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# Android Based Remote System Security and Monitoring

Archana Gupta[1], Pankaj Meel[2], Ashwini Salvi[3], Sourabh Shetty[4], Lakshmi Madhuri[5]
[1,2,3,4,5]Dept. of Computer Science, [1,2,3,4,5]*Dr. D. Y. Patil School of Engineering Pune*

***Abstract-Face recognition presents a challenging problem in the field of image analysis and computer vision, and as such has received a great deal of attention over the last few years because of its many applications in various domains. This paper refers to principal component analysis algorithm (PCA) for face recognition. This face recognition system detects the faces as an image captured by the web cam and these images are checked with images dataset based on database server and in any case captured image not found in the database then further decision or action is taken the administrators remote system. In this paper we present the implementation of access to system and identity management for endpoint protection and data security from USB devices to maintain information security and data theft prevention.***
***Key logger programs attempt to retrieve confidential information by covertly capturing user input via Keystroke monitoring and then relaying this information to others.***
***Keywords-Face Recognition, Principle component analysis (PCA), Key logger, USB(Universal serial bus), Authentication***

## I. INTRODUCTION

The requirement for reliable personal identification in computerized access control has resulted in an increased interest in biometrics. Biometrics being investigated include many techniques but in this paper face recognition is used. Face recognitionhas the benefit of being a passive, non-intrusive system for verifying personal identity. It can identify at least two broad categories of face recognition systems: First is to find a person within a large database of faces (e.g. in a police database). These systems typically return a list of the most likely people in the database. Often only one image is available for one person. It is not necessary for recognition to be done in real-time. Second is to identify particular people in real-time (e.g. in a security monitoring system, location tracking system, etc.), or allow access to a group of people and deny access to all others (e.g. access to a building, computer, etc.).[5] Multiple images per person are available for training and real-time recognition is required. In this paper, second case is used. Face recognition systems have been grabbing high attention from commercial market point of view and even for pattern recognition field. Face recognition has received substantial attention from researches in biometrics, pattern recognition field. The face recognition systems can extract the features of face and compare this with the existing one in database. Here Principle Component analysis (PCA) algorithm is used for face recognition. The faces considered here for comparison are still faces. The present paper is formulated based on image captured by web cam. The face recognition system detects only the faces from the image scene, extracts the descriptive features. In most of the places, remote surveillance is needed. These systems, capture pictures, transmit it through the internet to the server, and from the server it is transmitted to the client or administrator remote system. For any smart security system, the two elements that ensure perfect security are the picture capturing monitoring system and the access granting system. This paper state that it can access the system remotely through client or administrator android mobile phone, even administrator directly shutdown or restart the system, take screenshots of the system, enable/disable the USB, capture image after some time of interval to check whether it's the same person and can send message. This paper also includes key logger to capture the keystrokes done by the user and also includes USB enable/disable through system.

## II. LITRATURE REVIEW

There are various techniques related to face recognition [1] but for this paper Principle Component Analysis (PCA) [2] is selected. Many pundits have worked to raise the degree of accuracy of algorithm under and tried to provide solutions to the aforementioned problems. "SECURITY SYSTEM WITH FACE RECOGNITION,SMS ALERT AND EMBEDDED NETWORKVIDEO MONITORING TERMINAL" in this paper the security to system is provided with face recognition, sms alert and an embedded video monitoring terminal through network has built which has two sub systems. The external sub-system which senses any motion near the door and capture the image of the appropriate person, process the image and can deny the access to pass through the door. And the internal sub-system which senses the motion inside the room, send SMS alert and trigger the ENVMT [3]. "AN EFFICIENT METHOD FOR FACE RECOGNITION USING PRINCIPAL COMPONENT ANALYSIS (PCA)" this paper has proposed an algorithm i.e. Principle Component Analysis (PCA) for real time human face


