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# SIGN RECOGNIZATION AND VOICE CONVERSATION FOR DEAF AND DUMB PEOPLE USING DEEP LEARNING

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**ABSTRACT:**
Deaf and dumb people's key communication challenge nowadays is how to convey their ideas to other deaf and dumb people as well as to other normal people. This method will help those people by giving them a communication intermediary. OpenCV Python is used to implement it for concept-based gesture recognition. This method will translate into voice when deaf persons make gestures with their fingertips to interact with others. Python is used to play the audio file on the raspberry pi 3B model. In the proposed system once program run web camera open and shows the hand sign depending on sign it produce voice for dumb people for emergency situations. We integrated web camera and voice module to raspberry pi processor.

**KEYWORDS:**Gesture Vocaliser, Raspberry Pi, Speakers, Mute community, sign convertion.

## 1. INTRODUCTION

Humans may engage and communicate with one another by using their voice. Unfortunately, speaking and hearing aren't abilities that everyone has. However, it is not always feasible for someone to be present constantly to translate the sign languages.Everyone who is truly or simply minded is impaired. A dumb or elderly person must contend with a wide range of problems in the general populace. Impaired in this sense refers to a condition of weakness as well as the limits that the impaired person encounters when interacting with healthy people who are almost exactly the same age and sex. This essay aims to remove the correspondence barrier. The ability to communicate between the quiet groups and the majority of the population depends on the development of an electronic device that can translate motion-based communication into conversation. In the current framework, we used a MEMS accelerometer to detect quiet people's movements. We will include segments for MEMS accelerometers, ADC converters, microcontrollers, speakers, and Arduino in the square chart. An accelerometer sensor is used to detect hand motion. When an accelerometer actuator functions as a position indicator, their voltage also changes. The changing resistance of the accelerometer sensor is what makes it a high- and low-frequency sensor. Arduino

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receives this data in an open manner. The accuracy of data transfer in the current system is relatively low, and it requires a complicated integration of audio speaker connections and consumes a lot of power. To prevent this, we suggested a new raspberry-based sign conversion system.

They must display their hands in front of the camera, which is still another drawback. Here, a flex sensor is utilised to detect hand motion and translate it into voice using a raspberry pi microcontroller. When compared to employing a camera as a recognising component, this method is much simpler and more precise. This setup is quite portable. The component will appear in the block diagram.such is a speaker, flex sensor, ADC0804, PIC, or Arduino microcontroller. Here, the hand motion is detected by a flex sensor. Flex sensors are also known as bending sensors, and their resistance varies depending on how they are bent. Then, in accordance with the voltage value the command will be sent, their voltage also changed. As a result, the flex sensor functions just like a variable resistor. The flex sensor is an analogue device. The Arduino board receives this input directly. due to the internal analogue to digital conversion in an Arduino. By doing this, the analogue sensor input will be transformed into a digital Arduino input. But with the Raspberry Pi, we must utilise an external ADC IC. Case ADC0804.Normal and dumb individuals naturally communicate with one another using sign language. The majority of sign language relies on hand gesture recognition. Normal individuals occasionally struggle to read the signals correctly and comprehend what they are trying to communicate. Therefore, the gloves' purpose is to make the lives of the deaf and dumb people easier. The gloves translate hand gestures into text and then speech so that regular people may read the recognised gesture, hear the voice, and comprehend what that person is trying to say. This will improve communication because it will be easier for everyone to understand. Physical communication and non-physical communication are both parts of the system. There are regional variations in sign language; it is not a global language. American Sign Language (ASL) was created in America, followed by British Sign Language and so forth. Our approach is based on American Sign Language, which is used in the majority of nations. Using Arduino as the system's brain, the gloves translate precise motions into text and subsequently speech. The system, which is mounted to the gloves, makes use of flex sensors to translate gestures into resistance, which is then translated into text by an Arduino nano. The flexible sensors family, from which the flex sensors are descended, is sufficiently flexible. For accurate output, touch and accelerometer sensors are also used in addition to flex sensors. The hand's motion is tracked by the accelerometer, while the contact between the fingers is tracked by the contact sensors. The sensors are chosen based on the language's constituent words. Some signs depend on the movement of the palm, so an accelerometer is used to track them, while other signs depend on the touch of the fingers, so contact sensors are used to determine the specific output for those signs. The Arduino Nano processes the sensor output to produce text that is output for LCD display. Additionally, the text is delivered to PCs and mobile devices via a Bluetooth module. Additionally, using text-to-speech software, the data is rendered as voice. There is no such system that can translate sign language into speech that is accessible commercially. However, efforts are being undertaken to translate sign language into speech that is both highly accurate and portable.

