Speaking System For Mute People Using HandGestures

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Abstract-It's very difficult for mute people to convey theirmessage to regular people. Since regular people are not trained on hand sign language, the communication becomes very difficult. In emergency or other times when a mute person travelling or among new people communication with nearby people or conveying a message becomes very difficult. Here we propose a smart speaking system that help mute people inconveying 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 along with a speaker unit. Arduino is used for processing the data and operating the system. The system consists of around 10 stored messages that help mute people convey basic messages. The system reads persons hand motions for different variations of hand movement. It also consists of a trigger sensor in order toindicate that the person wishes to activate the system and speak something.

I.INTRODUCTION

With a population of about 7.6 billion people, communication today is a strong means for understanding each other. But people with speech impairment need some special skills called sign language to communicate with the rest of the world. They think that it's hard to be involved in a general public where a large portion of the population does not understand sign language. For people who are unable to hear or speak, sign language is the most convenient and simple skill to communicate. People without these disabilities never try to learn sign language in order to communicate with people who are deaf or dumb. As a result, the deaf and dumb group is isolated. This device will help the deaf and dumb community to communicate with the rest of the world using acoustic sounds. Indian sign language (ISL) uses both hands to represent different alphabets [1], numbers and words. Most researchers in this field focus on American Sign Language (ASL) recognition, because most ASL signs are used with one hand and, as a result, have a lower level of complexity. In recent years, more and more researchers have begun working on ISL.

1.2 OBJECTIVE

- To help the deaf and dumb community
- To read hand gestures accurately using the sensors
- To compare these hand gesture values with the standard values in the code
- To transfer the gestures equivalent speech and text data to the output device via the speaker.
- To show customizable words, symbols, numbers, and sentences into speech and text using the Speaker.

1.3 METHODOLOGY

The method to do this area of activity includes the usage of Arduino Uno. Our project mainly depends on the Arduino microcontroller to yield a better outcome. CNN divides the recorded video in multiple images, these images will be gathered and will assign importance to various aspects/objects in the image and be able to differentiate one from other.

II.LITERATURE

2.1 Hand Gesture Recognition and Voice Conversion for Deaf and Dumb 2018 (Rupesh Prajapati)

Sign language, Hand gesture, Feature extraction, Gesture recognition, Principal Component Analysis, Dumb and Deaf improved safety since drivers do not have to take their attention off the road as much as they would with touch controls.

2.2 ARDUINO UNO Based Hand Gesture Recognition and Voice Generation Using Python 2020 (Priyanka Dash)

Basic implementation of sensor glove is done using flex sensors. Priyanka Dash et al [2] proposed Sign Language to Speech Conversion Gloves using Arduino and Flex Sensors. In the proposed system, the method is used with a microcontroller (Arduino UNO) and a flex sensor based data glove. While the data is being transferred, the LED lights up. Flex sensors are inserted inside the glove.

2.3 On-device Real-time Hand Gesture Recognition 2021 (George Sung, Kanstantsin Sokal).

Reduced engineering effort by leveraging the hand tracker which is already real-time, robust, and fair [Simpler gesture classifier design which processes skeleton key points instead of raw pixels. Visualization of gestures supported by the heuristic based classifier. Left-to-right: Open Palm, Victory, Closed Fist, Pointing Up, Thumb Up, and Thumb Down.

2.4 EMBEDDED SYSTEM & Dual speaker-based gesture recognition for deaf and dumb (Kaifeng Tanga, Liangliang Hanc, 2019).

Acoustic gesture recognition based on the Doppler Effect is a natural HCI (human computer interface) mechanism for cooperation with robots. Environmental noise, nearby human motions, and user adaptability. These techniques in gesture recognition while using a simple alphabet of three geometrical figures: circle, square, and triangle.

