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HAND GESTURE RECOGNITION AND VOICE CONVERSION SYSTEM

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Abstract: This paper focus on advance study of Gesture control based robot. The first part of the paper provides an overview of the current state of the art regarding the recognition of hand gestures as these are observed and recorded by typical video cameras. We derive a set of motion features based on smoothed optical flow estimates. A user centric representation of these features is obtained using face detection, and an efficient classifier is learned to discriminate between gestures. A number of hand gesture recognition technologies and applications for Human Vehicle Interaction (HVI) are also discussed including a summary.

Index Terms **- Gesture control, hand gesture, Raspberry pi3b+, neural network.**

I.INTRODUCTION

Hand gesture recognition proffer possible safety benefits for various types of secondary controls. Face, head and body gesture recognition technologies may also proffer some safety benefits. In Skin filtering the RGB image is converted to HSV image because this model is more tactful to changes in lighting condition. Human gesture recognition in image string has many applications including humancomputer interaction, surveillance, and video games .The sensory interaction is one of the most user-friendly interactive interfaces for controlling objects. Prompted by the idea of a Wiimote, we try to perform interface which allows a user to navigate a car-robot in a sensory interactive way. An easy way is to directly use a Wiimote to control a robot; however, the price animate is not very low and Wiimote's size is not very small either. Therefore, the interface developed by us adopts a small sized accelerometer module instead of the traditional Wiimote. Recently, there have been many different hand gesture recognition systems, such as vision-based trajectory recognition systems and inertial-based trajectory recognition systems. No matter cameras or accelerators are used in the hand gesture systems.

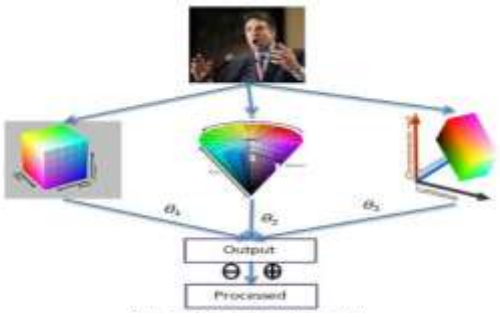

Figure1. Skin segmentation system.

II.. LITERATURE REVIEW

Hasan applied multivariate Gaussian distribution to recognize hand gestures using non-geometric features. The input hand image is segmented using two different methods skin color based segmentation by applying HSV color model and clustering based thresholding techniques. Some operations are performed to capture the shape of the hand to extract hand feature; the modified Direction Analysis Algorithm are adopted to find a relationship between statistical parameters (variance and covariance) from the data, and used to compute object (hand) slope and trend by finding the direction of the hand gesture International Journal of Artificial Intelligence & Applications

(IJAIA), Vol.3, No.4, July 2012 computing hand direction. Then Gaussian distinction is applied on the segmented image, and it takes the direction of the hand. Gaussian distribution applied on the segmented image. Form the resultant Gaussian function the image has been divided into circular regions in other words that regions are formed in a terrace shape so that to eliminate the rotation affect. The shape is divided into 11 terraces with a 0.1 width for each terrace. 9 terraces are resultant from the 0.1 width division which are (1-0.9, 0.9-0.8, 0.8-0.7, 0.7-0.6, 0.6, 0.5, 0.5-0.4, 0.4-0.3, 0.3-0.2, 0.2-0.1), and one terrace for the terrace that has value smaller than 0.1 and the last one for the external area that extended out of the outer terrace Kulkarni recognize static posture of American Sign Language using neural networks algorithm. The input image are converted into HSV color model, resized into 80x64 and some image preprocessing operations are applied to segment the hand from a uniform background features are extracted using histogram technique and Hough algorithm. Feed forward Neural Networks with three layers are used for gesture classification. 8 samples are used for each 26 characters in sign language, for each gesture, 5 samples are used for training and 3 samples for testing, the system achieved 92.78% recognition rate using MATLAB language.

