

# Sign Language Recognition System for Disabled People

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**Abstract:** *The aim is to present a real time system for hand gesture recognition on the basis of detection of some meaningful shape based feature like orientation, center of mass, status of fingers in term of raised or folded fingers of hand and their respective location in image. Hand gesture Recognition System has various real time applications in natural, innovative, user friendly way of how to interact with the computer which has more facilities that are familiar to us. Gesture recognition has a wide area of application including Human machine interaction, sign language, game technology robotics etc are some of the areas where Gesture recognition can be applied. More specifically hand gesture is used as a signal or input means given to the computer especially by disabled person. Being an interesting part of the human and computer interaction hand gesture recognition is needed for real life application, but complex of structures presents in human hand has a lot of challenges for being tracked and extracted. Making use of computer vision algorithms and gesture recognition techniques will result in developing low-cost interface devices using hand gestures for interacting with objects in virtual environment. SVM (support vector machine) and efficient feature extraction technique is presented for hand gesture recognition. This method deals with the dynamic aspects of hand gesture recognition system.*

**Keywords:** *Human Gesture Recognition, Sign language, SVM.*

## I INTRODUCTION

In creating an alternative form of natural interface which provides a mechanism to interact with the real world. The user have able to reach out, point, segments and move 3D objects just to do with real objects. These challenges opens a new direction for Human Computer Interaction [HCI] which is manipulated with computer vision technology and which makes it possible to develop an advanced input device. These devices can be implemented and upgrade to the new input device in future. It gives the input in form of a command to the computer rather than just taking photo, pictures or recorded video. We can make more changes to transform these computer vision devices to become an input command devise to reach the function as an alternate to keyboard or mouse. Hand gesturing is used to give signal to computer vision devices.

These will benefits the users with disabilities for without using a direct device they can send signals to the computer vision devices for sensing. These make the user to use

computer more easy than using the keyboard or mouse manually. In the future we can build computer or laptop without keyboard and mouse by replacing it with vision-based recognition devices. Interaction between human comes through sensory modes like gesture, speech, facial and body expression. Hand gesture is used to interact with another human by means through the computer. Human Computer Interaction presents various facts that control the computer processing gesture of various types of hand movements in the virtual environment. The specification also involves accuracy of detection and recognition which has user friendly methods of human computer interaction intelligence with the usage of hand gestures. Actions of the mouse like controlling of pointer for movement and virtual object specification has been replaced by hand gesture recognition.

The challenges encountered are by a noisy environment which creates an issue on the detection and recognition performance of human hand gesture. In this application web-cam is used for capturing hand which is given as an input which is a cost effective and a low cost tool. Highly skilled interpreters were used to make communication easy between deaf and hearing impaired people for a decade. The main objective is to provide exact and effective translation between spoken language and sign language. In the real time process pre-notification is required when someone likes to use it. The main idea is to support the millions of deaf people, where that many number of well-trained interpreters will not be available. So to bridge this gap we propose a machine translator (MT) system which translates sign language into spoken language and vice versa.

This system used for numerous applications, like telephony accessibility for deaf communication and sign language education. Through this the deaf can easily access a variety of public and information services.

## II RELATED WORK

The work is contributed by Tahir khan. In order to communicate here is a system that helps to recognize hand gesture where normal people with disable people more effectively without the help of translators. Aforesaid are based on the problem of gesture recognition in real time that provides a sign language recognition used by deaf people and their community. The problem addressed is based on digital image processing using color segmentation, skin detection, image segmentation, image filtering, template machine techniques. This system recognizes gesture of

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ASL(American Sign Language) including the alphabet and a subset of its words.

The work is contributed by Priyanka pawar . The proposed system is a cost-effective and possible to minimize the distance between hearing and speech impaired people with normal people. Proposed system capture the hand signs and compare with existing database and then accordingly converted into text. In this system we are using functions like skins color based thresholding, contour detection for detection of hands and identification of important points on the hand respectively. The distance between these contour points from the centroid of the hand becomes our feature vector which we will train our neural network.

The work is contributed by N. Dhruva. The concept of hand gesture recognition has been widely used in communication with deaf peoples, artificial intelligence, controlling devices and robotics. It is staple method of interaction especially for the deaf and the blind. Techniques for recognition are in great demand. Many algorithms have been discovered for this purposed system, each of them having their own advantages and disadvantages. In this paper it presents novel algorithm for hand recognition using image processing and explore it application in security based system.

