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SURVEY ON SMART DOOR FOR HOME SECURITY

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Abstract—in present day, home security is of vital essence. Securing mechanisms have evolved over the years. In this paper, we discuss the existing home security methodologies and their evolution over time. The biometric recognition techniques have gained popularity in the recent times. The differences between conventional security measures and the new methods in the field of home security have been highlighted in this paper.

Keywords—Home Security, Biometrics, Facial characteristics, Facial Recognition

INTRODUCTION

In today's world, security is of utmost importance. In the current global scenario we are experiencing the most comfortable living conditions compared to our ancestors. The transportation and communication facilities are almost boundless. With increased buying power, we are at a liberty of purchasing almost any commodity right from rare stones, jewellery, art pieces and electronic components to rare fruits and vegetables. This increased buying power has resulted in safeguarding these possessions with zeal.

An era where we can blindly trust our possessions with a lock and key is far gone as they do not offer the security we need in today's time. The major drawback with them is that keys can be duplicated and our possessions can be easily accessed. Also, for our friends and family members to access our possessions, it is required for us to either be physically present near the possession ^[1] or hand over the key to the friend or family member.

Nowadays, biometrics are also widely used for identification of individuals. These methods include fingerprint scanner, palm print scanner, etc. But these systems require an individual to touch the hardware for their identification. Also, major disadvantages of these systems are that they can cause false rejections or false acceptances at some times.^[2]

Fingerprints can also be used in the wrong way to get access to our houses. Their limitations also include that the hand should be clean for correct identification and it fails to recognize a person successfully if the hands are dirty or injured. Other biometric

methods include speech recognition. It includes its limitations as speech can be easily mimicked.^[4]

Thus, in times where the world is growing, home security definitely is the need of the hour. Securing our homes by new technologies instead of the traditional ones is important. This will eventually cause the development of the society, in turn leading to smart cities.^[3] Among all the new technologies, facial recognition is the most stable one as the physiological characteristics of an individual rarely change. Moreover, it does not require an individual to touch the hardware for identification. Face recognition is efficient in reducing the risks imposed on the security of our homes. The limitations that arise with the other methods can be solved using Facial Recognition.

LITERATURE REVIEW :-

- [1] IoT based Facial Recognition door access control home security system using Raspberry Pi : The idea proposed uses face recognition to perform efficient door access control system. Raspberry Pi is used as the main controller for face recognition.
- [2] Automated Door access control system using Face Recognition : This project proposes a method for automatic door access system using face recognition technique by using python programming.
- [3] Camera-Based Eye Blink Detection for Assessing Driver Drowsiness : This paper presents an adaptive camera-based eye blink detection algorithm for assessing the level of drowsiness during driving. The data used in this study were collected from driving simulator experiments using a remote camera.
- [4] Attendance Project using Face Recognition and Eye Blink Detection : This project recognizes the faces of the students and marks them present only after they blink twice.
- [5] Home Security System and Door Access Control Based on Face Recognition: This project uses facial

recognition to provide home security and notifies the user whenever there is an intruder.

[6] **Arduino Based Door Unlocking System with Real Time Control** : The system proposed is a door unlocking system containing multiple doors any of which can be used to access a certain zone e.g. a laboratory or library. The system is implemented using a central server which contains a central database gathering all the information about the authorized personnel.

[7] **Integrated System of Face Recognition and Sound Localization for a Smart Door Phone** : This paper proposes a smart system using both face recognition and sound localization techniques to identify foreign faces through a door phone in a more efficient and accurate way.

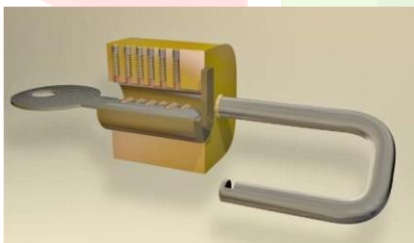
[8] **IOT based facial recognition system for home security using LBPH (Local Binary Pattern Histogram) Algorithm** : In today's world, home security is of utmost priority. IOT(Internet of Things) being an emerging technology can be used along with facial recognition to make our task of providing smart home security easier and simpler.

[9] **Smart Security System Using Face Recognition on Raspberry Pi** : This paper presents an adaptive camera-based eye blink detection algorithm for assessing the level of drowsiness during driving. The data used in this study were collected from driving simulator experiments using a remote camera.

EXISTING METHODOLOGIES:-

LOCK AND KEY:

Lock and key mechanism is the most common and well known method of securing the house. It is completely a mechanical process. Here each lock is provided with a unique key that can unlock it. Different locks have different keys.



KEYPADS:

Keypads are the most basic types of ID readers. It is based on simple twelve digit keypad that contains numbers from 0-9

- **Database Creation** : Using Pi camera we capture the images of the family members and store them in a folder.
- **Face Detection** : Here human faces are detected in the moving images. It uses Machine Learning algorithm to search for faces.
- **Face Recognition** : The detected face is recognized if it matches with any of the face in the database.
- **Blink Detection** : It is used to differentiate between an image and a real person by a blink .
- **Notification** : A message is sent when the face is recognized and blink is detected and also if there is

Facial recognition: an unknown person at the door.

In this method, the facial characteristics of an individual are

with a * and # sign as shown in the figure below. These are simple and cheap access control locks.



ACCESS CARDS OR CARD READER:

There are many types of card readers such as smart card, Wiegand card, proximity card, bank card readers etc. Some basic and common card readers are magnetic stripe cards, barcodes etc. Magnetic band is laminated to the back of the card in magnetic stripe cards. These access cards contain the unique code of a person which helps in identification of a person's details including his name and other useful data although only the ID is commonly encoded. These ID cards are effective and cheap. They are simple and easy to build, but they can be duplicated easily. Similarly other ID cards are built with the unique code and work similar to that of magnetic stripe cards.