The detection of hand gesture can be done using web camera i.e. using image processing. It captures the image from the video stream, remove sits background using RGB filtering and thresholding. This develops a system that can convert the hand gesture into text. The detection involves observation of hand movement. There are some drawbacks in this system, they are Image Processing can be significantly slow creating unacceptable latency. Many Gesture Recognition system do not read motions correctly due to factors like insufficient background light etc.

This phase is the first step in moving from the problem domain to the solution domain. In other words, starting with what is needed; design takes us toward how to satisfy the needs. The design of a system is perhaps the most critical factor affecting the quality of the software; it has a major impact on the later phases particularly testing and maintenance. It has two parts, one is mobile app and another is hand glove. After the hand glove is powered up, every fingers and hand movement each time will try to detect word or letter for its given pattern. If the finger or hand movement data is recognized, then it will be sent on to that app for display. If the finger or hand movement data are not recognized, then letter or word will not be shown. 3.1
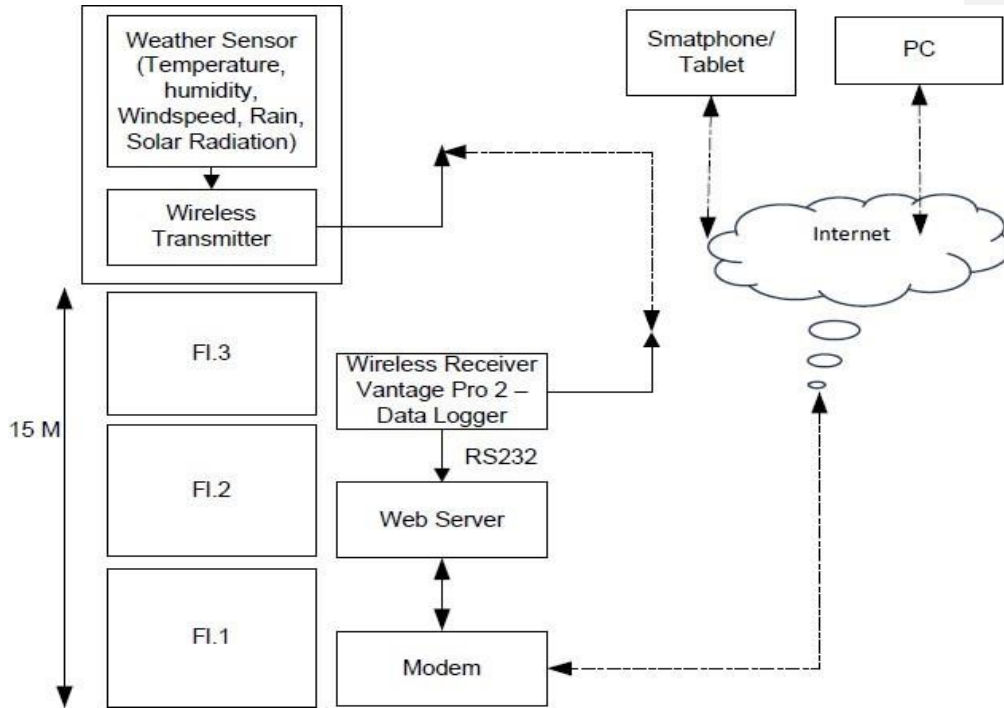
Fig. .1 Block Diagram of Existing System
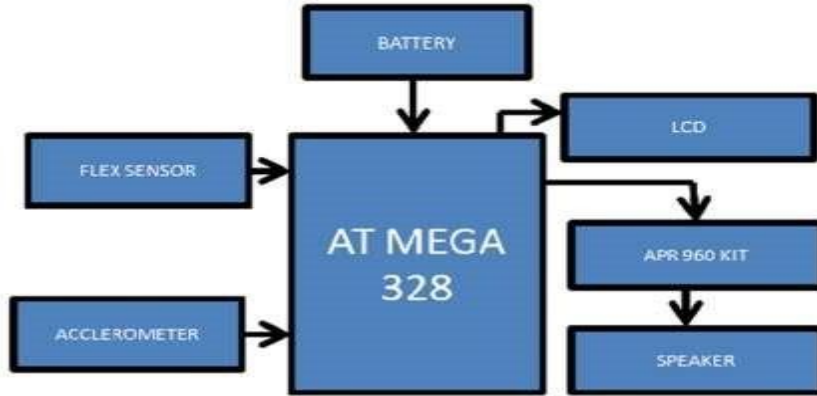
III.MATERIALS AND METHODS

