GESTURE BASED VOCALIZER for DEAF and MUTE PEOPLE

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Abstract— Sign language is the natural means of communication for deaf and mute people. It is a communication skill in which gestures are used instead of sound to convey meaning. Although it is an effective skill when communicating amongst themselves, it poses a serious issue when communicating with a person with all senses intact. A normal person needs to either learn sign language or seek the service of an interpreter to communicate with a speech or hearing impaired person. Both these solutions are tedious. As a result, communication barrier along with social barrier exists due to which the deaf and mute people don't enjoy equal rights and social status as the general public. To minimize these barriers, a device has been proposed that converts hand gestures into sound. The device consists of a glove fitted with an accelerometer. Moreover, spoken English words are converted into corresponding text and displayed on LCD screen.

Keywords— Sign Language, Communication Barrier, Gesture, Accelerometer, LCD.

I. INTRODUCTION

It is estimated that over 500 million people around the world are suffering from some sort of disability- physical, sensory or mental. In the recent years, the number of speech-impaired and hearing-disabled victims has risen rapidly due to accidents, diseases or birth defects.

A person who is not able to speak or has lost this ability in some accident, faces a grave issue in communicating his thoughts, ideas, views, knowledge or feelings to the society. Similarly, a person who doesn't possess the ability of hearing faces difficulty in understanding what is conveyed to him/her.

To address these issues, a system is conceptualized called "GESTURE BASED VOCALIZER FOR DEAF AND MUTE PEOPLE". In this system, we have made an electronic speaking glove, by simply wearing that glove, mute person can easily communicate with the normal people. The circuitry in the system translates tilt angles of hand into speech so it becomes easy for mute person to communicate with normal person. In this system LCD display is also used, the speech of normal person is recognized word by word and displayed as text on LCD display so it becomes easy for normal person to communicate with deaf/mute person. In this way, this system will help to lower the communication gap as well as the social gap between mute, deaf and normal people.

II. LITERATURE SURVEY

Kshirasagar Snehal P. et al. proposed a system based on flex sensors and accelerometer in which a glove is fitted with these sensors. Depending on the degree of bending of the flex sensor, gesture is translated into text format and displayed on LCD and in corresponding speech format via speaker. The microcontroller used is AVR microcontroller (ATmega 16).

M.Archana et al. presented a system in which an android application is used to obtain voice input of a normal person. The input is subject to voice recognition, voice to text conversion takes place. Text matching is done and corresponding image of hand gesture frame is displayed to the impaired user. This system requires a camera and a server.

Anju Varghese et al. proposed a system in their paper which is based on raspberry pi and flex sensors fitted to each finger. Flex sensors produce output based on bending of fingers which is then fed to the raspberry pi. Using data storage, the hand gesture is translated into voice and also displayed on LCD screen. For voice recording playback, APR 9600 device has been used.

Ata-Ur-Rehman et al. in their paper, presented a brief description of a system in which a glove is fitted with bend and tilt sensors. Tilt detection module detects the output of tilt sensors, while the gesture detection module detects the overall gesture of hand. Gesture is translated into text and displayed on LCD while after speech synthesis, corresponding message is heard from the speaker. The microcontroller used is AT89C51 and the speech synthesizer used is SP04256 IC.

III.PROPOSED SYSTEM

All the systems proposed earlier provide one way communication only i.e., they facilitate communication either of a normal person with an impaired person or impaired person with a normal person but two-way communication is not possible. We have proposed a system in with two-way communication is possible i.e., an impaired person can communicate with a normal person and vice-versa.

A wired glove is used which is normal cloth driving glove fitted with an accelerometer. Accelerometer is an analog sensor which senses analog signals from the environment. Environment is actually 3D but we only take values in two coordinates, that is, x and y (however we can take three coordinates as well). The data received by arduino is read through analog pins A0 and A1. Then conditions are created using simple if-else depending on data from particular coordinates. The arduino is interfaced with mp3 in such a way that the recordings in memory card of mp3 player will be played according to the conditions and the output will be produced through the speaker. The arduino communicates serially with the mp3 player as Rx and Tx pins of arduino are connected to Tx and Rx pins of mp3 player respectively. Mp3 player is controlled by the arduino, that is, arduino decides the volume, which recording is to be played, etc. but does not do the work itself. The arduino is programmed in such a way that it does not control the mp3 player for the first 20 sec in which we introduce the system by playing the recording "Gesture based vocalizer for deaf and mute".
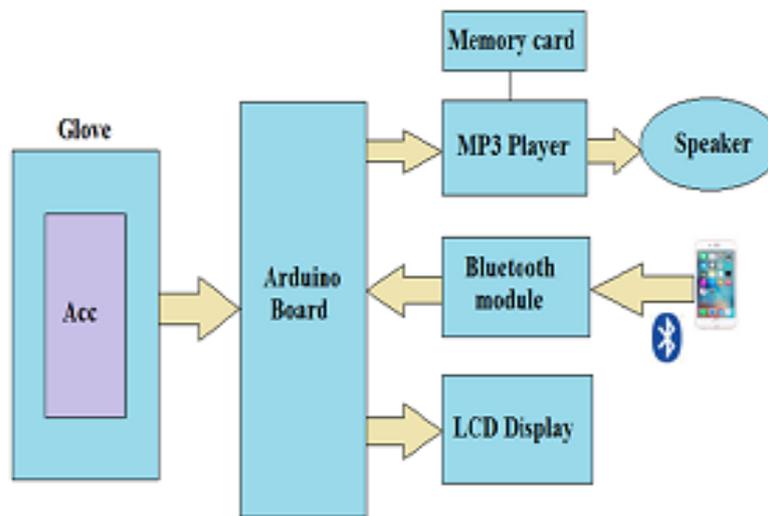

Fig. 1 Block diagram of gesture based vocalizer

Depending upon analog values read by arduino from the accelerometer and the condition that is being satisfied, a particular message will be played by mp3 player through speaker. Now we have LCD that interfaces with arduino in 4-bit mode. Also we have a Bluetooth module that is paired with cell phone on one side and connected serially with arduino through serial pins Rx and Tx. The cell phone which is being used will contain an application namely "AMR_Voice" which will convert our voice to string. This converted voice is sent to Bluetooth module which simultaneously sends it to arduino through its serial pins. On receiving the string by Bluetooth module, the arduino sends it to the attached LCD through pins D0-D7. This feature of Bluetooth is used by normal person to communicate with the handicapped and disabled person.

Now consider a situation where glove containing accelerometer is worn by a handicapped person. On the basis of his hand movement (left, right, up down), readings will be sent by accelerometer to arduino and the mp3 will play the recording according to the condition provided by arduino. Then another person will communicate with the disabled person by the use of AMR_Voice application on his mobile. This application will convert the speech to text and send it to Bluetooth, Bluetooth will send it to arduino which will finally display it on the LCD.

IV. CONCLUSIONS

This is a social project which has been conceptualized to provide voice to the voiceless and aid hearing-impaired people. Moreover it has made communication easier for a handicapped person and a normal person with each other, thereby minimizing communication and social barriers between the two.

There are several future enhancements associated with this system, which include:

1. Designing of wireless "Gesture based vocalizer".
2. Vocalize the movements and gestures of animals.
3. Replacement of conventional input devices with data glove.
4. The dynamic movements can be detected and sensed more perfectly.

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