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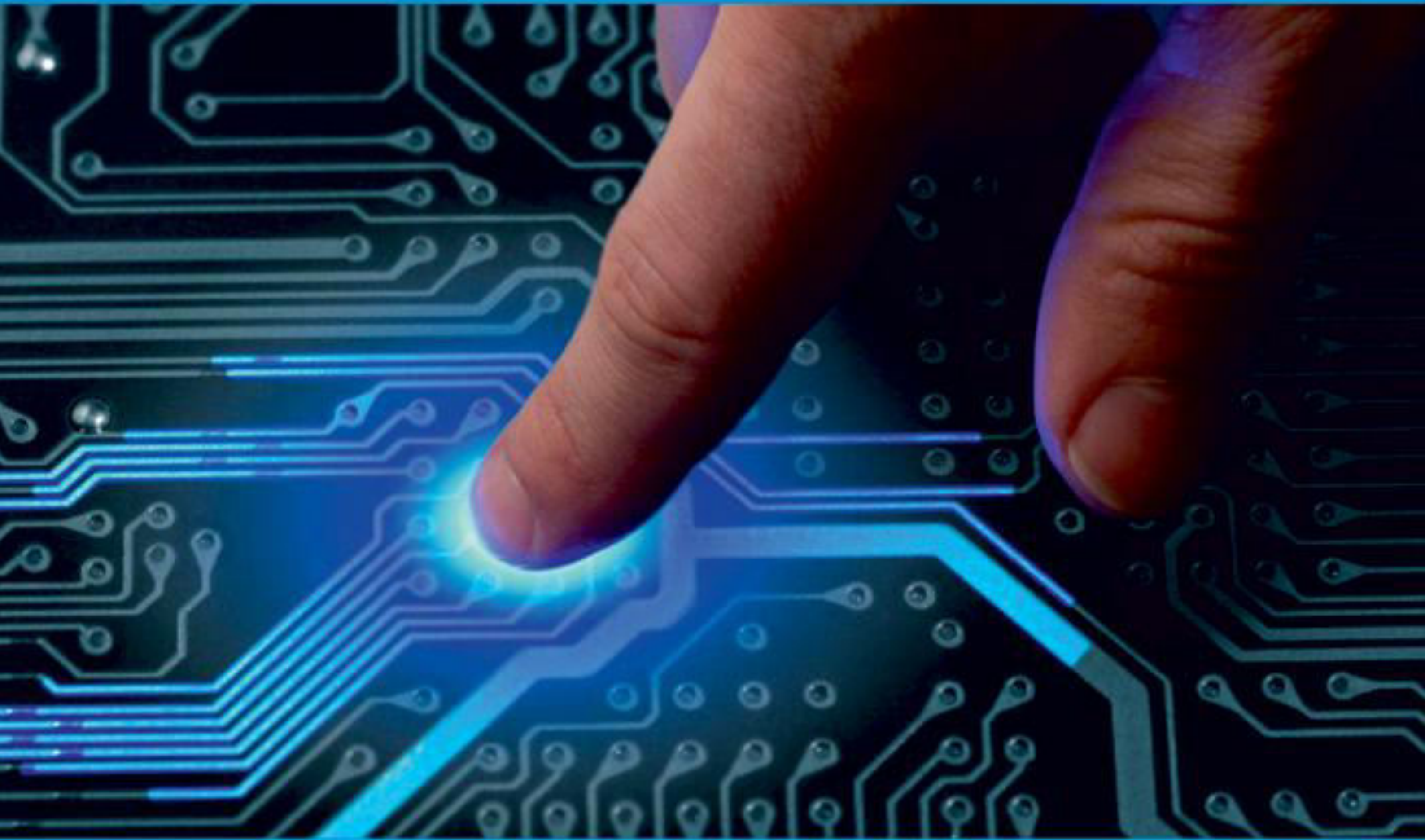

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Speaking System for Mute People using IoT with Machine Learning (CNN)

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ABSTRACT: It's very difficult for mute people to convey their message 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 speaking system for mute that helps mute people in conveying their message to regular people using hand gestures. Camera captures image of hand. Classifier classifies hand gesture into readable and understandable sentences/words by comparing input hand gesture with hand gesture present in database.Classified sentence is then sent to server (firebase server). App display and play audio of sentences. Database of proposed system consists of different hand gestures and against them is user defined readable word/sentences.

