"DHAVANI" – An Interactive System

A Tap for the Better Life

Arzoo R. Ranipa[1], Dr.Vishal S.Vora[2]*

[1]Department of Electronics & Communication Engineering, Atmiya Institute of Technology & science, Rajkot, Gujarat, INDIA

[2]Assistant Professor, Department of Electronics & Communication Engineering, Atmiya Institute of Technology & science, Rajkot, Gujarat, INDIA

Abstract– Now a days there are lots of people are deaf and dumb. They have problems in their living existence. Communications between normal person and a deaf – dumb people have always been a challenging task. The preference in embedded systems provides platform to design and develop a sign language translator system to benefit the deaf and dumb people; there exists a number of supportive tools. The main objective is to develop a real time embedded device for physically challenged to advancement for their communication in effective means. This system uses Raspberry Pi Camera for capturing the signs and controller for display in textual form and audio form.

Key Words – Gesture Recognisation, Indian sign language, Pi camera, Controller

1. Introduction

According to World Health Organization, about 300 million people are deaf and 1 million people are dumb [1]. In this present world, there are deaf and dumb people who suffer due to lack of effective communication. They have to undergo the treatment of being incomplete hearing. In present world deaf and dumb people suffer due to lack of communication because they cannot communicate easily with ordinary people. The main problem is communication for them. Deaf and Dumb people use sign language for communication. The people are not totally self-dependent. They are not able to hear emergency calls and emergency situations, and they were facing it as most difficult part in their life. It was very hard to manage. Sign language is the most preferable way of interaction for dumb and deaf people. To remove this gap between normal people and impaired people, sign language is used. It based on gesture which shows movement of hand [2]. There are several system available for this but there remains drawback and disadvantages. Our proposed system is more reliable and practical. Here sign language recognition is done with the Raspberry Pi camera and controller.

2. Related Work

Many researchers have worked on different methodology for sign language Recognisation. The first system is smart glove using flex sensor, microcontroller and accelerometer. Flex sensor is used to detect the movement of hand. At receiver side voice module and LCD module is placed. Drawback of this system is that flex sensor gives many threshold values and each figure requires separate flex sensor. This is not user friendly [3]. The second system is to recognize sign language with the Kinect sensor. Sensor is used as camera it capture the hand movement which perform by users. This method is more expensive [4].

3. Proposed System

A.Block Diagram of Proposed System

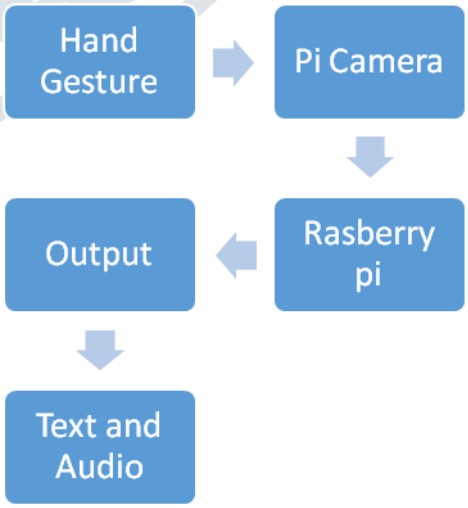

Fig.1. Block Diagram of Proposed System

B. Description of Block Diagram

Here, the hand Gesture contains Indian Sign language for the communication. Pi camera will capture that gesture which is connected with the Raspberry Pi controller with the help of predefined coding it shows the output display in form of Text and Audio.

Fig.1. Indian Sign Language

3.1 Raspberry Pi Camera Module

High Definition camera module compatible with all Raspberry Pi models. Provides high sensitivity, low crosstalk and low noise image capture in an ultra small and lightweight design. The camera module connects to the Raspberry Pi board via the CSI connector designed specifically for interfacing to cameras. The CSI bus is capable of extremely high data rates, and it exclusively carries pixel data to the processor[6].

Fig.2. Pi Camera Module

3.2 Raspberry Pi

Raspberry pi is small sized computer. It provides all expected abilities that implies of computer. The raspberry pi is open Hardware with the exception of the primary chip on the raspberry pi. The system in chip, which runs many of the graphics, memory, the USB controller, etc. Raspberry pi is one of the miniature computer [5]. Below raspberry pi model description is given in fig.3.

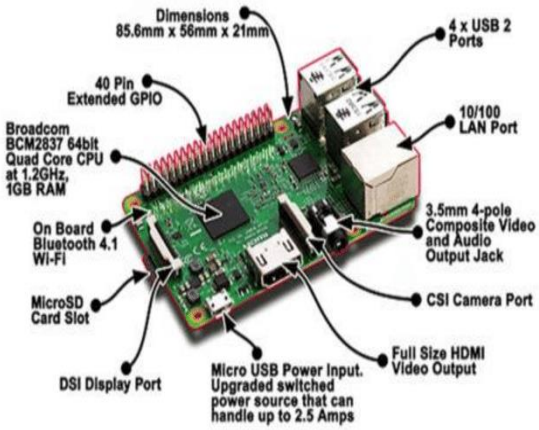

Fig.3. Raspberry pi model

As shown in figure raspberry pi is Broadcom BCM2387 ARM Cortex-A53 Quad Core Processor powered Single Board Computer running at 1.2GHz. The Boards have four USB ports. For video output HDMI and composite video are supported with a standard 3.5 mm tip-ring-sleeve jack for audio output.

