Speaking System for Mute People Using Hand Gestures

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1. **<u>INTRODUCTION:</u>**

It is very difficult for mute people to communicate their message to the general public. Communication becomes very difficult because most people are not trained in hand sign language. In an emergency or other circumstance, when a mute person traveling or interacting with or conveying a message to new people becomes very difficult [1].

Here we suggest a smart speech device that allows mute people to express their message to ordinary people by using hand movements and gestures. The system uses a hand motion monitoring system fitted with motion and webcam and a speaker unit. A microcontroller can be used for data processing and device operation [2]

This system will be useful to solve this problem. Gestures are in line with people's habits of communication, so many researchers have done a lot of work in gesture recognition based on vision based approach [3]. In this paper, hand gestures also known as sign language will be converted into voice for mute people. Image processing is used for hand gesture recognition [4].

The need of this system is to give output in day-to-day life for "Image Processing Based Sign to Speech Converter for Mute People" [5]. It explains the aim and declaration for the evaluation of system. It will also explain system difficulties, interface and interactions with other external applications. The aim of the proposed project is to overcome the challenge of skin color detection for natural interface between user and machine [6].

This project is developed for the impaired people and would be beneficial as they can communicate with everyone. It actually becomes the same problem of two persons which knows two different language, no one of them knows any common language so its becomes a problem to talk with each other and so they requires a translator physically which may not be always convenient to arrange and this same kind of problem occurs in between the Normal Person and the Deaf person or the Normal Person and the dumb person [7]. To overcome this problem, we introduce a unique application. Our application Model is a desirable Interpreter which translates sign language to synthesized text and voice [8].

The Heart of the system will be the Microcontroller which is responsible for the conversion of hand movement signals to the corresponding codes which is further converted into voice and text message. This system needs the basic knowledge of embedded system [10]. Embedded systems are designed to do some specific task, rather than be a general purpose computer for multiple tasks [5].Some also have real time performance constraints that must be met, for reason such as safety and usability, others may have low or no performance requirements, allowing the system hardware to be simplified to reduce costs [9].

2. **PROBLEM STATEMENT:**

The inability to verbally communicate poses significant challenges and limitations for mute individuals in their daily lives. While sign language is a valuable tool for communication, it requires both parties to have knowledge of the language, which is not always the case. Additionally, there are situations where sign language may not be practical or sufficient.

The lack of an accessible and efficient communication system for mute individuals restricts their ability to interact with the world. It's very difficult for mute people to convey their message to normal people in their day-to-day life.

3. **OBJECTIVES:**

➢ Develop a robust gesture recognition system that can accurately interpret hand gestures and translate them into corresponding spoken words or text.
➢ Implement a speech synthesis module that converts the interpreted gestures into audible speech, allowing communication with others.
➢ Hand gestures are a form of non-verbal communication that is been be used in several fields.
➢ The great challenge lies in developing an economically feasible and making hardware independent system so that physically impaired people can communicate easily.

4. **METHODOLOGY:**

In this project we make a smart speaking system that help mute people in conveying their message to regular people using hand motions and gestures. The system makes use of a hand motion reading system equipped with motion and flex sensors or web cam along with a speaker unit. This system is powered by a battery powered circuitry to run it. A Microcontroller is used for processing the data and operating the system. The system reads persons hand motions for different variations of hand movement. It also consists of a trigger sensor in order to in date that the person wishes to activate the system and speak something. In this project we are categorized into.

➢ Flex sensor glove based hand gesture recognition,
➢ Vision based hand gesture recognition.

Flex Sensor Glove Based Hand Gesture Recognition:

The number of fingers present in the hand gesture is determined by making use of defect points present in the gesture and then used to detect through the Flex Sensor and Accelerometer what gesture would it be Performing action: The recognized gesture is used as an input to the Microcontroller It detects the message and then text to speech converter convert into voice.
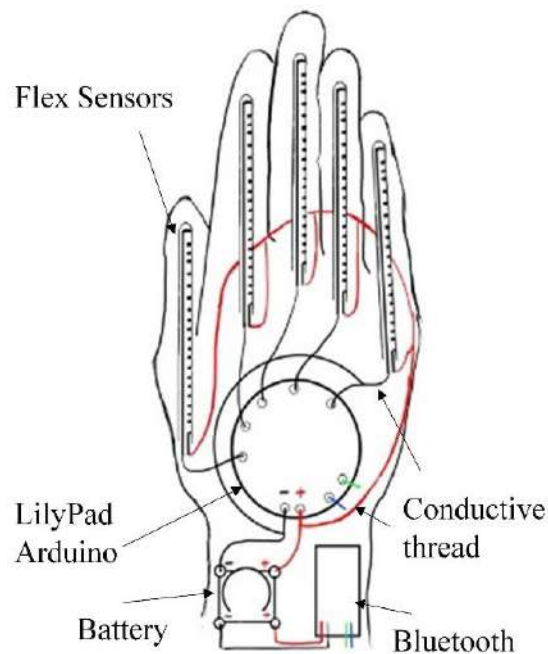

Fig.1 Hand Gesture Recognition System

Vision Based Hand Gesture Recognition:

