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# Speaking System for Aphonic People Using Hand Gloves

[1]Lakshya Verma(17EAYCS050), [2] Pankaj Kumari, [3] Ashwini Bari(17EAYCS014),
Department of Computer Science Engineering, Jaipur

**Abstract:- It is very important for people with disabilities to participate and maintain contact with each other and with other members of society. People who are deaf some way by which they can express themselves. However, many modern interactive tools for speaking interact with users through voice commands, which may be a problem for deaf-mute people. Using Hardware techniques like raspberry tool and integrate other hardware which has opened up new horizons for the speaking industry. The instrument may interact with 3D visuals and sound detectors with players. This implies that players may influence the game world with their physical motions and vocal instructions. This document aims to develop a system which will be a speaking device for creating gesture game suitable for deaf-mute people. Stupid persons, ordinary persons, cannot talk. Know the language of the sign used for interaction among the dumb. The method is helpful in solving this problem. Gestures correspond to people's communication habits. Different researches are still working with gesture recognition and speak system. In this document, speaking tool (also called sign language) become the voice of deaf people. Image processing is used to recognize gestures.**

***Keywords:-*** *Raspberry Pi 4,Accelerometer. Flex Sensor, Speaker, LCD's, Crystal Oscillator, Resistors, Cables & Connectors, Diodes, Adapters, Gesture Recognition, SD Card.*

## I. INTRODUCTION

It is quite hard for silent people to pass on their message to ordinary people. The communication gets quite tough as average individuals aren't skilled in the manual sign language. When an urgent person travels and communicates with or transmits a message between new individuals, it becomes quite difficult in an emergency or other occasions[2]. Here we present a clever speech system that helps mute persons to transmit their message with hand moves and gestures to ordinary people. . The system uses a hand motion measurement system with movement and flex detectors and a speaker unit. A rechargeable batteries circuit is used to power this device. For data treatment and system operation, a raspberry pi is utilised [7]. For people with disabilities and virtual environments (PE), today's keyboard, mouse, and pen user interaction devices are insufficient, leading to many new ways of presentation and interaction. solve this problem. In order to make human-computer interaction and natural contact with VE applications and the disabled, the human hand can be used as an input device[5].

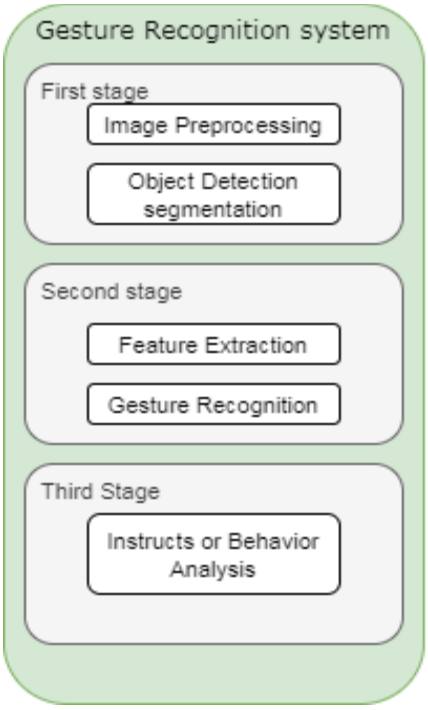


Figure 1: Basic layout of the tool

Many speaking tools mainly have three main stage. Item reconnaissance is the initial stage. This stage is intended for the identification of hand items in digital photos or movies. At this point, several difficulties with the environment and image must be fixed. to guarantee the proper recognition of the contour or region of the hand and thus improve the accuracy of recognition. Irregular luminosity, noise, low resolution and contrast[4] are common picture difficulties. It can be better with a better setting and better camera equipment. But when the gesture recognition system operates in the actual world or when it becomes a product is tough to manage. Thus, the best way to tackle these photographic challenges and construct an adaptable gesture detection system is through image processing technologies. The second stage is the identification of objects. Recognize the recognized hand object for gesture recognition[6]. At this stage, distinguishing features and effectively selecting classifiers are important topics in most

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studies. The next step is to analyze gestures in sequential manner to determine instructions or user behaviour[1].

## II. PROPOSED DESIGN STRUCTURE

The aim of the project is to provide a system which converts the basic message for deaf and dumb people to the people around them using a software and gesture control motion.

