Real Time Communication between Deaf Dumb and Blind using MATLAB

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Abstract— The work is used to achieve the Real Time Communication between Deaf Dumb and Blind. Communication between these people is impossible as a way of conveying information by one person cannot be received by another. The system mainly includes camera, DB9 connector, speaker, microphone & display. The camera is mainly used to capture the colour designation from dumb. DB9 connector is used to interface controller with PC. Speaker is used to speak out for colour input given by dumb. Micro phone is used to give to the voice data base. The voice data base viewed in the admin end of the LCD. At the output side speaker will speak out the message and also LCD displays the message.

Key words: Binary Imaging, Grayscale Conversion, Image Acquisition, LPC Filtering

I. INTRODUCTION

The current era is a zoom of technology. Each and every field has an impact of the technological advancements onto it. One such rapidly growing technical advancement is the increasing impact of camera on human life. The enormous and ever increasing Internet usage along with smart phones has proven a boon to mankind. But despite of these advancements, there is a certain part of the society which is deprived of these benefits. The hearing disabled and mute people cannot mingle with the social world because of their physical disabilities. Unintentionally, they are treated in an unusual manner by the rest of the society. They cannot be a part of the social events, say students cannot study in schools with normal students, elderly persons cannot work at work places, and much more. A simple activity like going and buying a commodity from the grocery shop is very complicated task for the deaf and dumb person. The gap between normal human beings and deaf and dumb is wide and ever increasing day-by-day. Today, the national count of hearing disabled and mute persons throughout India is approximately 17 lakh. Despite of this large number, very less research is done in order to bridge the communication barrier. In an attempt to bridge the communication barrier, we propose an Application which helps blind and deaf and dumb people to effectively communicate with each other[1].

II. LITERATURE SURVEY

1) Anbarasi Rajamohan, Hemavathy R, Dhanalakshmi proposes a Deaf-Mute Communication converter. Deaf-mute person has always found it difficult to communicate with normal people. The project aims to facilitate people by means of a glove based deaf mute communication interpreter system. For each specific gesture, the flex sensor produces a proportional change in resistance and accelerometer measures the movement of hand. The glove includes two modes of operation – training mode to benefit every user and an operational mode.
2) To facilitate the communication between the Deaf and hearing persons, many gesture recognition systems used the help of color markers or data gloves to make the task easier. However, using of markers and gloves sacrifices the user's convenience. In the dissertation work, focus is given hand gesture recognition without help of any markers and gloves. Detecting and tracking hand gestures in a sequence of images help in extracting hand region. Thus, processing time will be reduced and accuracy will be increased as the features of that region will represent the hand gesture only.
3) In July 2014, it was proposed a face and hand gesture recognition system which is able to control computer media player. It used the face recognition scheme for viewer verification and the hand gesture recognition in mechanism of computer media player, for instance, volume down/up, next music and etc.
4) In April 2014, using hardware as an aid to communicate it was aimed to facilitate people by means of a glove based deaf-mute communication interpreter system. The glove is internally equipped with five flex sensors, tactile sensors and accelerometer. For each specific gesture, the flex sensor produces a proportional change in resistance and accelerometer measures the orientation of hand[2].

III. METHODOLOGY

A. *Block Diagram*

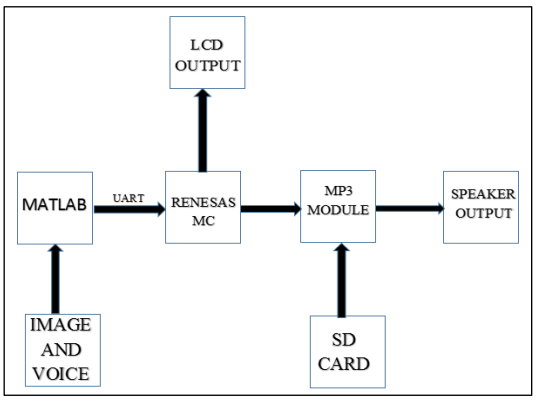

Fig. 1: Proposed Block Diagram

Renesas R5F100LE is a microcontroller which belongs to RL78 family. It is designed as true low power platform for general purpose applications. The CP2102 is a highly-integrated USB-to-UART Bridge Controller providing a simple solution for updating RS-232 designs to USB using a minimum of components and PCB space. The CP2102 includes a USB 2.0 full-speed function controller, USB transceiver, oscillator, EEPROM, and asynchronous serial