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tracking is realized that algorithm takes advantage and even took the geometric relations between a human face, but also of precise other feature extraction. And finally get the result of that image. "RFID and Face Recognition Based Security and Access Control System" the researcher in this paper support face recognition with RFID and the communication system. They expect to increase the strength of security by 50%. The approach presented in this paper for face recognition uses DWT and Euclidean distance method. Face recognition has application like search engine and emotion detector. "Face Recognition: A Convolutional Neural Network Approach" in this paper the author's has presented a fast and automatic system for face recognition which are a combination of local image and a self-organizing map network for face recognition. "A Literature Survey on Face Recognition Techniques" this paper tell us that face recognition is a challenging problem in the field of image processing and even in computer vision. And because of lots of applications in different fields the face recognition has a better attention from everyone.In this paper there are various features given for face recognition, advantages and appropriate required information are there. "An Overview of Principal Component Analysis" the authors of this paper present that the PCA method is an unsupervised technique of learning that is mostly suitable for databases that contain images with no any class labels. A detailed explanation of PCA techniques which is utilizes for face recognition has been provided. "System Monitoring and Security Using Keylogger" in this paper it is stated that the software that can only monitor the each an every keystrokes and action performed at a PC but also be used as legally binding evidence of wrong-doing has been unveiled. And the people worries about cybercrime and sabotage have prompt to employees. Websites monitoring service can check HTTP pages, SNMP, SMTP, FTP, HTTPS, IMAP, POP3, DNS,TELNET and many more in particular time of interval.

## III. PROPOSED SYSTEM

The proposed system comprises of three modules as follows:

### *A. User Authentication*

It is done using face recognition i.e. when user entered a wrong password then the PCA [2] algorithm of face recognition starts and check or tally the face of the user.

Principal Component Analysis (PCA)

### *B. Pattern recognition in high-dimensional spaces*

Problems arise when performing recognition in a high-dimensional space (curse of dimensionality).
Significant improvements can be achieved by first mapping the data into a *lower-dimensional sub*-space.

$$x = \begin{bmatrix} a_1 \\ a_2 \\ \dots \\ a_N \end{bmatrix} \text{--> reduce dimensionality --> } y = \begin{bmatrix} b_1 \\ b_2 \\ \dots \\ b_K \end{bmatrix} \quad (K \ll N)$$

The goal of PCA is to reduce the dimensionality of the data while retaining as much information (but no redundancy) as possible in the original dataset.

### *C. Dimensionality reduction*

PCA allows us to compute a linear transformation that maps data from a high dimensional space to a lower dimensional sub-space.

$$\begin{aligned} b_1 &= t_{11}a_1 + t_{12}a_2 + \dots + t_{1n}a_N \\ b_2 &= t_{21}a_1 + t_{22}a_2 + \dots + t_{2n}a_N \\ &\dots \\ b_K &= t_{K1}a_1 + t_{K2}a_2 + \dots + t_{KN}a_N \end{aligned}$$

$$\text{or } y = Tx \text{ where } T = \begin{bmatrix} t_{11} & t_{12} & \dots & t_{1N} \\ t_{21} & t_{22} & \dots & t_{2N} \\ \dots & \dots & \dots & \dots \\ t_{K1} & t_{K2} & \dots & t_{KN} \end{bmatrix}$$

### *D. Lower dimensionality basis*

Approximate vectors by finding a basis in an appropriate lower dimensional space.

1) *Higher-dimensional space representation:*

$$x = a_1 v_1 + a_2 v_2 + \cdots + a_N v_N$$

$v_1, v_2, ..., v_N$ is a basis of the $N$-dimensional space

2) *Lower-dimensional space representation:*

$$\hat{x} = b_1 u_1 + b_2 u_2 + \cdots + b_K u_K$$

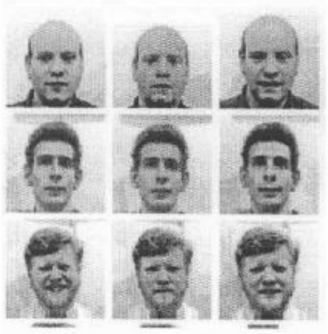
$u_1, u_2, ..., u_K$ is a basis of the $K$-dimensional space