KEYWORDS: IoT, SVM, ROI extraction, color skin masking.

I. INTRODUCTION

It's very difficult for mute people to convey their message 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 smart speaking systems that help mute people in conveying their message to regular people using hand motions and gestures.

Mute people can't speak and normal people don't know the sign language which is used for inter-communication between mute people. This system will be useful to solve this problem

II. LITERATURE SURVEY

In [1], authors successfully designed and implemented a novel and smart wearable hand device as a sign interpretation system using a built-in SVM classifier. An Android-based mobile application was developed to demonstrate the usability of the proposed smart wearable device with an available text-to-speech service.

Jian Wu and Lu Sun [2] proposed a wearable real-time American Sign Language recognition system in their paper. Feature selection is performed to select the best subset of features from a large number of well-established features and four popular classification algorithms are investigated for our system design.

The prototype architecture of the application comprises of a central computational module that applies the camshift technique for tracking of hands and its gestures. Haar like technique has been utilized as a classifier that is creditworthy for locating hand position and classifying gesture. The virtual objects are produced using Open GL library. [3]

In [4], hand tracking based virtual mouse application has been developed and implemented using a webcam. The system has been implemented in MATLAB environment using MATLAB Image Processing Toolbox. The system can recognize and track the hand movement and can replace the mouse function to move the mouse cursor and the mouse click function. In general, the system can detect and track the hand movement so that it can be used as user interface in real time.

YellapuMadhuri and et al [5] presents a report on a mobile Vision-Based Sign Language Translation Device for automatic translation of Indian sign language into speech in English to assist the hearing and/or speech impaired people to communicate with hearing people. This system is an interactive application program developed using LABVIEW

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software and incorporated into a mobile phone. This is able to recognize one handed sign representations of alphabets (A-Z) and numbers (0-9).

Siddharth S. Rautaray and AnupamAgrawal design a system for gestural interaction between a user and a computer in dynamic environment in their paper [6]. The gesture recognition system uses image processing techniques for detection, segmentation, tracking and recognition of hand gestures for converting it to a meaningful command. The interface being proposed here can be substantially applied towards different applications like image browser, games etc.

G. Simion and et al [7] studied advances in the field of vision based hand gesture recognition, from hardware and software point of view and reviews some major trends and the recent evolution. While providing a non-exhaustive inventory of the huge amount of past research in the field, the paper reviews in more detail part based approaches, particularly those embedded in the compositional framework, an emerging dominant trend in computer vision.

To get daily information from the internet has become most people’s living habits today. In order to reduce the steps of receiving the information, such as complex mouse or keyboard steps, paper [8] propose a system designed for easily getting daily information without mouse and keyboard actions.

N. Subhash Chandra, T. Venu and P. Srikanth developed a simple and fast motion image based algorithm. Gestures recognition deals with the goal of interpreting human gestures via mathematical algorithm In general; it is suitable to control home appliances using hand gestures. [9]

The system proposed in [10] by Lee and et al is divided into three modules: processing module, sensor module, and communication module. The sensor module, consisting of three BNO055 absolute orientation sensors, is placed on the thumb, index finger, and the back of the hand. The magnetometer is used to remove orientation readings caused by gravity.

In [14], authors successfully designed and implemented a novel and smart wearable hand device as a sign interpretation system using a built-in SVM classifier. An Android-based mobile application was developed to demonstrate the usability of the proposed smart wearable device with an available text-to-speech service. The participating subjects gave a high rating to the proposed smart wearable sign interpretation system in terms of its comfort, flexibility, and portability. The device holders were 3D-printed using a flexible filament, and the same holders are able to fit different hand and finger sizes, thus eliminating the necessity of custom-made devices. Future work on the proposed smart wearable hand device will consider the design of a smaller sized printed circuit board, the inclusion of words and sentences at the sign language level, and instantly audible voice output components.

