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Hand Gestures Recognition System for Deaf, Dumb and Blind People

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ABSTRACT: Communication is the process of exchanging ideas, thoughts, feelings and information in form of verbal or non-verbal message. But for a person who cannot hear is visual, but not auditory. This person lacks the amenities which a normal person owns. The big reason behind this is lack of communication, as deaf people are unable to listen and dumb people are unable to speak [2]. The sign language is an important and only method of communication for deaf-dumb persons. As sign language is a formal language employing a system of hand gesture for communication.

KEYWORDS: verbal and non-verbal message, deaf-dumb, sign language, hand gesture.

I. INTRODUCTION

Each typical person sees, tunes in and after that responds to the circumstances by talking himself out. Individuals, fundamentally the hard of hearing and the imbecilic [4], depend on some kind of gesture based communication for imparting their emotions to others. For the most part idiotic individuals utilize gesture based communication for correspondence, yet they discover trouble in speaking with other people who don't comprehend communication via gestures. Thus, there is a boundary in correspondence between these two groups. This venture intends to lower this obstruction in correspondence.

It turns into the issue for two people who knows two diverse dialects, so it turns into an issue to chat with each other thus they require an interpreter physically which may not be constantly helpful to orchestrate and this same sort of issue happens in the middle of the Normal Person and the Deaf individual or the Normal Person and the Dumb individual [1][2]. The fundamental point of the venture is to build up a financially savvy framework which can offer voice to voiceless. With the proposed work is signalled are changed over into discourse. It implies that correspondence boundary between two unique groups can be made productive.

II. LITERATURE SURVEY

A. Hand Gesture to Speech Conversion using MATLAB

It presents a system that will not only automatically recognize the hand gestures but also convert it into corresponding speech output so that speaking impaired person can easily communicate with normal people. The gesture to speech system, G2S, has been developed using the skin color segmentation. The system consists of camera attached to computer that will take images of hand gestures. Image segmentation & feature extraction algorithm is used to recognize the hand gestures of the signer. According to recognized hand gestures, corresponding pre-recorded sound track will be played [1].

B. Sign Language to Speech Conversion

This work is to develop a system for recognizing the sign language, which provides communication between people with speech impairment and normal people, thereby reducing the communication gap between them. Compared



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to other gestures (arm, face, head and body), hand gesture plays an important role, as it expresses the user's views in less time. In the current work flex sensor-based gesture recognition module is developed to recognize English alphabets and few words and a Text-to-Speech synthesizer based on HMM is built to convert the corresponding text [2].

C. Sign Language Recognition System to Aid Deaf-dumb People Using PCA

This paper presents design and implementation of real time Sign Language Recognition system to recognize 26 gestures from the Indian Sign Language using MATLAB. The signs are captured by using web cam. This signs are pre-processed for feature extraction using HSV colour model. The obtained features are compared by using Principle Component Analysis (PCA) algorithm. After comparing features of captured sign with testing database minimum Euclidean distance is calculated for sign recognition. Finally, recognized gesture is converted into text and voice format. This system provides an opportunity for a deaf-dumb people to communicate with non-signing people without the need of an interpreter [3].

D. Full duplex communication system for deaf & dumb people

Sign language is a useful tool to ease the communication between the deaf person and normal person. The system aims to lower the communication gap between deaf people and normal world, since it facilitates two way communications. The projected methodology interprets language into speech. The system overcomes the necessary time difficulties of dumb people and improves their manner. This system converts the language in associate passing voice that's well explicable by deaf people. With this project the deaf-mute people can use the gloves to perform sign language and it will be converted into speech; and the speech of normal person is converted into text and corresponding hand gesture, so the communication between them can take place easily [4].