## 2. LITERATURE SURVEY

About 9.1 billion people worldwide have hearing loss and are illiterate. They deal with a lot of problems with their correspondence in their daily lives. It is believed that more than half of our minds are devoted to comprehending what we see, making sight the dominant sense [1]. Motion acknowledgement plays a crucial role in this essay. The proposed paper includes a smart glove that converts Braille letters, which are typically used by the educated, hard-of-hearing, visually impaired population, into text and vice versa, and sends the message through SMS to a distant contact [2]. While using hand signals to communicate is simple for the Deaf, the general public frequently has trouble understanding these gestures. In these situations, mediators [3] who are proficient in sign language mediation techniques are constantly needed. For the Raspberry Pi, the talk module, a simple, open-source discourse synthesiser, is used to convert the prepared text to discourse. Even simple tasks like turning on the fan or lights are included in the generated scripts. The customer wears a wristband with a vibration sensor attached to it. When the doorbell rings, the sensor [4] vibrates and alerts the client. The main goal of this essay is to provide a solution that can effectively translate linguistic cues [5] into text and reasoned speech. People who are frequently disoriented have trouble locating their current location. The Raspberry Pi is connected to the glove and features a GPS module that can identify latitude and longitude in order to support them. Using the decoder's module of Python, the position corresponding to those characteristics is found. Once more, the eSpeak module converts this location into speech or sound output. Signal acknowledgment is divided into two main categories: locator-based and primarily vision-based [6]. A device designed by Silvia Mirri et al. allows visually impaired clients who have difficulty hearing to communicate with other clients by using a glove and the Malossi letters in order. The created characters (and phrases) will be delivered to the Android application and displayed or audibly heard during speech.The hand gesture has been translated into text in the past using a variety of methods. However, they had a finite range of capabilities. Many techniques required sensor-equipped gloves, which increased the complexity and cost of the application[7]. The system was restricted to a specific background without any noise or disruption in the other version. Some projects required powerful GPUs, which made it challenging for the average person to operate the system. Additionally, certain detecting systems required a specific skin tone for the object to be detected[8]. Though there are numerous methods for translating hand gestures into text, very few—and those that do have very limited capabilities—concentrate on doing so.The drawback of vision-based processes completely encompasses their use of sophisticated algorithms. Constraints on the field of scan, occlusion, and varying lighting conditions are additional challenges in image and video methods. The detector-based method completely offers higher quality. The main goal of this essay is to present a problem that will effectively transfer linguistic gestures [9] to every text and sensitivity voice. The interpreter uses a glove-based system that includes instrument sensors and a flex detector. The sensors recognise each hand gesture made, and the controller correlates the gesture with pre-stored inputs to create a symptom. The device can sort words using customised motions in addition to decoding alphabets. The device has a training mode, so accuracy is increased and it fits every user. Even more extensive movements that need a single hand movement will be translated by the gadget[10]. motion recognition alludes to a process through which information is gathered from physical body parts (often the hand) and processed to identify characteristics like hand form, direction, and speed of motion being executed. They must display their hands in front of the camera, which is still another drawback. Here, a flex sensor is utilised to detect hand motion and translate it into voice using a raspberry pi microcontroller. When compared to employing a camera as a recognising component, this method is much simpler and more precise. This setup is quite portable[11]. The component will appear in the block diagram.such is a speaker, flex sensor, ADC0804, PIC, or Arduino microcontroller. Here, the hand motion is detected by a flex sensor. Flex sensors are also known as bending sensors, and their resistance varies depending on how they are bent. Then, in accordance with the voltage value the command will be sent, their voltage also changed. As a result, the flex sensor functions just like a variable resistor[12]. The flex sensor is an analogue device. The Arduino board receives this input directly. due to the internal analogue to digital conversion in an Arduino. By doing this, the analogue sensor input will be transformed into a digital Arduino input. But with the Raspberry Pi, we must utilise an external ADC IC. Case ADC0804.