Jian Wu and Lu Sun [15], proposed a wearable real-time American Sign Language recognition system in their paper. This is a first study of American Sign Language recognition system fusing IMU JBHI-00032-2016 10 sensor and sEMG signals which are complementary to each other. Feature selection is performed to select the best subset of features from a large number of well-established features and four popular classification algorithms are investigated for our system design. The system is evaluated with 80 commonly used ASL signs in daily conversation and an average accuracy of 96.16% are achieved with 40 selected features. The significance of sEMG to American Sign Language recognition task is explored.

III. PROPOSED SYSTEM

Camera captures image of hand. Pre-processing: aim of pre-processing is to de-noise the image and subtract background from image. RoI (Region of Interest) extraction: as the name suggest extracting only that part of image which is of our interest or which has meaningful information. Database: it consists of different hand gestures and against them is user defined readable word/sentences. Classification: classifying hand gesture into readable and understandable sentences/words.

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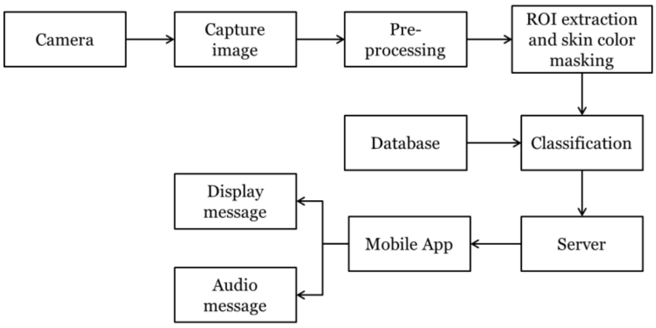

Fig 41 system architecture.

Classifier compares input hand gesture with hand gesture present in database and accordingly classifies it into sentence.Classified sentence is then sent to server (firebase server). Android App fetches this sentence from server and then displays it onto app. App also plays audio of sentences for better results.