III EXISTING SYSTEM

Flex sensors, tactile sensor, accelerometer is used to detect the hand gestures [2] which are mounted on the hand gloves of the user with various resistance value of each sensor is detected and sent to microcontroller and matching the gesture to database based on the gesture shown. The gestures are detected using colors which ill mapped and compare the image stored in the database, if the image is matched the meaning of that particular gesture are displayed

During the images segmentation stage the skin color detection and region segmentation is carried out and we now extract a 1D binary signal by tracking the circle constructed in the previous step. Ideally the uninterrupted "white" portions of this signal correspond to the fingers or the wrist. By tracking the circle, we keep the track of the transition i.e. either from white-to-black or black-to-white. We store the co-ordinates of the transition points and for visual convenience we plot the points on the circle [1].

Limitations are connection between the flex sensor and the microcontroller is not effective [2]. Hand gloves are mandatory for sensor based hand gestures recognition [4]. The same text file should be converted to the audio file for voice output. [3] Hand region tracking is tedious process to perform. Two way communications are executed only by matching the gestures in the database [4].

IV PROPOSED SYSTEM

PC will have the MATLAB [1] Programming running which has program to detect the hand gestures by capturing the image through web cam and the image is pre-processed and the ID is sent to the microcontroller through universal asynchronous receiver and transmitter cable. The corresponding gesture's ID of the gestures received by microcontroller through UART cable is then processed and the output is sent to the alphanumeric liquid crystal display and FN-M16P MP3. ALCD will display the output based on the ID received from the microcontroller. The ID sent to FM-MI6P unit where it matches the gestures ID with the stored commands in the SD card and speaker outputs voice of respective command. On the other hand, two-way communication is performed by voice recognition kit which recognizes the voice and the output is displayed through ALCD.

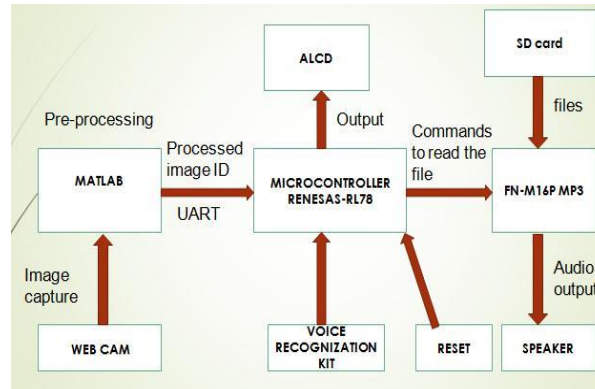
Benefits of this system are hand gestures are recognized by the camera and not by flex sensors. Only red and green combination is used for gestures recognition. This system establishes Two-way communication. This method can be used for secret communication in military.

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V.IMPLEMENTATION

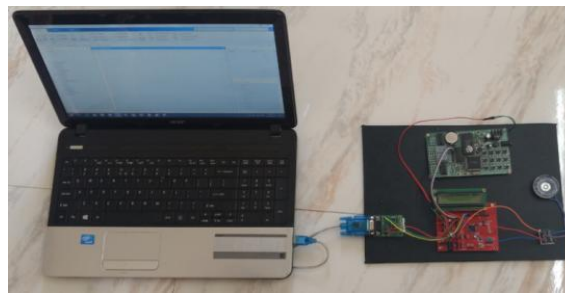


Fig: Experimental setup

Step 1: Initialize the components

The ALCD connected to the microcontroller will display the message “WELCOME” and the FN-M16p mp3 player will speak out hello message. After the initialization the ALCD will display “WAITING COMMAND” which means it is ready to receive the command.