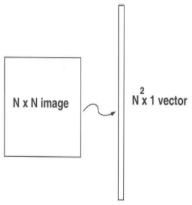
- *Note:* if both bases have the same size ($N = K$), then $x = \hat{x}$)

*E. Computation low-dimensional basis (i.e., Eigen faces)*

Step 1: obtain face images $I_1, I_2, ..., I_M$ (training faces)

(**very important:** the face images must be *centered* and of the same *size*)






Step 2: represent every image $I_i$ as a vector $\Gamma_i$

Step 3: compute the average face vector $\Psi$:

$$\Psi = \frac{1}{M} \sum_{i=1}^{M} \Gamma_i$$

Step 4: subtract the mean face:

$$\Phi_i = \Gamma_i - \Psi$$

Step 5: compute the covariance matrix $C$:

$$C = \frac{1}{M} \sum_{n=1}^{M} \Phi_n \Phi_n^T = AA^T \quad (N^2 \text{x} N^2 \text{ matrix})$$

$$\text{where } A = [\Phi_1 \ \Phi_2 \cdots \Phi_M] \quad (N^2 \text{x} M \text{ matrix})$$

Step 6: compute the eigenvectors $u_i$ of $AA^T$

The matrix $AA^T$ is very large →not practical!!

Step6.1: consider the matrix $A^TA$(MxM matrix)

Step6.2:compute the eigenvectors $v_i$ of ATA

$$A^T A v_i = m_i v_i$$

What is the relationship between $us_i$ and $v_i$?

$A^T A v_i = m_i v_i \Rightarrow AA^T A v_i = m_i A v_i \Rightarrow$

$CAv_i = m_i Av_i$ or $Cu_i = m_i u_i$ where $u_i = Av_i$

Thus, $AA^T$ and $A^T A$ have the same eigenvalues and their eigenvectors are related as follows: $u_i = Av_i$!!

Note 1: $AA^T$ can have up to $N^2$ eigenvalues and eigenvectors.

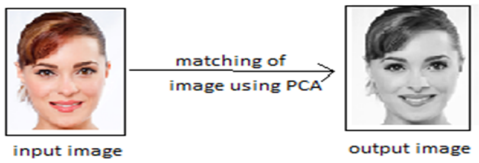
Note 2: $A^T A$ can have up to $M$ eigenvalues and eigenvectors.

Note 3: The $M$ eigenvalues of $A^T A$ (along with their corresponding eigenvectors) correspond to the $M$ *largest* eigenvalues of $AA^T$ (along with their corresponding eigenvectors).

Step 6.3: compute the $M$ best eigenvectors of $AA^T$: $u_i = Av_i$

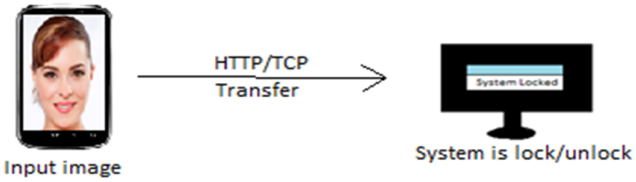
(**important:** normalize $u_i$ such that $\|u_i\| = 1$)

Step 7: keep only $K$ eigenvectors (corresponding to the $K$ largest eigenvalues)




*F. Remote System*

Here remote system is refer to the administrator's android mobile. So if the face of the user doesn't match on server then further role is of remote system that means admin will decide to allow that person or not. Even after opening the system the admin can keep eyes on the user by taking screen shots and sending message to user.




*G. Key logger and USB*

In this paper security is provided by key logger and USB disable/enable i.e. whatever the user do like open any URL or accessing which folder and even save the key strokes pressed by user in log file. And if user want to insert the pan drive for that also this paper has provide security to that.