The work is contributed by Nancy. Hand gesture recognition and human computer interaction is an open research problem as the main purpose behind gesture recognition research is to identify a particular human gesture by computer. Hand gesture recognition based man-machine interface is begins currently develop a technique for recognition the gesture made by user using MATLAB and implementation this control the computer remotely without any keyboard or mouse. We present a rea-time hand tracking technique by using a white cloth glove with a red color marker placed at fingertip. In this paper, a hand gesture recognition method based on color marker detection is presented as we have used a red color marker that is mounted on the fingertips of right hand to track the user's hand. We proposed a technique for natural, finger-tip based interaction with computer.

The work is contributed by Chethana, Divya [5]. The primary goal of gesture recognition is to create a system which can recognition specific human gesture and can be used to convey information or for device controls. This project aims at developing a Human Gesture Recognition(HGR) system captured from a webcam in real time. The system consists of three stages: image acquisition, feature extraction and recognition. In the first stage input image of hand gesture are acquiesced by digital camera in approximate frame rate. Finally, edge detection is used and k-curvature algorithm is applied to recognize the hand gesture.

The work is contributed by S.Kannadhasan, R.Suresh . Mobile and wearable devices are continuously optimized towards a small outline. At the same time the number of function in these devices continuous to increase. While this development is clearly beneficial for the ubiquity of mobile

and wearable systems. MEMS sensors are used to measures 3D acceleration and 3D angular rates. In this paper it specifies the sign actions into an equal acceleration value. The action and the corresponding accelerations values are placed into a look up table along with appropriate voice commands. The processed output is then output via the ports available on the controller. The output is fed to the voice chip, where the pre-records voice are stored. By activating the corresponding channels the voice will be played in the speakers.

The work is contributed by Meenaakumari .This paper presents an MEMS accelerometer mostly based on gesture recognition algorithm and its applications. The hardware module consists of a triaxial mems accelerometer, microcontroller and zig-bee wireless transmission device for sensing, controlling and collecting accelerations of handwriting and hand gesture trajectories. Users uses the hardware module to write down digits, alphabets and numbers in digital kind by making four hand gestures. The trajectory algorithm composed of information controlling, signal preprocessing for reconstructing the trajectories to attenuate the cumulative errors caused by drift of sensors. So, by changing the position of MEMS (micro electro mechanical systems) we can able to show the alphabetical characters and numerical within the PC.

### III EXSISTING SYSTEM

In existing system, MEMS based hand movements, head movements, leg movements are been recognized. In this sensor has to be placed on the people body which causes radiation damage to the peoples. Our literature survey states all base papers states gesture are recognition using Matlab and mems sensor.

MEMS are termed as micro electro mechanical system. Also in the existing system we use accelerometer sensor. An accelerometer sensor is a device that measures the physical acceleration and momentum of the objects in the devices. This approach is commonly used for acquiring information necessary for gesture recognition system.

#### USAGE OF DATA GLOVES METHOD:

Mechanical or optical sensors are attached to a glove that transduces finger flexions into electrical signals for the determination of the hand position and actions.

In this approach the user has to carry a load of cables for the connection of the hardware device to the computer that hinders the ease and naturalness of the user interaction.

It follows many disadvantages in detecting fingers same detection algorithm are used for different features. It does not provide clear image for the given action. It cannot work under different light condition. Only few kind of actions and features are provided.

### IV PROPOSED SYSTEM

The main aim of building hand gesture recognition system is to establish a communication between human and computer system. The gestures recognized are used to establish a smooth



communication channel between human & computers but also a hearing impaired person will find it easy to communicate with normal human beings in sharing their thoughts. This paper centralizes on the efforts of implementation of an application that employs computer vision algorithms and gesture recognition techniques that will result in developing low-cost interface devices using hand gestures for interacting with objects in virtual environment using hand detection.

In this project, we use python to analyze the hand gesture SVM and efficient feature extraction technique. It follows many future works based on the hand detection. Hand gesture recognition system is a technology that can be implemented in various applications like hand gesture controlled robot for physically challenged, Hand gesture controlled doors and vehicles, Hand gesture controlled keyboard and mouse to interact with computer. Gesture controlled appliances like air conditioner, Switching Channels, TV without a Remote, Automated Homes and driving to Safety.