**Existing System**

In the current framework, we used a MEMS accelerometer to detect quiet people's movements. We will include segments for MEMS accelerometers, ADC converters, microcontrollers, speakers, and Arduino in the square chart. An accelerometer sensor is used to detect hand motion. When an accelerometer actuator functions as a position indicator, their voltage also changes. The changing resistance of the accelerometer sensor is what makes it a high- and low-frequency sensor. Arduino receives this data in an open manner. The accuracy of data transfer in the current system is relatively low, and it requires a complicated integration of audio speaker connections and consumes a lot of power. We suggested a new sign conversion mechanism utilising a Raspberry Pi to prevent this.

## 3. METHODOLOGY

The suggested sign conversion system combines hardware and software components. This system uses a Raspberry

Pi 4 model microprocessor, audio speakers, open-CV-based finger motion sign, and a regulated power supply portion for sign conversion using Python programming.

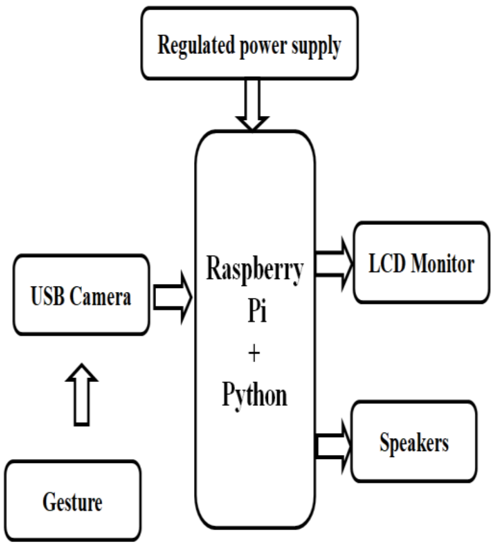


Fig.1. Proposed Block diagram

Every sensor determines the appropriate parameter of data and provides it to the processor using an inbuilt microprocessor, which processes the data. By employing a USB camera, we can display motions for the Raspberry Pi processor to recognise and respond to with the appropriate voice over audio speakers. The output modules are controlled by this output voltage, which the computer reads using the Python scripting language. The voice generation circuit for good sound is a 3.5mm audio jack. For voice alerts of four parameters, we employed four gesture signs. I need water on an LCD monitor when you present B symbol-activated displays, and the same thing will also be voice conversion through speakers. I need a meal massage on an LCD monitor when you show Y displays, and the same thing will also be voice converted through speakers. I require a medicinal massage on an LCD monitor when you present C symbol activated displays, and the same thing will also be voice converted through speakers. Please assist with the bathroom massage on the LCD monitor when you present L symbol activated displays. The same thing will also be voice converted through speakers..