- This system comprises around 10 saved messages like 'need assistance': 'where is the toilet/washing place,' etc. The technology reads hand movements for various manual movements.
- It also has a trigger sensor, which shows that the individual wants to activate and talk about the system. This guarantees that the system does not talk if the individual makes hand movements unintentionally.
- The CPU for raspberry pi receives and analyses input sensor information continually. He is now looking for messages matching the sensor values supplied. Once identified in memory, these messages are extracted and delivered via the interface speaker utilising text to voice processing.
- Therefore we have a completely working intelligent speaker system which helps silent persons communicate using a simple wearable system to ordinary people.

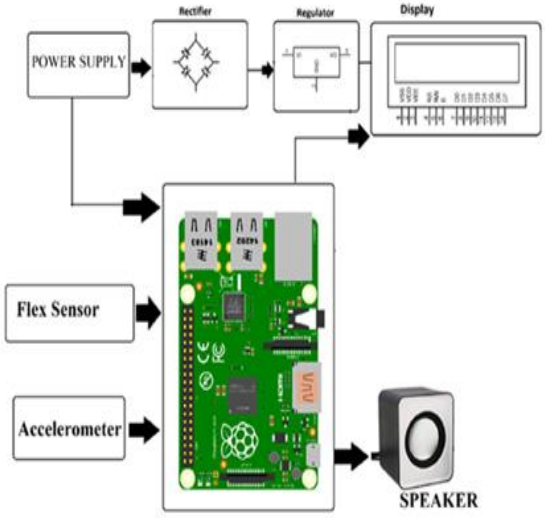


Figure 2: Layout of the proposed system

Image capture and pre-processing: first capture the image and perform pre-processing to hide noise in the image and make it smooth. Once the image is smoothed, perform gray scale converting the threshold of the image. Each pixel in an RGB image consists of three layers: red, green, and blue[3][2].

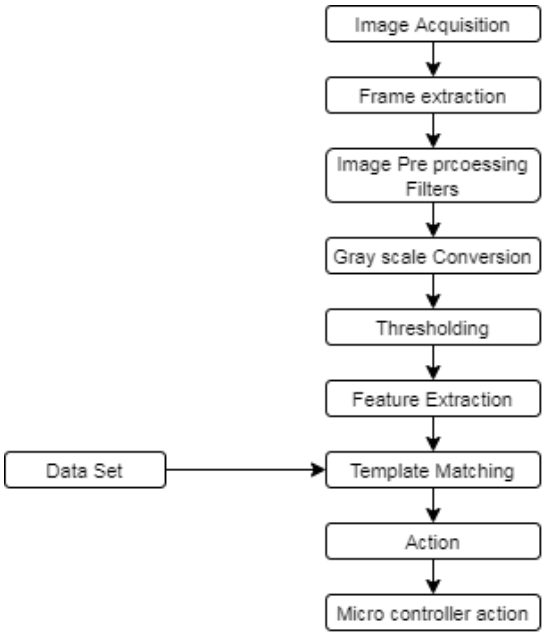


Figure 3: Image and gesture control, extensible feature

The design will be simple but will extensible features like accelerometer, small speaker, IC chip and raspberry tool kit and a small screen to click the message to speak. The data set can be used for communicating and storing different data and also in recognizing pattern and other voice factors[5][6]. The main role will be of raspberry tool and the python input. The microcontroller processes the received data. The data is in the form of a unique code. The voice text database is collected in memory's SPI sector in the format of WAV files. SPI storage is essentially an SD card helpful in storage & is necessary for storing the correct database.

## HARDWARE DESIGN

The used microcontroller inside the raspberry tool is LPC2100. The microcontroller LPC2131/36/00 is based on the 16/32-bit ARM7TDMI-S processor with real-time simulation and integrated tracking support, and combines the microcontroller with a highly integrated 32-bit flash-memory: 128 KB, 256 KB and 512 KB and up to 1024 KB memory interface 128-bit memory and single speed architecture can run 32-bit code at maximum clock speeds[4][3][1]. The 16-bit alternate view mode reduces the code by 25% or more and minimizes the output efficiency degradation. These microcontrollers are small in size and low in power consumption. They are best choice for developing such tools and an important requirement, such as B. access control and access points[2][7].