### V SYSTEM ARCHITECTURE

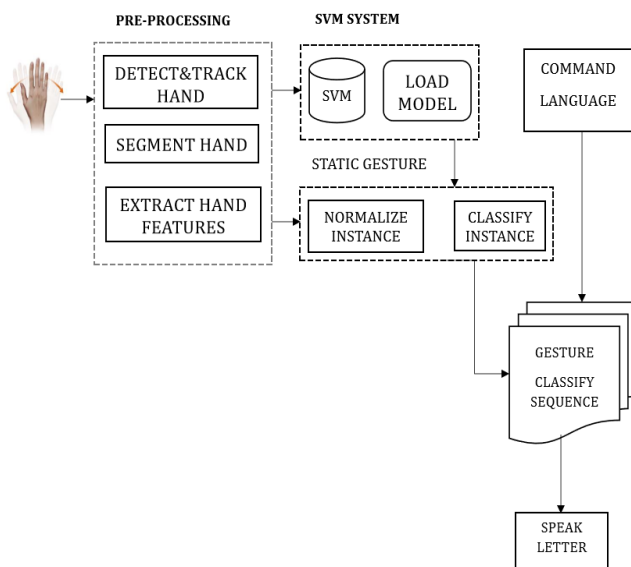


Fig 1 System Architecture

### VI SYSTEM MODULES

#### FRAME CAPTURE

The input data can be a frame and a sequence of video frames, taken by a Raspberry Pi camera module pointed towards user hand are segmented. The frames captured with simple background and stable light which provides an accurate functions of hand. Region of Interest (ROI) is the hand region, so it captures the images of the hand and converts the hand images into gray scale in order to find the ROI in segmented hand that is the portion of the image that is present is converted into a required form for image processing. In this system it established frames are have captured in the webcam are stored in the ROI. This carries the major portion of implementation. First the captured image is pre-processed by techniques like color space detection, color space conversion & differentiation, Skin color detection using open cv [Emgu -cv wrapper] & finally line segment detection for finger detection.

#### BLUR FRAME

In image processing, a Gaussian blur (also known as Gaussian smoothing) results in blurring of image by a Gaussian function to avoid the back ground images. This is an effect that is widely used to reduce image errors and reduce noise detail in graphics software. The processing of blur frame shown in starts with noise reduction using Gaussian Blurring on the original frame. Blur frame is necessary process for frame enhancement measures and for getting good results in detections. Blurring is used for smoothing frames and reducing background noise and details from the frame. With blurring, smooth transformation provided for one color to another and reduction of the edge are satisfied. This is also known as a two-dimensional Weierstrass transform. In image processing, a Gaussian blur which is also known as Gaussian smoothing results a blurred image. It is typically used to reduce image noise in graphic software.

#### FRAME SEGMENTATION

Frame segmentation is a task of segmenting and grouping pixels of images in a simplified fashion by capturing high quality footages by the webcam for most stop motions. Additionally, an image with a moving camera tend to be the exception, the need for background subtraction is a natural choice for segmenting hand actions and hand detections. If a clean background plate is not available, median filtering in the time domain can usually generate one shown in fig 2.

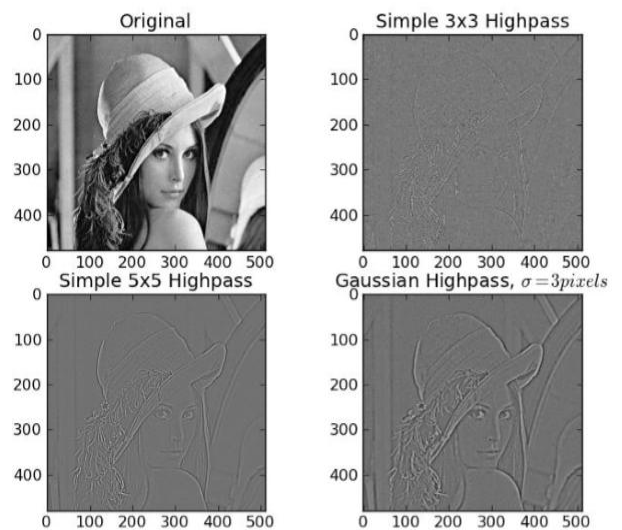


Fig 2 frame segmentation

In the entire sequence a pixel location is observed, sorting the intensity values depending on as many as frames that can be reconstituted one pixel at a time.