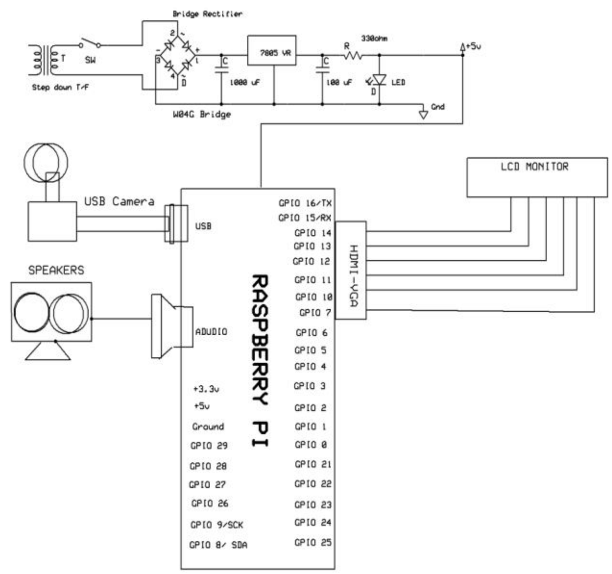


Fig 2. Schematic diagram

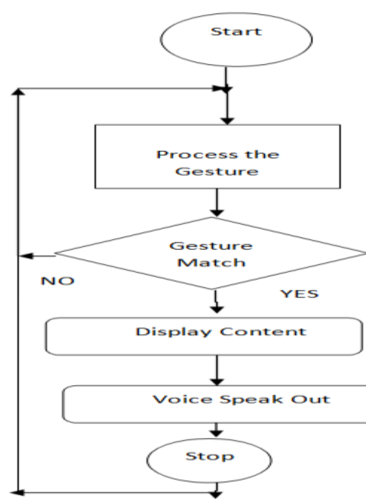


Fig 3. Flow diagram

## 4. RESULTS AND DISCUSSIONS

The author of this project used Raspberry Pi to build a sophisticated sign-to-speech conversion system utilizing a Raspberry Pi, integrating all input web camera and output modules speaker and monitor with the Raspberry Pi Micro processor.

Fig.4. Hardware setup of smart electronic vehicle surveillance system

Author run the Python program to execute Sign-voice converter system, once the web camera open we need to show the sign through hands like 'A', 'B' , 'C', 'L','Y' symbols. According to the symbol particular voice over will be generated.

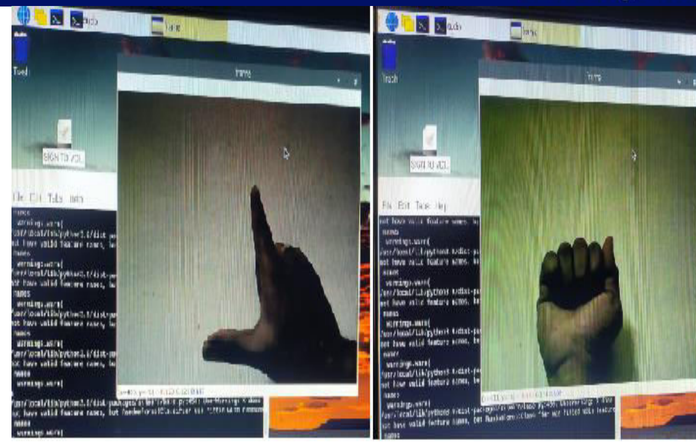

Fig. 5. Data displayed on LCD

Symbol 'A' represent the 'need MEDICINE', Symbol 'B' represent the 'need FOOD', Symbol 'C' represent the 'need WATER', Symbol 'L' represent the 'EMERGENCY', Symbol 'Y' represent the 'Help for Washroom'.

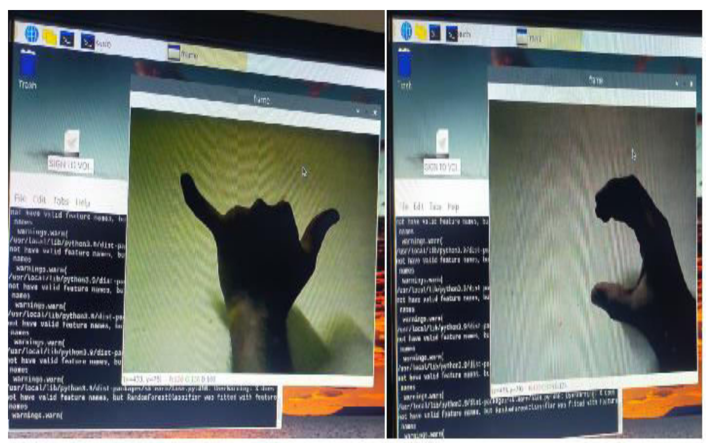

Fig.6. Android app based alerts monitoring through IOT

## 5. CONCLUSION:

We successfully built and deployed a sign-to-speech conversion system utilising a Raspberry Pi, integrating all input and output modules with the Raspberry Pi Micro processor. We accurately gathered the results. The proposed system demonstrates that it is more effective than the current one.

Open CV-based gesture-to-voice conversations are examined successfully using the LCD monitor module and the audio speakers. This method will translate into voice when deaf persons make gestures with their fingertips to interact with others. Python is used to play the audio file on the raspberry pi 3B model. In the proposed system once program run web camera open and shows the hand sign depending on sign it produce voice for dumb people for emergency situations. We integrated web camera and voice module to raspberry pi processor.

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