*1)* Keystrokes entered

*2)* Keystrokes and event recorded and stored in log file

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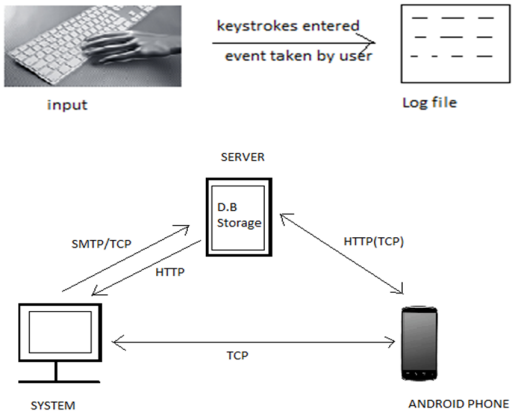



Fig 1. Architecture of System

## IV. WORKING

The proposed model will work in following steps:

*A.* If the user knew password-directly entered to system and if not and entered a wrong password then camera attached to that system take a picture and that picture is checked on database server.

*B.* And if face/picture matches then user can login otherwise that picture is send to administrator's remote system and then admin will decide whether that person to allowed or not.

*C.* After opening of System the Key logger starts which will retrieve the confidential information and stores the key stokes entered by the user.

*D.* Remote system have many features like administrator can Shut down or restart the system even take the screenshots, send message to the system.

*E.* Even if user wants to connect the USB device then for that security is provided which is also handled through android system.

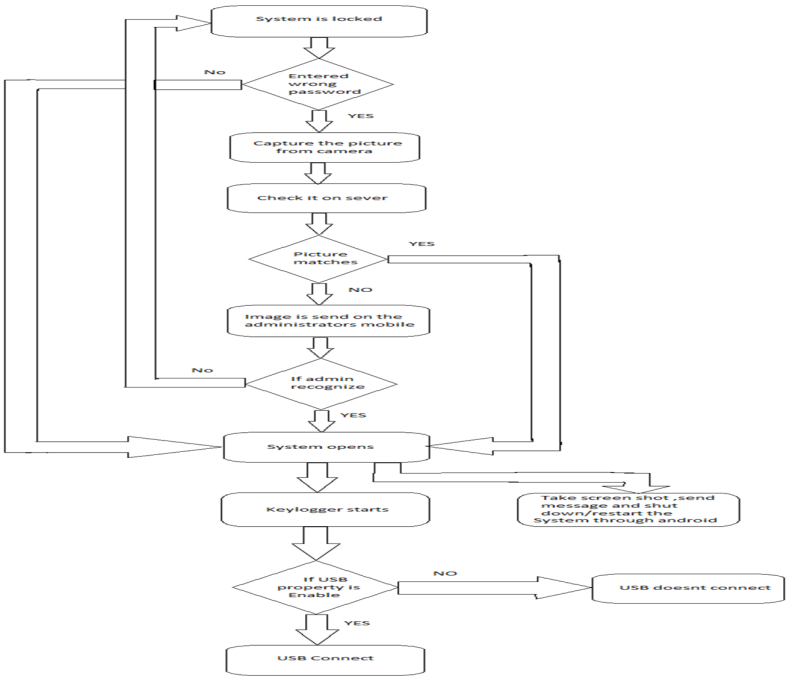



Fig 2. Design Process of the system

## V. ADVANTAGES

*A.* It doesn't need Physical interaction from the user.
*B.* Accurate and more secure.
*C.* It can use any cameras or image capture device.
*D.* Admin can remotely control the system.
*E.* If the unauthorized user gets access to the system then we record the log of key strokes.
*F.* Restrict the unauthorized access through USB.

## VI. CONCLUSION

Users registered to system can login directly on face recognition, and a picture of an unrecognized user can be sent to the admins mobile, who can grant or deny access accordingly. Administrator can also monitor usage of the system and restrict system functionality remotely. Even if some malicious user somehow gains access to the system, the administrator has complete knowledge of everything that is done on it, and can receive logs, screenshots and webcam captures on demand.