data bus (UART) with full modem control signals in a compact 5 x 5 mm MLP-28 package. No other external USB components are required. The on-chip EEPROM may be used to customize the USB Vendor ID, Product ID, Product Description String, Power Descriptor, Device Release Number, and Device Serial Number as desired for OEM applications. A liquid crystal display (LCD) is a flat panel display, electronic visual display, based on Liquid Crystal Technology. A liquid crystal display consists of an array of tiny segments (called pixels) that can be manipulated to present information. Liquid crystals do not emit light directly instead they use light modulating techniques. FN-M16P module is a serial MP3 module that is with a perfect integrated MP3 and WMV decoder chip. It provides micro SD card driver, and supports FAT16 and FAT32 file systems. It is able to play back specified sound files and realize other functions through simple serial commands. In the meantime, this module supports AD key control mode that facilitates users to develop their jobs in some simple applications. Without the cumbersome underlying operating, easy to use, stable and reliable are the most important features of this module.

The commands which will be given are stored in the memory chip which is accessed by microcontroller(5V supply) through MP3 audio module(3V supply) .A specific number is given for the audio files like 01,02,03,04 which is accessed by the C programmed microcontroller. Cube suite+ software is used to dump code to the microcontroller. The Image and Voice input commands are given through Matlab and there a link between the matlab and microcontroller. Deaf person can give the commands through the webmic and through webcam (gestures) .The matlab checks the command, if the command matches with the preloaded commands then it will display same command in the text format in the LCD screen. Dumb person will give the commands through the webcam using hand gesture .In hand gesture we have taken two colours red and green in different format, we pre-coded these colours by matlab, if input colours matches with respective colour then it will Display command stored for the particular colour in the text format in the LCD screen and in audio through the speaker. Blind person who is unable to see but he is able to speak and listen, will give the commands through the webmic. The matlab checks the command, if the command matches with the preloaded commands then he will get the output through speaker.