In vision based hand gesture recognition system, technology uses a bare hand to extract data for recognition. With the help of this technology user can directly interact system. Using camera to get images of hand, and then preprocess those images by color splitting, morphological processing and feature extraction. At last, the template matching is used to realize the hand gesture recognition. The recognized image is processed by the hardware and converted to voice.
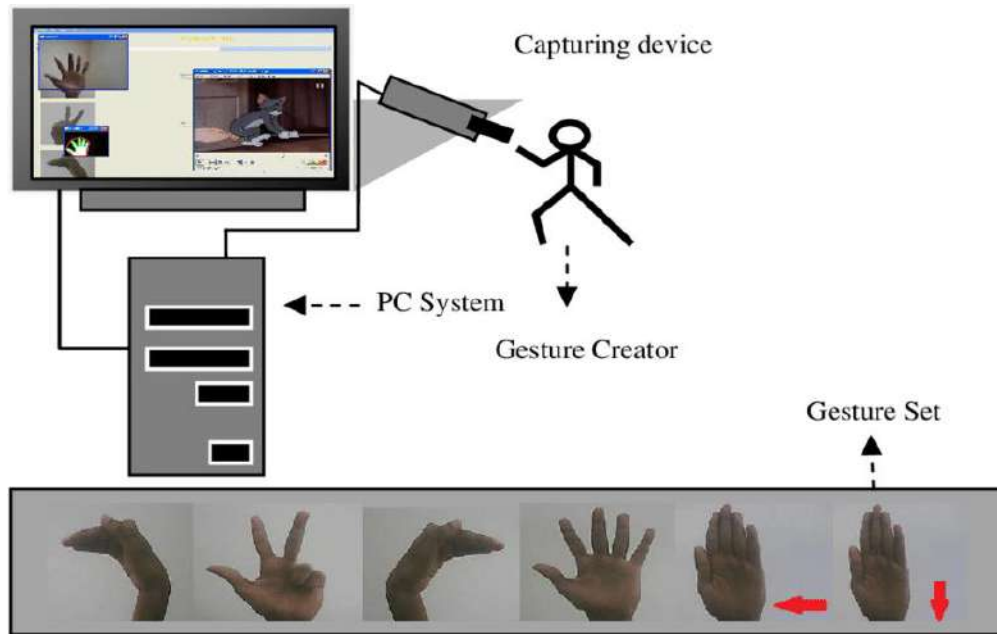
Fig.2 Vision Based Hand Gesture Recognitions
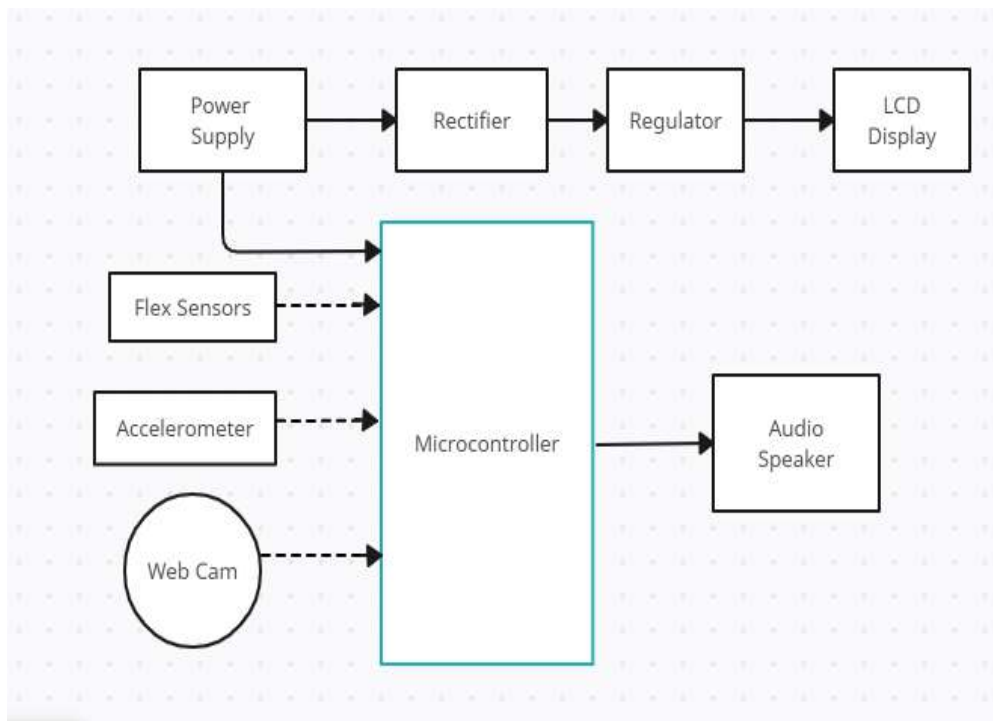
5. BLOCK DIAGRAM:

Fig 3 Block Diagram of Speaking System for Mute People Using Hand Gestures

This ensures the system does not speak when the person is just involuntarily making hand motions. The Microcontroller processor constantly receives input sensor values or images and then processes it. Now it searches for matching messages for the set of values. Once it is found in memory this messages is retrieved and is spoken out using text to speech processing through the interfaced speaker. Thus we have a fully functional smart speaking system to help mute people communicate with regular people using a simple system.

6. <u>TIME LINE:</u>

Work Schedule per weeks	Sep-Oct	Nov-Dec	Jan-Feb	Mar-Apr	May	June
Literature Survey	18-09-2023 4-10-2023					
Data Collection	05-10-2023 01-11-2023	02-11-2023 03-12-2023	05-01-2024 31-01-2024			
Hardware/Software Implementation		02-12-2023 29-12-2023	02-02-2024 27-02-2024	01-03-2024 29-04-2024		
Result Compilation & Thesis Writing					02-05-2024 29-05-2024	01-06-2024 15-06-2024

7. **APPLICATIONS:**

➢ It can solve the daily difficulties suffered by the people, who cannot speak or one who recently undergone an accident.

➢ It can also be used by elderly people

➢ This can also be integrated in the field of automation.

➢ It can be used in military actions based on hand gestures, which can be used for squad communication.

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