Other hardware used: Flex, Glove, Speaker, LCD, Crystal Oscilator, Resistors, Transistors, Cables & Connectors, Diodes, PCBs, LEDs, Adapters and Push buttons that assist complete the overall structure and processing of input and output.

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## SOFTWARE REQUIREMENT

The whole software or the project designed is developed using the python programming language and several test case and API tool along with different text to speech library and additional tools have been used. Several APIs are available in Python for converting text to language. One of such APIs, widely known as the gTTS API, is Google Text to Speech API. GTTS is a programme that transforms input text to audio that can be saved as an mp3 file[3][6]. It is straightforward to use.

The gTTS API supports various English, Hindi, Tamil, French, German and many more languages. The talk can be given quickly or slowly at any of the two audio speeds offered. But the voice of the produced audio cannot be changed from the newest update [1][7].

We can get Python to talk to the computer. The written words are spoken in English with a text string. This procedure is called Speaking Text (TTS). Pytsx is a text-to-speech wrapper throughout the platform. They are depending on your operating system using different speech motors:

**nsss** - NSSpeechSynthesizer on Mac OS
**sapi5** - SAPI5 on Windows
**espeak** - eSpeak on any distro / Ubuntu / Fedora Linux platform

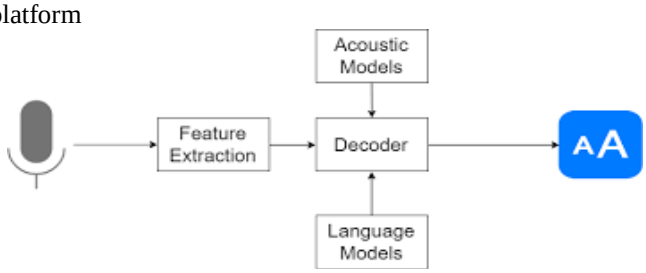


Figure 4: Basic functionality flow in software

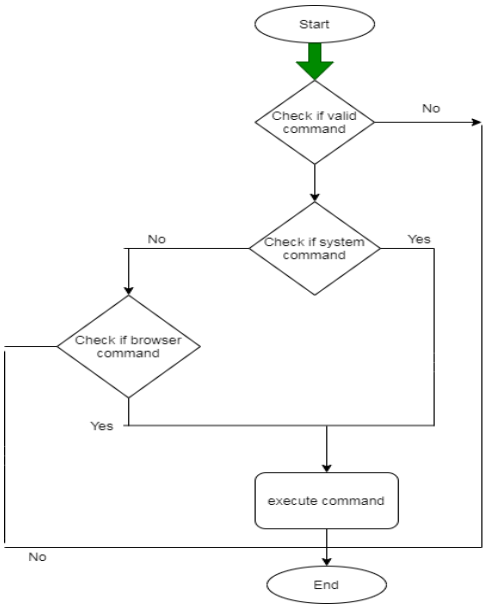


Figure 5: Flowchart for text processing using python

## III. RESULTS OF EXPERIMENT

Performed pilot setup to verify that the equipment is working as required. In this case, rather can code sending from the image processing unit, the basic lighting tools were used to send the code to the device. Its serial interface has connection with RS232 hardware interface card[1]. If the code is sent and the corresponding voice file will be played on the speaker. There were numerous test will provided the desired result which signifies that the tool is best to use. The database had different speech and all were being tested and the system was 100% effective and 90% efficient. Efficiency is less due to bugs and errors in the program which were found using the BlackBox testing and other testing.

## IV. CONCLUSION

With the advent of virtual reality, hand gestures, which are regarded as inputting computer commands, have led to extensive research. The system proposes a recognizing method of multiple static gestures. The system pre-processes the recorded video images and then performs feature extraction and categorization. Gesture recognition is truly dependent on pattern comparison[2]. Devices that recognize gestures and convert them into speech have been developed. This research conversion specification gestures into a set of computer-interpreted characters that can be further processed. You can convert gestures to speech, but you can control many different devices in the same way. There were some limitations while recognizing the hand gesture and converting the text and image portion, however these bugs and limitations can be removed by using different datasets, data structure mechanism, advance libraries in python[5]. There are some other extensible functions and features which will be implanted later on as the tool will start to work. There was no need to internet connection but may be after some updates the online dictionary features will be added in order to get different outputs and for multiple languages. Apart from this, the tool had maximum efficiency and the hardware implementation and integration was successfully possible.

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