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# Real Time Access Control using Face Recognition

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***Abstract:*** ***Face recognition is one of the most successful applications of the image processing. It can used to play a vital role in the field of security. Verification of a person accessing a secured area in industry is very important, hence human face recognition can be used for a purpose of authentication. This paper is aimed at implementing system for allowing access to a secured area using face recognition. Current access control methods use Personal Identification Numbers (PIN) or Smart Cards but the person using it cannot be verified because it can be stolen. Hence the paper is proposed to tackle all these issues.***
***Keywords: Image Processing, Face recognition, Threshold, Matlab***

## I. INTRODUCTION

The use of smart cards for door access control has been common for many years, but we cannot ensure that they provide the expected levels of protection as it can be stolen can used by unauthorized person of gain access to a secured area. Face recognition is a biometric identification form which involves recognition of persons based on the salient characteristics of their face images [1]. Unless and until a well addressed image is been captured, the processing of image cannot be processed further. A very efficient technique called image retargeting is proposed by Wenyu Hu et al. [2] in which it helps to identify the area of interest from an image whereas the unwanted areas of the image are sacrificed. Image retargeting technique can be useful in case of face detection systems by identifying only the faces from the image and neglecting the unwanted area. Real time image capture also possess problem such as facial pose, lighting and poor image resolution [3]. Hence above parameters are to be taken into consideration while building the system.

Many other experts who have proposed their work related to face recognition system suggest that the image to be captured must not contain noisy data [4], which may lead to poor image quality resulting into failure of the system. The problem of visual face recognition affecting by pose variation, expressions, light intensity are overcome by 3D technology [5] where 3-D face recognition can achieve higher recognition accuracy than visual face recognition system.

A concept of perfect recognition and its analysis is put forth by Wang et al. [6] to model the system performance without training data. This method helps to improve the performance of recognition system. Srinivasan et al. [7] explored the use of region covariance matrices for face recognition as a set of holistic face image feature. But the main drawback lies with the description which does not lie in Euclidean space.

Prototype modeling proposed by Dahmane et al. [8] successfully identified the facial expressions with a recognition rate of 86.69% for better recognition technique. A simple and flexible system for face image quality assessment, in which multiple feature fusion and learning to rank are proposed by Jiansheng Chen et al. [9].

## II. SYSTEM ARCHITECTURE

The main objective of the proposed system is to provide a better security for home applications where both husband and wife are working, leaving their elderly parents and small kids alone at home. As the system is completely automatic it involves zero man power. Image captured through an appropriate camera will undergo various processing steps as described in the design flow later on. .

If an authenticated person is recognized, the door will be opened automatically. But if an unknown person or an intruder is detected, an alerting message will be delivered to the owners cell phone as well as a buzzer will blow alerting the persons that are present within the house. No any advanced components are required for building up the proposed system. Existing webcams, security cameras are sufficient for capturing the images. Apart from the camera, selection of each hardware resource is made as per the design requirement of the system.

The most important part of the system relies on localizing the faces from the captured image. Once the localization module is successful, recognition module proceeds as per the defined algorithms in the design flow shown below.

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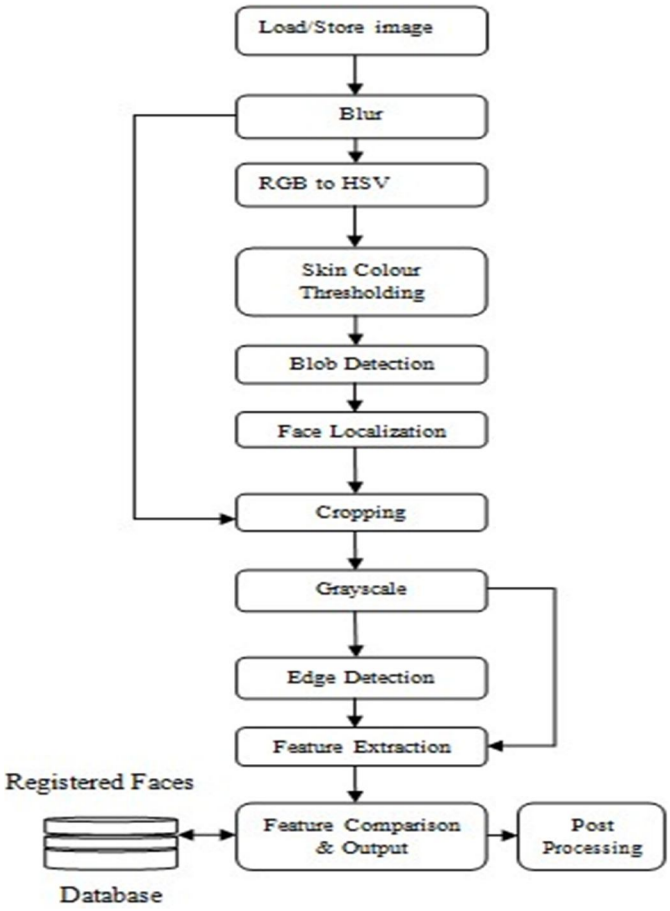


Fig. 1 Design Flow

## III.DESIGN FLOW

Fig 1. shows the overall design flow, related to face localization, feature extraction and face recognition of the individuals. The proposed face recognition system involves various algorithms such as blurring, RGB to HSV, thresholding, blob detection, cropping, gray scaling, edge detection and extraction process.

*Blurring*: It helps to reduce image noise and reduce details by eliminating high frequency components from an image acting as a low pass filter.