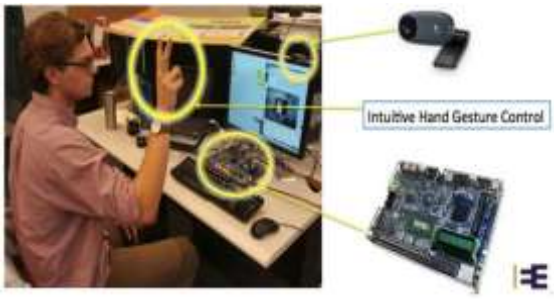

Figure2. Hand gesture control setup.

III.METHODOLOGY

3.1 EXTRACTION METHOD AND IMAGE PREPROCESSING

Segmentation process is the first process for recognizing hand gestures. It is the process of dividing the input image (in this case hand gesture image) into regions separated by boundaries. The segmentation process depends on the type of gesture, if it is dynamic gesture then the hand gesture need to be located and tracked [12], if it is static gesture (posture) the input image have to be segmented only. The hand should be located firstly, generally a bounding box is used to specify the depending on the skin colour and secondly, the hand have to be tracked, for tracking the hand there are two main approaches; either the video is divided into frames and each frame have to be processed alone, in this case the hand frame is treated as a posture and segmented [12], or using some tracking information such as shape, skin colour using some tools such as Kalman filter. Some pre-processing operations are applied such as subtraction, edge detection, and normalization to enhance the segmented hand image.

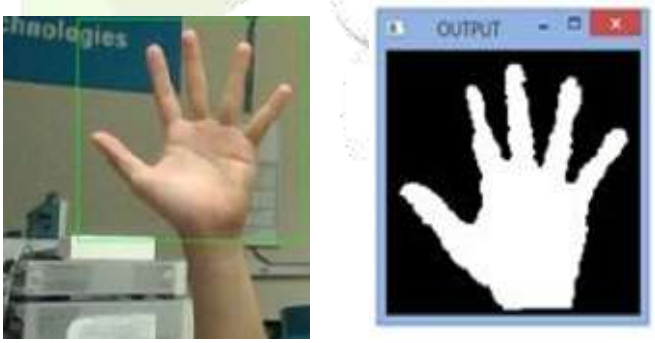

Figure3. The input video frame (left) and segmented hand (right) with lower lighting.

Block Diagram

Figure 4. Block diagram of hand gesture and voice conversion system

IV. CONCLUSION

In this paper various methods are discussed for gesture recognition, these methods include from Neural Network, HMM, fuzzy c-means clustering, besides using orientation histogram for features representation. For dynamic gestures HMM tools are perfect and have shown its efficiency especially for robot control. NNs are used as classifier and for capturing hand shape. For features extraction, some methods and algorithms are required even to capture the shape of the hand as in, applied Gaussian bivariate function for fitting the segmented hand which used to minimize the rotation affection. The selection of specific algorithm for recognition depends on the application needed. In this work application areas for the gestures system are presented. This system converts the sign language into voice which is easily understandable by dumb and normal people. The sign language is translated into some text form, to facilitate the deaf people as well. This text is display on LCD and on our web server.

V.FUTURE SCOPE

The completion of this project suggests that these data gloves can be used for partial sign language recognition. In future it can support more number of signs and different language mode. We can make this system wireless so that it becomes handy and portable for commercial use. Talking wireless using this we can even transmit the code to a mobile phone. It can also be used for secret military messages.

VI.RESULT

In the experiments, two data sets of hand gestures are used to evaluate the performance of the proposed method. The data set captured in cluttered backgrounds is a great challenge for hand gesture recognition. Besides, for each gesture, the subject poses with variations in hand orientation, scale, articulation, and so forth.

The system was applied in different conditions, it has given the best results when the background is clear and the light is medium. The centroid algorithm proves to be really efficient and robust method to locate the center of the palm. However, this method doesn't give a flexibility in detecting the hand at any position on the captured video frame. It requires the user to put his hand in a pre-defined region of the video frame range.

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