IV. EXPERIMENTATION

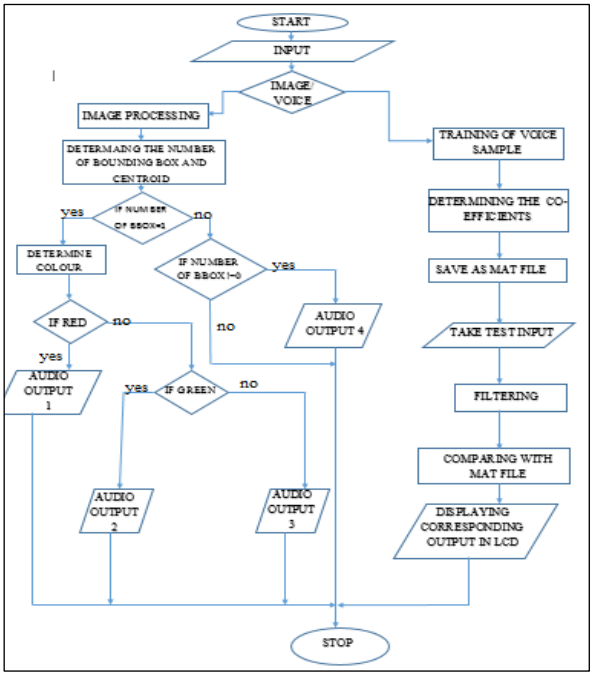

Fig. 2: Flowchart

Image acquisition involves the original image being captured by the web cam and pre-processing involves this image is converted into image containing frames of only one colour and again the original image is converted into grayscale image. The grayscale image is subtracted with the particular colour frame image to obtain the difference image upon which further processes are carried out on this difference image. The difference image is filtered to remove salt and pepper noise using median filter, feature extraction consists of filterd image being converted into binary image, in this image the region which had color component would be in white color and the background will be in black color , now areas with less than 300 pixels are removed and blob analysis is carried out determine the number of bounding box and centroid in the image, this information is used in the classification to determine the number of color components present in the original image by super imposing the bounding box and centroid on the original image, depending upon the color and number of colored component in the image the key word is sent from uart to the microprocessor to produce output in the speaker.

To produce lcd output, speech input is required, first stage involves establishing the sampling frequency and training of the samples, the keywords help, food, sleep and danger have to be spoken six times and each sequence of words are saved in a file and these speech signals are subjected to lpc filtering to determine the co-efficients. These filtered signals are concatenated and multiplied with random matrix and the tan hyperbolic values of the results are determined and again these values are multiplied by another weighted random matrix and the tan hyperbolic values of the results are determined and plotted as signal o and this signal serves as the reference signal to determine the output.

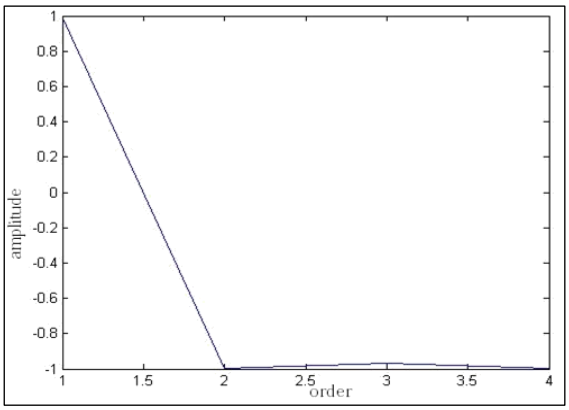

Fig. 3: Plot of reference signal o

The test input is given after training of the samples, the test input is also subjected to lpc filtering and the resulting wave is multiplied with a random matrix and tan hyperbolic values is obtained and these values are again multiplied with a rando weighted matrix and tan hyperbolic value is obtained and plotted, and this plot is compared with the reference signal, if the maximum value occurs at the region of 0 to 1, the test input is determined to be help, if the maximum value is between 1 to 2, the input is identified to be food, and if the maximum value is present at 2 to 3 and 3 to 4 the input is identified to be sleep and danger, and in each case a specific key is sent to microprocessor through the uart to produce the required lcd display output.

V. RESULT AND DISCUSSION

When the input is an image of colour red, an audio output is produced saying danger please help me.

Fig. 4: One red colored component

And if the image is of colour blue the output produced will say I am thirsty.

Fig. 5: One blue colored component

And if the input image is green color a voice output is produced saying I am hungry.

Fig. 6: One green colored component

If the input image has two red colored component a voice output is produced saying I want to eat.

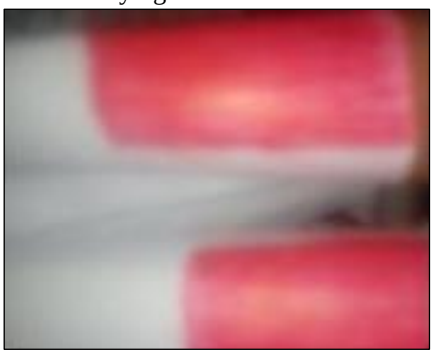

Fig. 7: Two red colored component

When the input is a voice the samples are processed and the corresponding output will be displayed on the LCD screen. If the voice input is help the lcd output will be need help

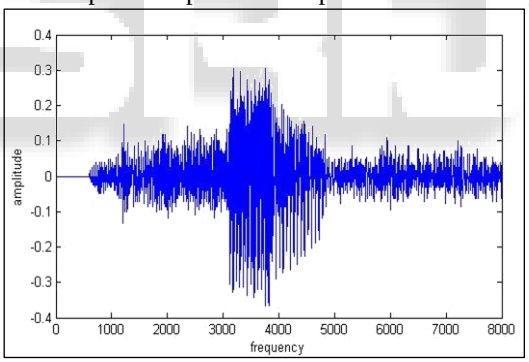

Fig. 8: Frequency response of help

Lcd output for above response is

Fig. 9: Lcd output for help

If the voice input is food, the sample is processed and need food is displayed on the lcd.