*RGB to HSV*: RGB color space describes colors in terms of amount of red, green and blue present. HSV describes colors in terms of hue, saturation and value. Also it describes color using more familiar comparisons such as vibrancy, color and brightness.

Skin color thresholding: Thresholding helps to convert obtained image in terms of black and white. A specific threshold value is set. If the value of required pixel is above threshold value, it is labeled as 1 and if it is less, it is labeled as 0.

Blob detection: It helps to identify the region of interest.

Once the region of interest is identified, further processing becomes simpler.

Face localization: In proposed system, the region of interest will be the face. Further, once the face gets localized, the unwanted part of the image is excluded and face gets cropped.

*Gray scaling*: Every gray scaled image contains information in terms of range between black and white color. Every pixel carries a gray scaled value.

*Edge detection*: It significantly reduces the amount of data and filters out useless information while preserving important structural properties in an image.

*Feature Extraction*: Once the above algorithms are processed, relevant features from the image are extracted and compared with that of initially stored image performing further door accessing action.

## IV. EXPERIMENTAL RESULTS

As discussed below, the experimental results depicted are, the system successfully identifies the face from captured image and indicates whether it is authenticated or not as shown in fig 2. If authenticated person is recognized, door gets opened as shown in fig 3.


Fig. 1 Authentication Fail


Fig. 3 Authentication Successful

## V. CONCLUSIONS

In this paper, we have developed such a face recognition system which is reliable under controlled environment. As compared to other existing biometric techniques, face recogni- tion can be considered as the most effective mean of security very secure. The system is very cost effective as no any expensive device is been used. Alert messages are successfully delivered to the owners cell phone through SMS messaging services. The system can be made robust by improving the detection and recognition of faces under uncontrolled environments.

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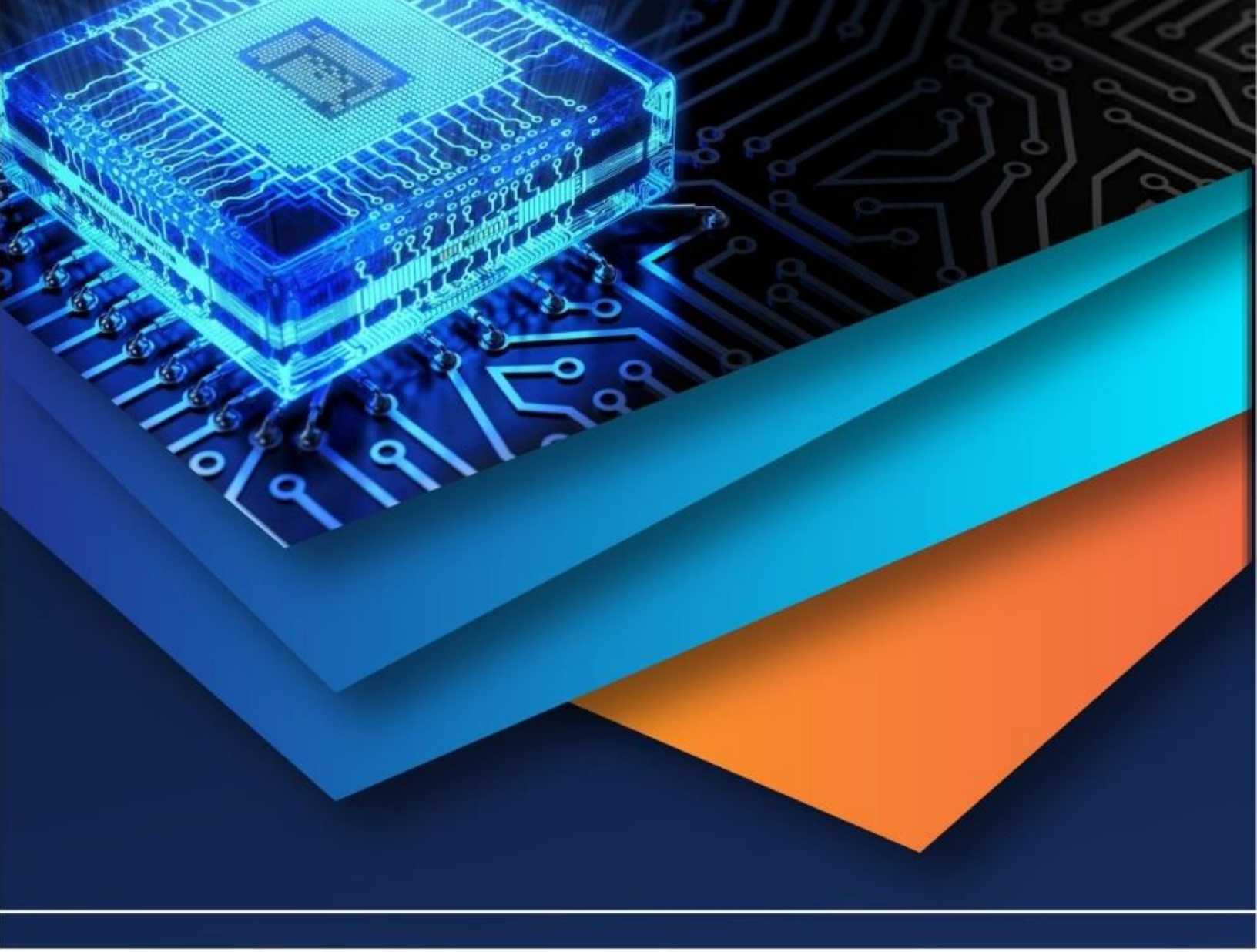

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