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HAND GESTURE TO SPEECH CONVERSION FOR DUMB PEOPLE USING IOT

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ABSTRACT: In the world around 1 million people are dumb (who are not able to speak). They can communicate only through their hand gestures and expressions. Here we proposed a new technique which has a speaker (artificial- mouth) for dumb people which acts as a mediator to convey the messages to others. Some peoples can easily understand their motions or gestures but most of us cannot able to understand their way of conveying the message. In order to overcome this situation, the artificial mouth is introduced for the dumb peoples.This system is based on IOT and Image processing technique. According to dumb people, for every motion they have a meaning. So that each action is related or assigned to a hand gesture and kept in a data base. In the real time the database is fed into a microcontroller and the camera is fixed in front of them. For every action the motion sensors get accelerated and give the signal to the microcontroller. Once the motion senses the motion microcontroller matches the gesture with the database and produces the speech signal. The output of the system is using the speaker.

INTRODUCTION

According to the WHO, there are 300 million deaf people and one million dumb people in the world. Communication power can be both a blessing and a curse. Expression of ideas and emotions is beneficial. It can be quite difficult for silent persons to communicate with non-mute people. Communication becomes extremely difficult because the majority of individuals are not trained in hand sign language. Communicating with others around or delivering a message becomes exceedingly difficult in an emergency or at other times when a mute person is travelling or among unknown individuals. We propose a smart speaking system that uses hand gestures and body language to enable mute persons interact with non-mute people. A speaker unit, a hand motion reading system, and motion and flex sensors are used in the system. Circuitry that runs on batteries powers this system. The system is operated and data processed using an Arduino Mega. The system offers pre-stored messages like "Good morning," "Can you please do me a favour," "Can you help me cross the road," and other common phrases to assist mute people in communicating basic messages. The system interprets people's

hand movements for various hand movement variations. As input sensors, the system makes use of accelerometers and flex sensors. Sensor input is continuously received and processed by the microcontroller. Now, it employs a simple logic to look for messages that match the set of sensor values. Text-to-speech processing is used to find the sound signal in memory, retrieve it, and speak it aloud through the interfaced speaker when a matching value is found. With the help of a simple wearable system, mute people can now communicate with hearing people using a fully functional smart speaking system. Additionally, establishing a connection between people with special needs.

LITERATURE REVIEW

In Literature Review, we studied about existing project related to this topic and try to understand about the existing system behavior.

Zhou et al., a wearable system that uses machine learning is capable of properly translating American Sign Language hand movements into voice. The stretchy yarn-based sensor arrays used in the wearable sign-to-speech translation system, together with a wireless printed circuit board, provide great sensitivity and quick reaction times, enabling real-time translation of signals into spoken words with 98.6% accuracy. this work was done with usage of wearable gloves and applied machine learning. even though the efficiency is higher, in real-time a disabled person will not be able to spend more money on the software including the device and then use it to express their thoughts to a commoner.

Shweta S. Shinde, Rajesh M. Autee and Vitthal K. Bhosale have proposed a method in which the angle and peak calculation approach is used to extract the features of hand gestures by using MATLAB and then they convert the recognized gesture into speech using MATLAB inbuilt command.

Sangeetha. R.K, Valliammai. V and Padmavathi. S have proposed a system based on the Indian hand sign language which contains both hands to create a gesture unlike the American sign language in which one hand is used. Their system is implemented using MATLAB without using any other external hardware for the user, here the runtime live image is captured after which image frames are extracted and image processing is applied using HIS model and then the feature extraction is done by distance transform method. The results obtained by this model is found to be satisfactorily good for most of the hand signs.

Sonal Kumari and Suman K. Mitra have purposed a system based on hand action recognition using background subtraction technique for image processing and they use Direct Fourier transform (DFT) algorithm for image extraction based on the MATLAB.

Mrs. Neela Harish and Dr. S. Poonguzhali have proposed a system based on the hardware approach, the system consist of hardware called as data glove, the glove consist of sensory part, that consist of flex sensors, accelerometer and PIC- microcontroller which provides all the input and output for the system.The results obtained are efficient and satisfactory.

Prashant G. Ahire, Kshitija B. Tilekar, Tejaswini A. Jawake, Pramod B. Warale system works on MATLAB for hand gesture recognition, here they have taken a real time video as an input and after applying the image processing stage they have used the correlation-based approach for mapping purpose and then at last the audio is generated using google TTS API. The system provides an efficient result as per the system is proposed.

WORKING PRINCIPLE

Here we are using Raspberry pi 3. Many Hand Gestures are uploaded into Raspberry pi (data set). With the use of camera, the gestures are monitored and sent to processor, then the processor checks it with the uploaded data set and sends the corresponding message to the speaker and a message through Mail (IoT).

Also, with the use of Hand Gesture home appliances can be controlled (example: fan and light….). A web page or web link is shared to the user through which the user can send the message to the system which it converts into an audio and provides output at the speaker.