#### DRAW CONTOUR

The basic idea in contour models is to generate a curve, according to the constraints from a given image in order to detect hand and fingers. For instance, starting with a curve around the object to be detected, the curves in moving objects toward its interior portions of the hand and the



constraint is that it has to stop on the boundaries of the object are shown in fig 3 contour in which it specifies an outline representing or bounding the shape or form of somethings in the image produced in the webcam. It marks the boundaries of the fingers in the image with the contour lines. Then the edges of the hands are detected and provided by the gray scale analysis system. The aim of contour is to detect the edges of image in webcam. In the contour, it denotes object boundary in many cases contour is performed by processing the edges in the images. In fig 3 (a) image specifies the edges of the image in the system. In image (b) it eliminates the back ground error using gray scale process. Then in image (c) it fully specifies the boundaries of the image given.

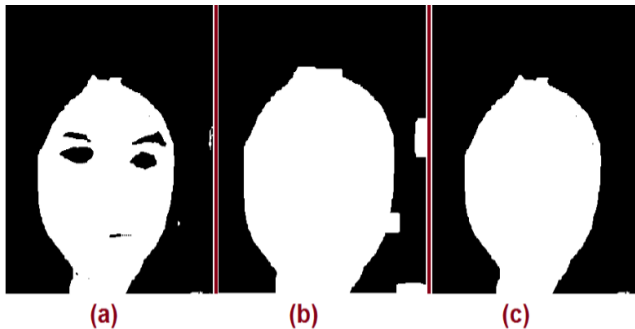


Fig 3 contour

**FIND CONVEX HULL AND CONVEXITY DEFECT**

In this paper to find the number of fingers pointed we have certain considerations. The points in the tips of the fingers are called the convex points. It is found that there is a convexity defect, which is used to detect deepest point of deviation on the contour. By this, it can find the number of fingers extended and then it can perform different functions and counts according to the number of fingers detected and extracted. In some stages it includes the skin color detection also which captures only the skin region of the hand effectively. Here there is an advantage that it eliminates noise and applies convexity defect and convex hull algorithm to determine the number of fingers extracted to find the finger count.

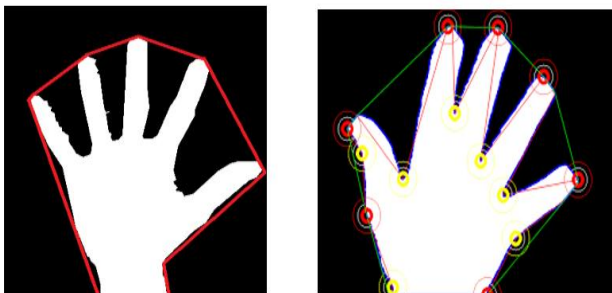


Fig 4 convex hull and convexity defect

**SVM**

The system uses the support vector machine (SVM) process to analysis and then classify fish species according to their features or characteristics by constructing an N-dimensional hyper-plane that separates fish species into categories are represented in fig 5. The hyper-plane is based on a predictor variable and a vector of predictor values (which is the set of values assigned to the different fields in

the dataset) is formed. For this research, the training set is a collection of the features of the fish and it is used to discover the predictive relationship among the fish species while the testing set consists of the features actually extracted from the fish species and is used to access the strength of the SVM algorithm for correct classification.

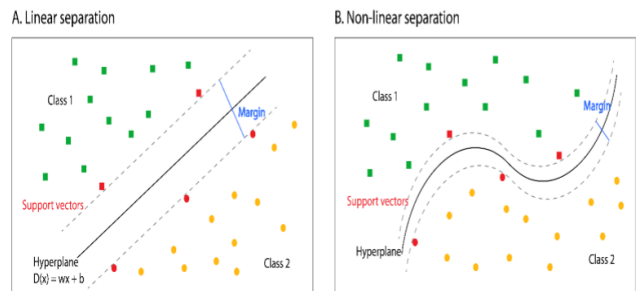


Fig 5 SVM linear and non-linear segmentation

**VII CONCLUSION AND RESULT**

**CONCLUSION**

In this system, different effective techniques for man-machine interaction are observed. Only a few systems for preprocessing of input images are presented. This project also introduces gesture detection in the hand which can be easily used. These methods are going to be implemented in various applications in the future. This may reduce the usage of translator for the communication of disable peoples.

**FUTURE ENHANCEMENT**

Without any dark background hand gesture will be detected from the image. More sophisticated ways of Gesture recognition from various other human actions will take place instead of just hand gestures. Voice recognition system will be coupled with gesture recognition system which will then completely remove the requirement of hardware like Keyboard and Mouse. It can also perform communication between disabled persons using computer as an interface. this system is developed using voice as an output for the communications of disabled person. It may help them in communicating with the other people who are unable to convey their message or needs through any specified actions.

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