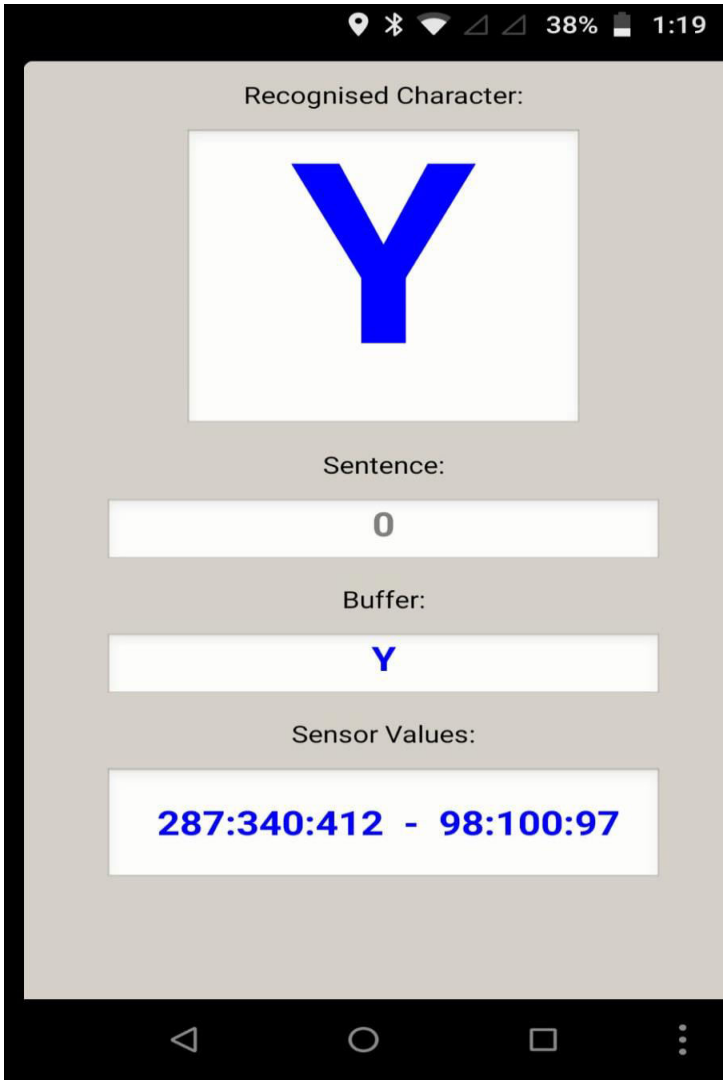

Fig. 4 LETTER Y

In the Fig. 4, the single letter will appear on the screen of the application. Through this single letters the dumb person will create a word / sentence to communicate with normal person for better commnication between both the peoples for better understanding.

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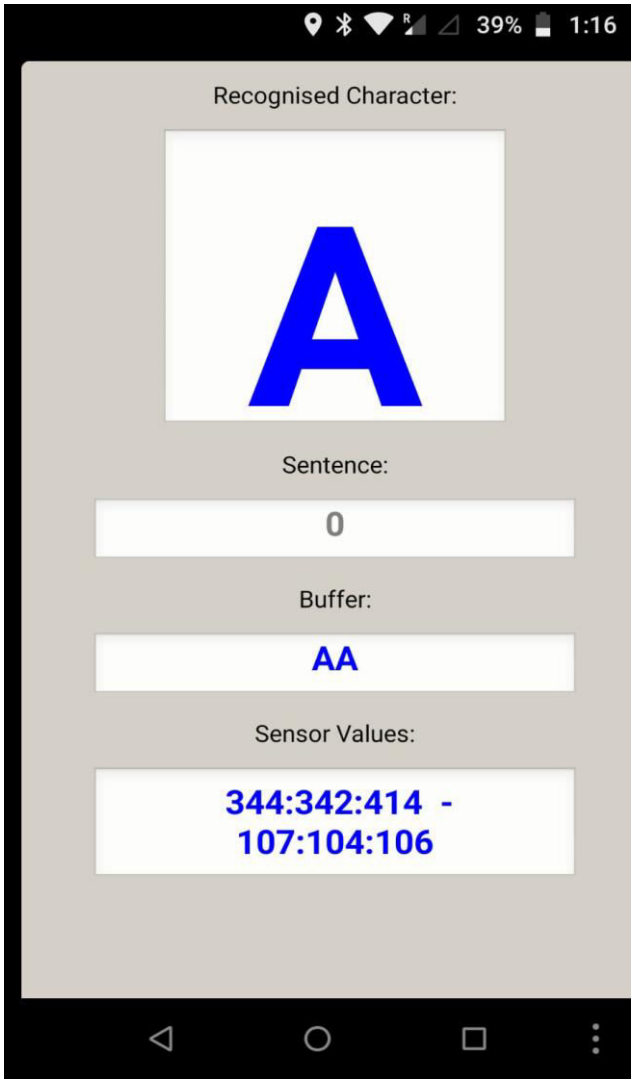

Fig.5 LETTER A

In Fig. 5, it indicates the letter A. In this the letter A will be displayed on the application after the movement of the glove. With the movement of the glove individual letter will be displayed & with the individual letter a word will be created for communicating easily between the dumb and the normal person.

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V. CONCLUSIONS

This papers aims to automated hand gesture speech recognition system offers a novel approach to voice to voiceless communication. The system can help individuals who are unable to speak to communicate more effectively and efficiently using hand gestures. Further improvements can be made to the system to enhance its accuracy and usability.

In this system this could be further improved by incorporating machine learning techniques for better recognition of hand gestures.

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