FIG: Examples of Hand Gestures

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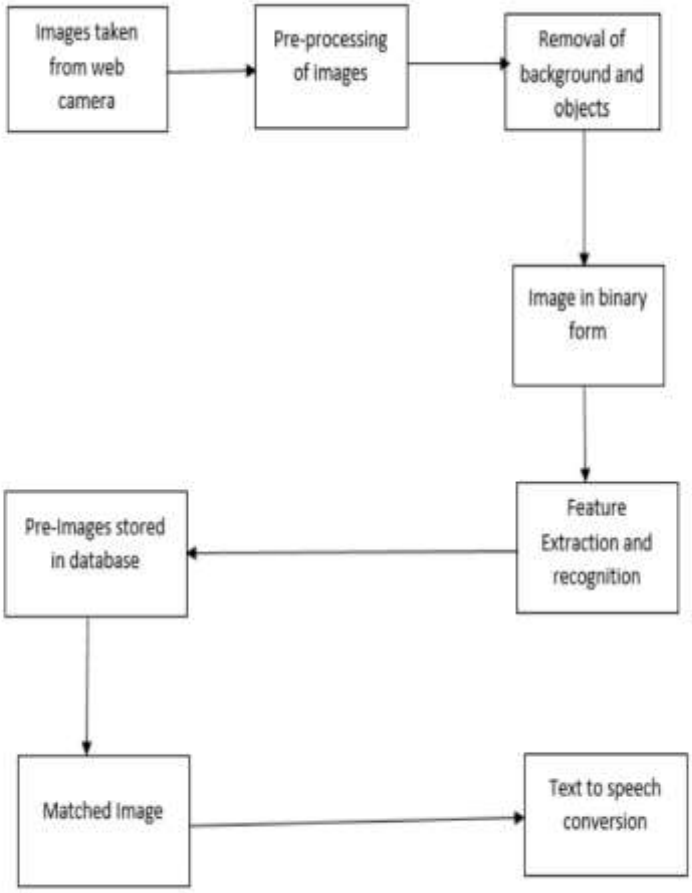

FIG: System Architecture

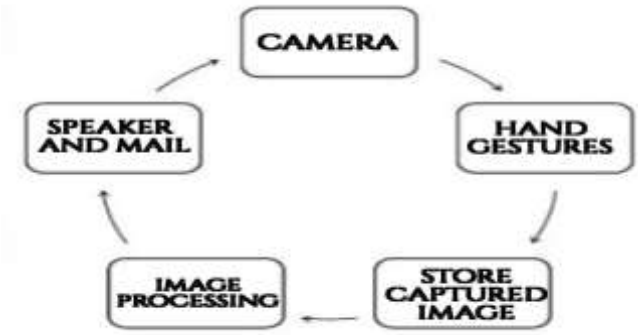

FIG: Work Flow Of System

COMPONENTS LIST

1.Raspberry Pi 3 Model B:

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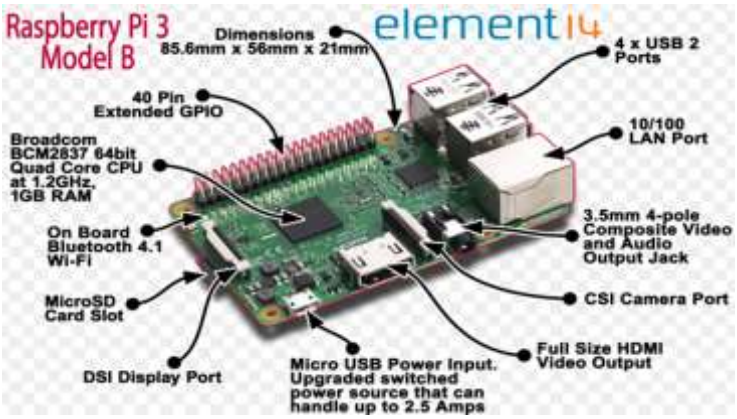
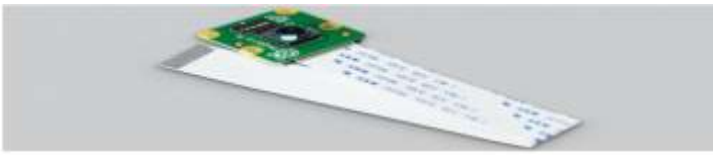


The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful. credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B.

2.Pi camera v1.3:



The pi Camera module is a camera that can be used to take pictures and high-definition video. Raspberry Pi Board has CSI (Camera Serial Interface) interface to which we can attach the PiCamera module directly.This Pi Camera module can attach to the Raspberry Pi's CSI port using a 15-pin ribbon cable.

3.Adapter:

Features/Specs:

Input Supply voltage: 200~240ACV @50/60 Hz

Output Voltage: 5.1V

Output Current: 2.5A

Power Rating: 12.7 Watts

Output Plug: Micro USB

4. Speakers:

Speakers are standard output devices used with computer systems that enable the listener to listen to a sound as an outcome. Some speakers are used once they have been linked to a computer, while others may be connected to any type of sound system. A user who provides vocal commands to a software program is known as a speaker. A computer speaker is a piece of hardware attached to a computer system used to produce sound. The computer's sound card has the signal used to generate the sound from a computer speaker.

CONCLUSION

There are so many deaf and mute people around the world are facing communication issues for those there are so many devices and applications are developed to remove the communication barriers with normal people. But in this project, a functional real time vision based American Sign Language recognition for deaf and mute people have been developed for American sign language alphabets. We achieved final accuracy of 98.0% on our data set. The prediction will be improved after implementing two layers of algorithms wherein we have verified and predicted symbols which are more similar to

each other. This gives us the ability to detect almost all the symbols provided that they are shown properly, there is no noise in the background and lighting is adequate.

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