Flowchart

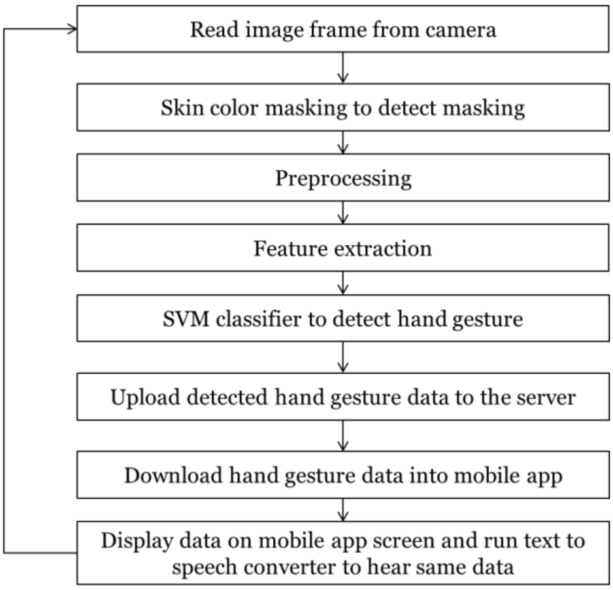

Fig.2. Flow Chart

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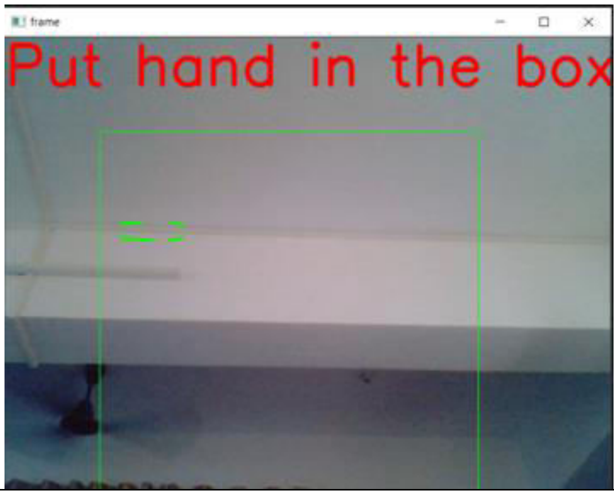
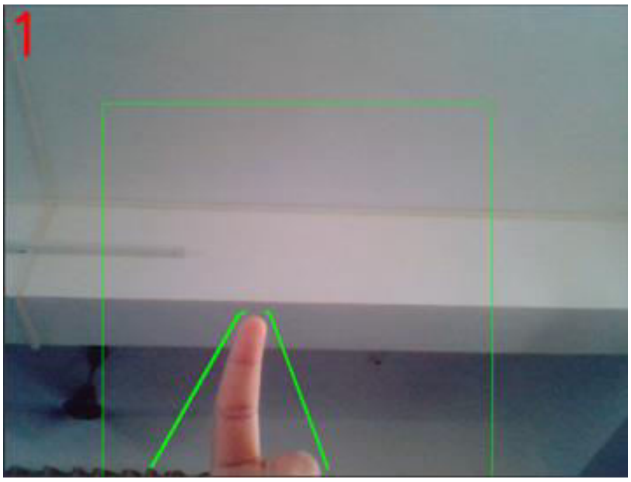
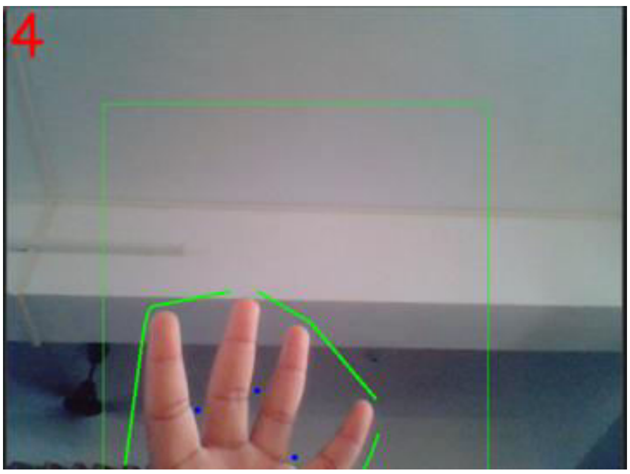
IV. EXPERIMENTAL RESULTS

Sr. no.	Image captured y camera	Processed image
1		
2		
3		

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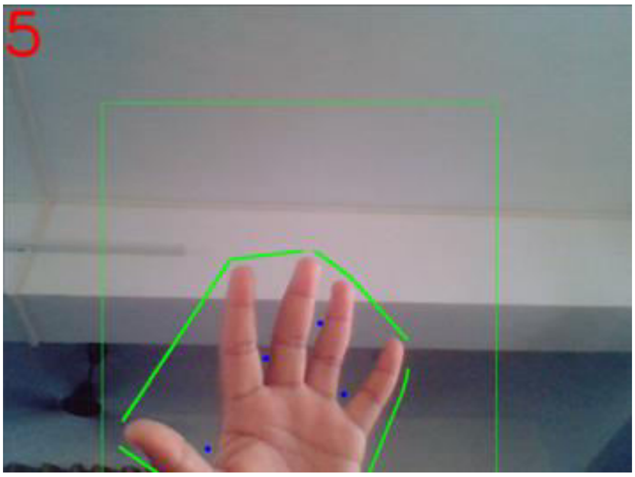
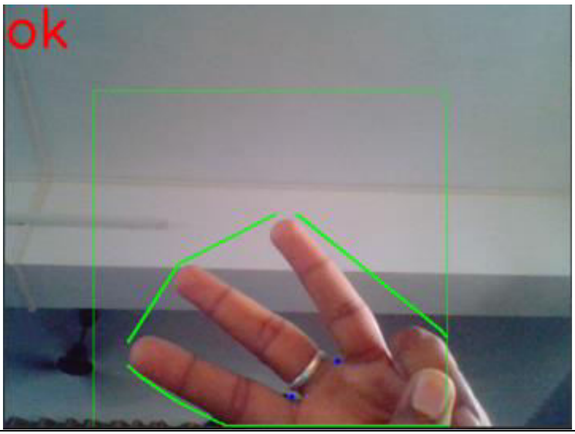
4		
5		

V. CONCLUSION

This system eliminates the barrier in communication between the mute community and the normal people. It also provides communication between dumb and blind. It is also useful for speech impaired and paralysed patient means those do not speak properly. The project proposes a translational device for deaf-mute people using glove technology. Further the device will be an apt tool for deaf mute community to learn gesture and words easily. And also it is portable.

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