## VII. FUTURE ENHANCMENT

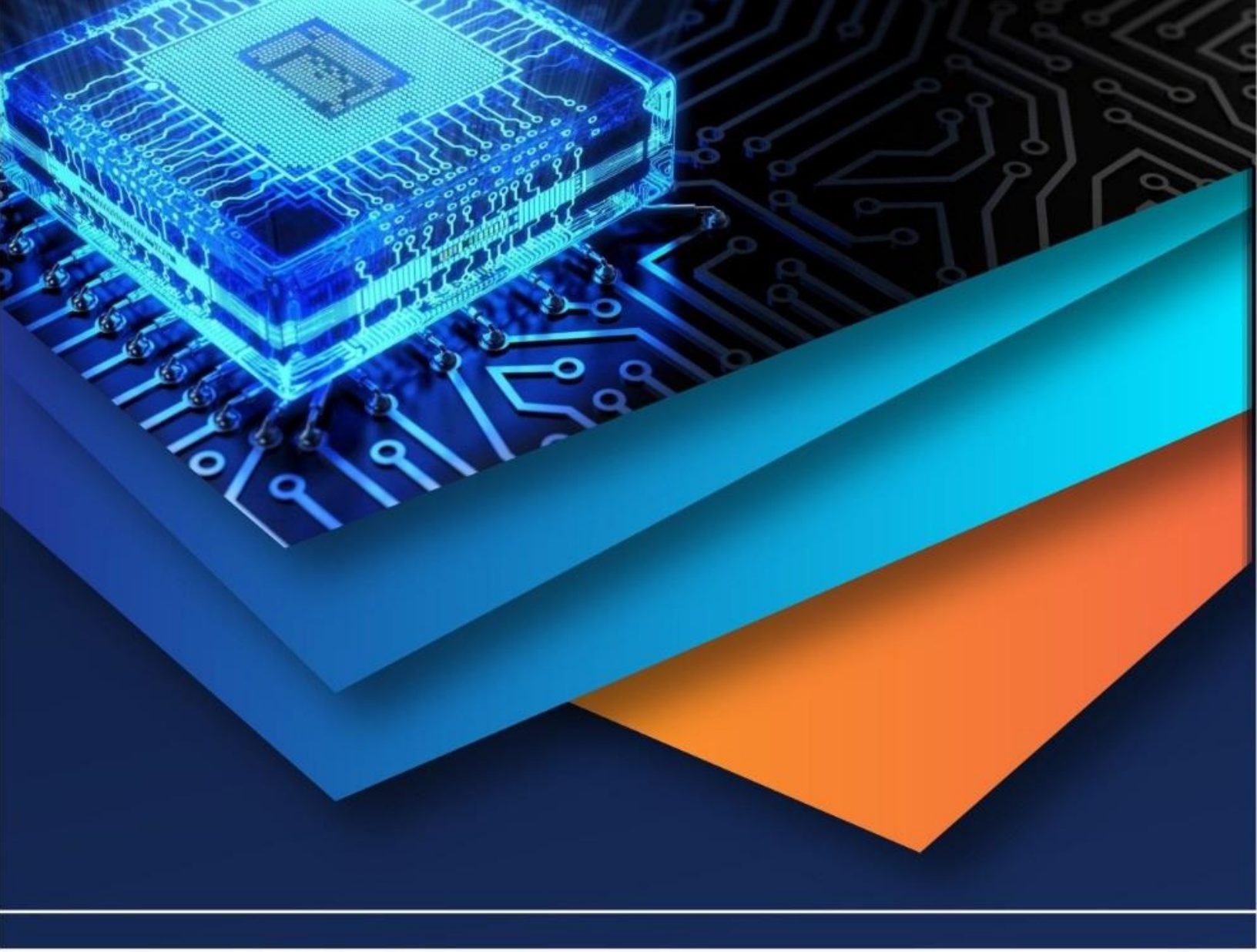
The features that can be develop in this system as providing light effects while recognizing the face.And also in future images are recognized very clearly because in this system the picture taken are not that much clear.

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