BLOCK DIAGRAM

Fig. 2 Block Diagram of Proposed System

The figure 4.1 block diagram describes our proposed system using Arduino microcontroller in which it is powered by 9v battery.

The Arduino Uno is one kind of microcontroller board based on ATmega328. Arduino Uno can detect the surroundings from the input. Here the input is a variety of sensors and these can affect its surroundings through controlling motors, lights, other actuators, etc. The ATmega328 microcontroller on the Arduino board can be programmed with the help of an Arduino programming language and the IDE (Integrated Development Environment). Arduino projects can communicate by software while running on a PC.

Working Principle

The user must enter desired number in order to store samples in database. More samples should be used to get greater accuracy than 5. User must select folder where photos will be saved. Click start video to start web camera & start database creation process. Click capture image to add specified number about photos to training folder for each sample. When number about images displayed matches number about successfully.

Fig. 3 Module of Voice Device

The figure 3 represents the module of ISD 1820 Voice Device in which the parts such as Mike and speaker outputs are labelled.

Power Amplifier Circuit

The amplifiers are the circuit which is used to enhance the characteristics of the signal. The power amplifiers are used in broadcast transmitters, wireless transmitters and high audio systems. In this project it is used to drive the loads like speakers with minimum output impedance. If you want extern power amplifier circuit to Speakers, you can use LM386, D2283, D2322, TA7368, MC34119 etc. amplifier IC. Note, SP+ or SP- is you do not want to use, must vacant, do not connect to GND. Used LM386 power amplifier circuit as below:
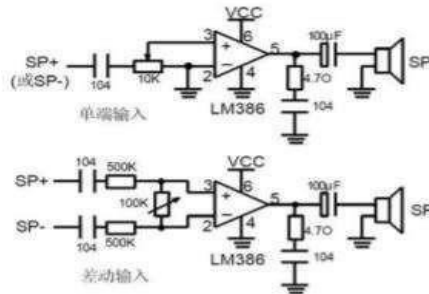

Fig. 4. Circuit diagram of Power Amplifier

The figure 4.5 shows that if we want loud voice from speaker we can achieve this by using external power amplifier circuit. The power amplifier circuit uses LM386 operational amplifier to amplify the power that is required to get a necessary output.

Table .1 Specification Table

ROSC	DURATION	SAMPLE RATE	BANDWIDTH
80KΩ	8 secs	8.0 KHz	3.4 KHz
100 KΩ	10 secs	6.4 KHz	2.6 KHz
120 KΩ	12 secs	5.3 KHz	2.3 KHz
160 KΩ	16 secs	4.0 KHz	1.7 KHz
200 KΩ	20 secs	3.2 KHz	1.3 KHz

Application

Typical schematic list as follows.
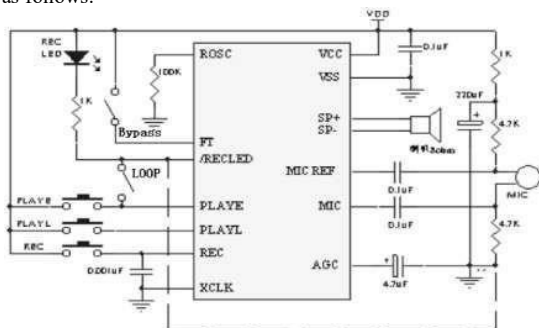

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Fig. 5 Schematic Diagram of Voice Module

If you want change record duration, an external resistor is necessary to select the record duration and sampling frequency, which can range from 8 – 20 seconds (4-12kHz sampling frequency). The Voice Record Module of us provide default connect 100k resistor by short cap. So the default record duration is 10s.