BIOMETRIC READERS:

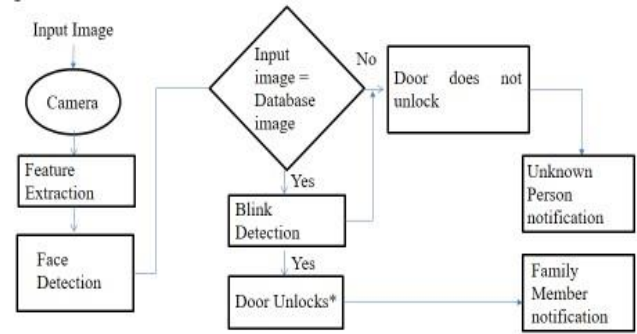
Biometric readers are devices that reads the identity of a person by comparing some of their physiological attributes or their behavioral traits against a sample database. Biometrics readers include some techniques which are commonly used such as:

Fingerprint recognition:

It is a technique in which a person is identified through the recognition of one's finger dermal ridges. It is one of the techniques used for automatically identifying people using fingerprints.

with the images stored in the database.

compared

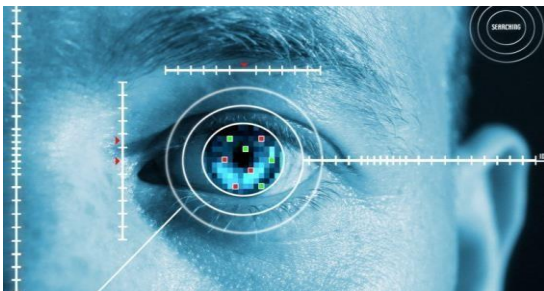


*Door unlock mechanism is replaced with LED in prototype

Iris recognition:

Iris recognition identifies a person through his/her iris pattern. It uses mathematical pattern recognition techniques to identify this biometric trait. This is a widely trusted technique as every individual's eye is unique.

COMPARISON BETWEEN CONVENTIONAL AND NEW TECHNOLOGIES IN THE FIELD OF HOME SECURITY :-



Speech

recognition:

In this method, an individual's speech is taken as an input and he/she is recognized based on it. Its limitations include that the speech of a person can be mimicked.



METHODOLOGY

Giving access to this form of system is only through keys, in case we forget to carry the keys we need to wait for the other family member in order to enter the house.	With the help of smart systems we can easily enter the house with the help of facelock, fingerprints, etc .
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CONVENTIONAL METHODS	NEW METHODS
The traditional lock and key system is relatively simple as it does not require any smart phone and wireless connection in order to function .	In the latest smart security system we can access our household from anywhere just using our smart phone and can have good updates about the security of our house.
Traditional lock system does not have the access to send alerts.	Smart lock systems send alerts to your smartphone directly .
The traditional lock systems are not safe, intruders can easily invade by breaking the lock.	Smart electronic locks can easily be hacked by malicious parties , presenting a possibility of security threat. But hacking is not done by everyone.
It is cheap and easily available.	It is expensive compared to the traditional system.
Installation is easy.	Installation and accessing the data can only be done with the help of experts.
Does not require any internet to access.	Requires internet in order to access.

A thief or any unauthorized person may easily gain access to a safe with your cash, valuables, jewellery and other important documents, upon finding the key or breaking the lock.	A digital safe offers greater security.
A key lock safe is reliable, but may compromise the security of valuables.	This security system is simple to use and provides greater security as compared to key locks.
Traditional methods are not flexible as they include the same old method of lock and key.	The smart locks allow flexibility with different combination code, which can be changed when required.

password is changed too often or is very much complicated, we tend to forget it. Digital locks are dependent upon electricity, in case of power cut our homes are vulnerable to attack. Nowadays hacking has become one of the major issues for home security, as the digital locks can be hacked.

In digital locks using phone access, the door can be opened by giving access from the phone. Most of the time the battery of our phone is low, which could result in being locked out of our house. Also, there are chances of losing our phones which will provide access to unknown intruders to our house. In fingerprint locks, there are many possibilities to have false notations, few reasons are dirt on the fingerprint scanner, our fingers being wet, oily or injured. Everything we touch, we end up leaving our fingerprints on them, which could later be misused.

In face recognition systems, security of our house can be increased immensely using facial biometrics. Facial recognition can provide high accuracy rates. Using face recognition system, we can also track down the burglar who tries to enter our house. There is also a disadvantage, i.e. the intruder can enter the house by using a photo of the owner or anyone who has access to enter the house. Facial Recognition is one of the best ways implemented till now, though it includes disadvantages, it can be improved by adding additional features to it.

Out of these identity methodologies, recognition of face and iris scan are considered as more secure and stable techniques as each individual has unique physiological features that cannot be easily changed or copied except in the case of severe injuries. Whereas speech or voice recognition is considered less stable as the voice or speech of a person can be easily mimicked. It is much easier and comfortable to get our faces scanned than placing our eyes before or fingers on the scanner. [4] Therefore facial recognition is highly beneficial and accurate without being intrusive.

CONCLUSION

All the methods discussed above have their own limitations. Let's first look at the traditional method which is lock and key. There are a lot of disadvantages when we look at the traditional method. There are chances of losing the key and getting locked out of your own house. If there is a single key, then the other family members would have to wait for the key holder to arrive and if we have multiple duplicates of the same key in order to provide access to all the family members, there would be chances of key misuse. In digital passwords we often make the password strong to maximize the security, however if the

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