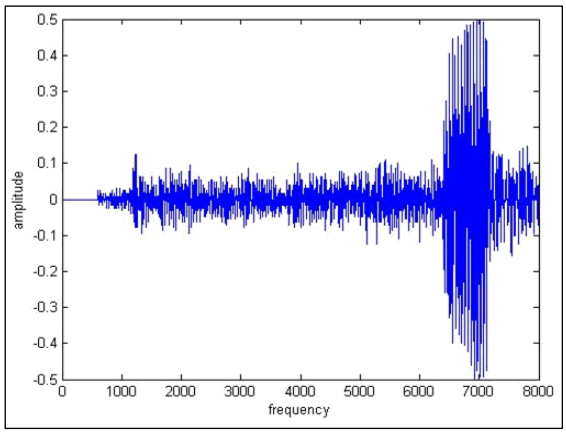

Fig. 10: Frequency response of food

Lcd output for above response is

Fig. 11: Lcd output for food

If the input is sleep, the lcd output will be need rest.

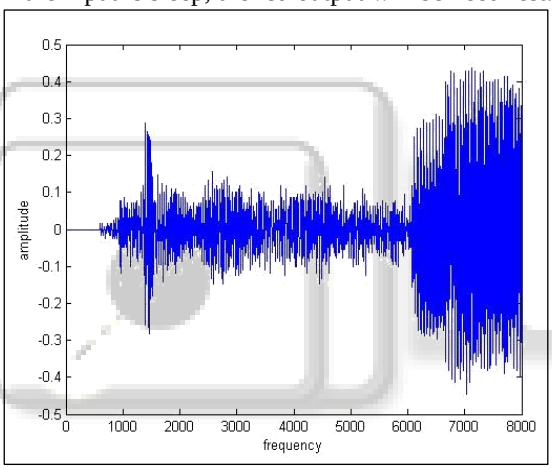

Fig. 12: Frequency response of sleep

Lcd output for above response is

Fig. 13: Lcd output for sleep

And if the input is danger a lcd output is displayed saying Im in danger.

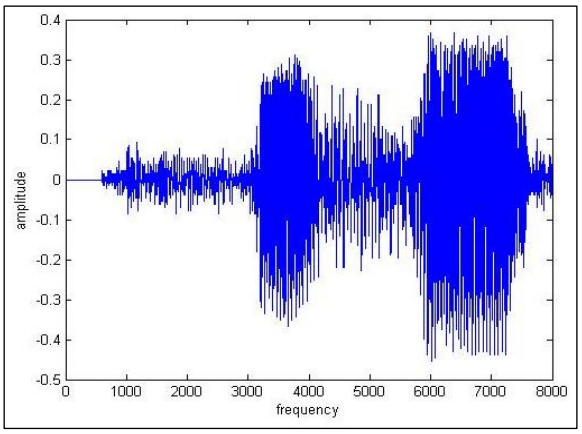

Fig. 14: Frequency response of danger

Lcd output for above response is

Fig. 15: Lcd output for danger

VI. CONCLUSION

The main aim of our project is to provide a helping hand to the deaf, dumb and blind people. Communication is a key which not only unlocks the lock to every question but it also helps to bind a mutual healthy relationship between each other. The deaf, dumb and blind are always treated as a part of different world. Our main moto is to build a bridge and fill up the gap of communication between their world and our world. We as normal human beings too find it difficult to communicate our feelings to them, this work will help us to share our feelings with them.

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