IV.RESULT AND DISCUSSION

A flex sensor has a range from about ~10K to ~35K, that means it won't give us a full 0-5 volt range (or 0-1023 analog value). Try to use the serial monitor below to find out what analog value you will take while you bending the sensor. It supposed to be between 700 to 900.

Fig: 6 Circuit With Flex Sensior For Voice Module

A flex sensor has a range from about ~10K to ~35K, that means it won't give us a full 0-5 volt range (or 0-1023 analog value). Try to use the serial monitor below to find out what analog value you will take while you bending the senso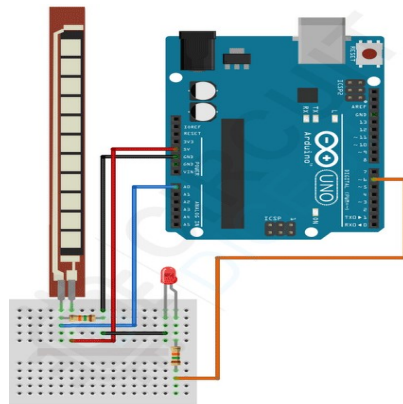r. It supposed to be between 700 to 900. The module itself comes with a microphone and a speaker (8ohms 0.5watts) and it should look something like this shown in figure 5.2.

Fig 7 Voice Module device with Pin Configuration

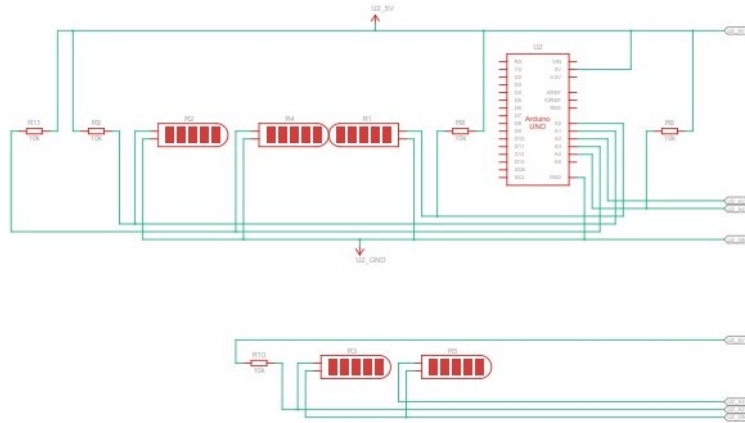*5.3 Circuit Diagram and Explanation*

Fig 5.3 Circuit Diagram of Proposed System

A Flex and Force sensor. This is a flexible sensor which changes its output when it is bent or when force is applied on it. This sensor has two output wires. The resistance between these two wires varies when the sensor is bent or when subjected to a force. Hence, this sensor can be used as a flex or force sensor. When the sensor is kept straight with no force acting on it, it has a resistance of around 10 K Ohms. When the sensor is bent in either way, or when force is applied on the sensor, the resistance between these two wires increases proportionally to the amount of bending. They convert the change in bend to electrical resistance - the more the bend, the more the resistance value. They are usually in the form of a thin strip from 1"5" long that vary in resistance from approximately 10 to 50 K ohms. Flex sensors are analog resistors. They work as variable analog voltage dividers. Inside the flex sensor are carbon resistive elements within a thin flexible substrate

IV.CONCLUSION

Dumb & deaf persons, image processing has been used to translate voices & recognise hand movements. method takes an image as input & outputs text & audio. implementation about this system offers accuracy about up to 90% & performs well in most test situations. objective about this project is to build a machine learning model that can forecast hand motions from webcam footage & then convert recognised hand gestures into voice, enabling hearing & hearingimpaired people to converse among regular people. finished product is shown as static text after captured image has been retrieved from image dataset. A hand motion is transformed into a picture through.

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