C. Flowchart of Entire System

The flowchart of the process is shown in Figure 4.1. The description of the flowchart is as given bellow.

1. When the power switch is turned on, system gets started.
2. Pi camera will capture the hand gestures
3. Camera starts to detect the hand gestures.
4. This hand gestures are captured in the form of images.
5. These images are compared to pre-define coding which stored in the memory.
6. If the images are found equal, the stored text will be displayed on the screen and the text will be converted it into speech signal.
7. If the input and the hand gestures are found unequal, go to step 3.
8. Process continues till the power switch is turned off.

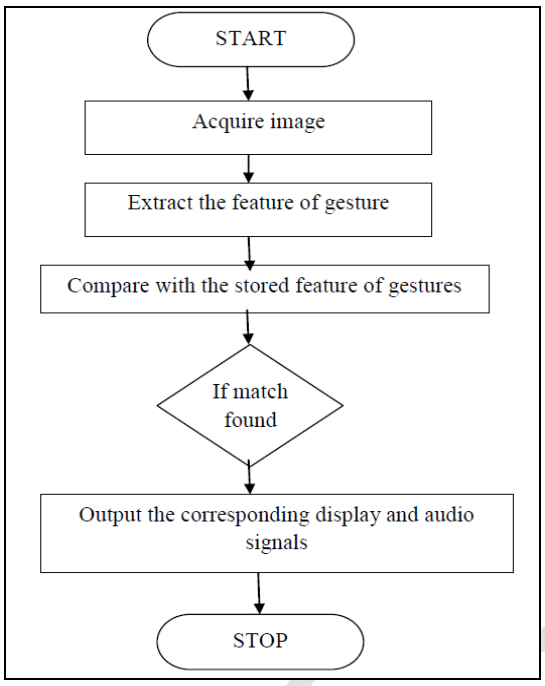

Fig 4.Flow chart of proposed system

4. Result and discussion

Raspberry pi is one type of operating system environment with python .python is the programming language. The introduction of python is through IDLE, a python development environment. Along with raspberry pi OpenCV library is used. OpenCV is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications.

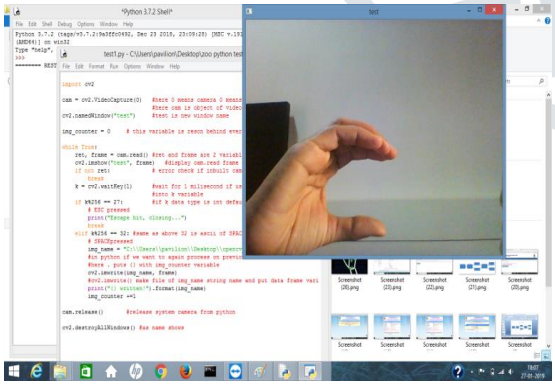

Fig.7. Software running with python shell

5. Conclusion

In this Research paper, Indian sign language Recognisation is done with Raspberry pi and pi camera. Now a day's sign language is more preferable language for the deaf and dumb people. According to gesture it will shows the alphabet in display and converts it to the speech signal. Here Raspberry pi interfaced with pi camera shown in fig.5.

Fig.5. Raspberry pi and pi camera connection

With the help of pi camera it will take the gesture which given by user. By interfacing raspberry pi and pi controller with the help of OpenCV it shows the gesture which taken by pi camera after this process as per predefined coding it shows the correct output of gesture into text and audio form shown in fig.6. and fig.7.

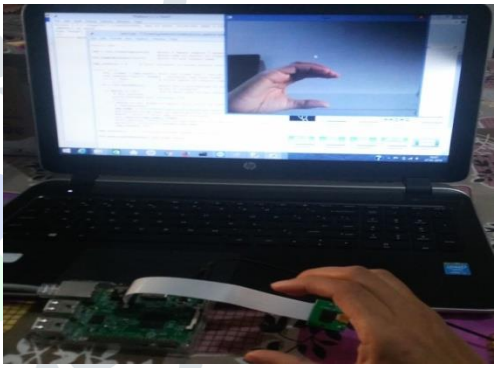

Fig.6.Detection of hand gesture for alphabet 'c'

this method is future extraction and more reliable. It can also possible to recognise sign language which continuously capture the gesture and generate sentence. In future more work has been done according to more words and sentences.

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