Step 2: Run the MATLAB code

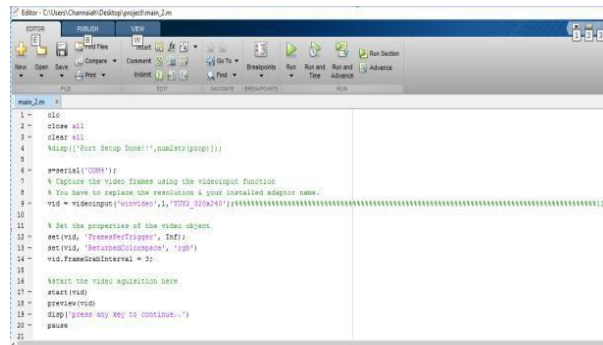
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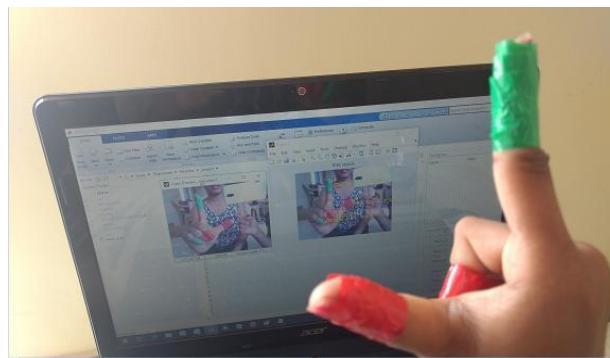
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The code designed to detect colors and to send the corresponding id's will be executed, webcam will be initialized and opens the preview window. Press any key in the command window of the MATLAB color detection window will be appear on the screen

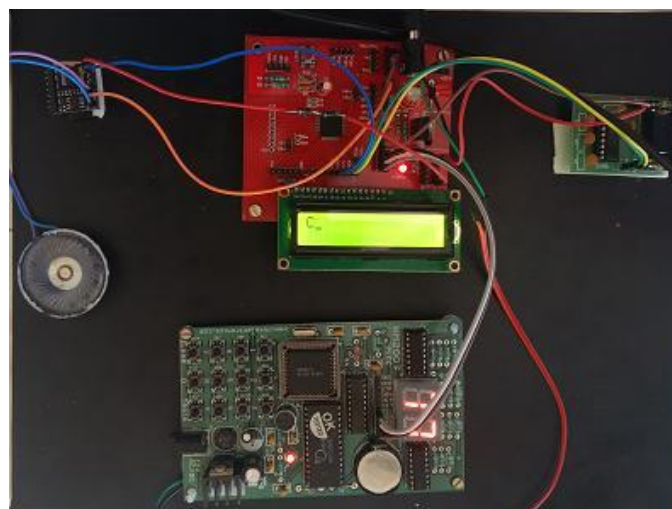


```
main_2.m
1 = cld
2 = close all
3 = clear all
4 = setup('Web Setup Home','',num2str(1000))
5
6 = serial('COM1');
7 % Capture the video frames using the videoinput function
8 % You have to replace the resolution & your installed adaptor name:
9 = vid = videoinput('winvideo',1,'UYVY_30x240');
10
11 % Set the properties of the video object.
12 = set(vid, 'FrameRateTrigger', 'on');
13 = set(vid, 'ResolutionColumns', '1920');
14 = vid.FrameRateInterval = 30;
15
16 % Start the video acquisition here.
17 = start(vid);
18 = preview(vid);
19 = disp('press any key to continue..');
20 = pause
21
```

Step 3: The gestures are provided by the deaf and dumb with the colors on fingers.



Step 4: The ID's sent to microcontroller will be processed by showing it on the ALCD and FNM16P mp3 player will play the meaning of the gesture of show gesture.



Step 5: The voice recognition module which is speakerdependent module will send the id to the microcontroller which in turn helps in displaying the output that will be a full duplex communication.



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VI. CONCLUSION

Our project aims to bridge the gap by introducing an inexpensive computer in the communication path so that the sign language can be automatically captured, recognized and translated to speech for the benefit of blind and dumb people. In the other direction, speech must be analysed and converted to textual display on the screen of ALCD.

VII. FUTURE ENHANCEMENT

Future enhancement is to do additionally investigate with a specific end goal to create improved form of the proposed framework. Framework would have the capacity to convey in both headings by precisely knowing the yield from a specific part. It will have the ability to make an interpretation of ordinary dialects to hand signals effectively. The picture handling some portion of the framework will likewise be altered to work with each conceivable condition. A test will be to perceive signs that include movement.

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