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Fingerprint Recognition using 3D Touchless Technology

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ABSTRACT

Fingerprint is a unique pattern composed of ridges and furrows on the surface of human finger. This fingerprint can be used For providing biometric security and to identify criminal. Biometric fingerprint can replace old password and token authentication. In todays time most of the private/government organizations are using 2d touch based fingerprint recognition, But in this pandemic situation of covid-19. A 3d touchless fingerprint technology will be the best alternative for maintaining human hygiene and to protect people from getting affected by corona virus. So in this topic we are going to cover the touchless fingerprint recognition using 3d technology.

KEYWORDS: *Biometric, Touchless fingerprint 3D Technology, Image Mapping, Minutia*

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I. INTRODUCTION

Password or token based are old way of authentication which is replaced by biometric based fingerprint authentication .Biometric authentication is a process that compares biometric data which is exclusive biological characteristic of an individual. In this identification fingerprint based authentication is one of the most secured and most widely used authentication method. We can say that fingerprint is most researched and mature field of biometric authentication Fingerprint recognition is a technique to identity of an individual by comparing two fingerprints. There are three major finger print pattern:

The Arch:- this can be the rarest form of fingerprint.5% of people in world have this fingerprint pattern .This pattern has continuous raised ridges or sharp tents from one side to other.

The Whorl:- This fingerprint pattern makes up about 25 to 35 percent of the full population. This pattern have continuous spiral or swirl from center or central ridges forms inner smaller whorl.

The Loop:- This is that the preferred fingerprint pattern. Indeed, with 60 to 70 percent of the full population have this pattern This pattern has ridge coming from one side and exiting on other side.

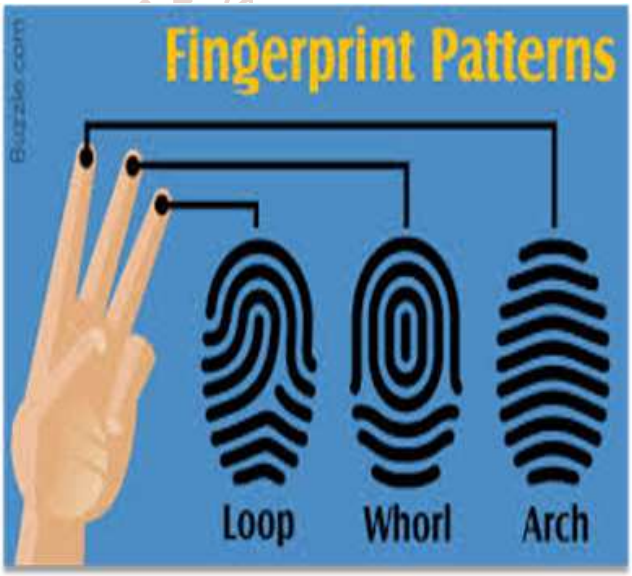

Fig1. Types of Fingerprint Pattern

II. LITERATURE REVIEW

Base Paper:-Finger Print Recognition System Design And Analysis (Presented by Dibyendu Nath, Saurav Ray And Sumit Kumar ghoshc. In this paper they have covered automated method of verifying a match between two human fingerprint with touch based fingerprint recognition system. The drawback of this base paper is that it has covered only the touch based fingerprint recognition system where as it fails to cover the region of touchless based fingerprint recognition system.

III. PROBLEM STATEMENT

Touch based fingerprint recognition system requires the user to touch the same sensor again and again. So there may be chances of damaging to sensor and problem of hygiene maintenance. So the main aim is to find solution that can be used to replace touch based fingerprint recognition system considering the present scenario of the pandemic situation like corona-virus may repeat in future.

Fig2. Touch-Based Fingerprint

IV. EXISTING TECHNIQUE

A biometric recognition system is basically a pattern recognition system that senses a biometric trait, extracts a feature representation and so compares it with stored representations, called templates, to acknowledge the input pattern. There are 2 steps in this recognition process

Enrollment:

With appropriate sensor, a user's biometric trait is captured during enrollment process. The sensed measurements are processed to extract a representation, called a template that's stored within the biometric database. This database may be either centralized (e.g., in forensics) or stored during a device carried by the user (e.g., mobile phones). Template protection is one in every of major challenges in biometric.

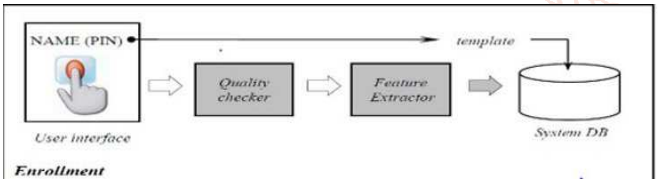

Fig3. Enrollment

Recognition:-

During recognition, a sensor kind of like that used during enrollment captures the biometric trait. In enrollment stage template is extracted by analyzing trait. A comparison algorithm computes the similarity between input template with template(s) stored within the database. If the similarity exceeds a predetermined threshold then the user is alleged to be recognized. the edge is chosen supported the required recognition performance in terms of True Accept Rate (TAR) and False Accept Rate (FAR).

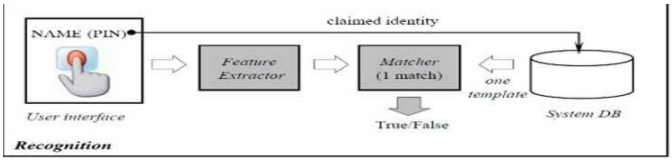

Fig4. Recognition

V. PROPOSED SYSTEM

Touchless fingerprint scanner or 3D fingerprint scanner can be used as an alternative for traditional fingerprint scanner It uses CCD(Charged Coupled Device) sensor camera, polarized filter and a bandpass filter in order to acquire good quality image

Image mapping technique is used on captured image which will convert a 3D fingerprint image to 2D image.

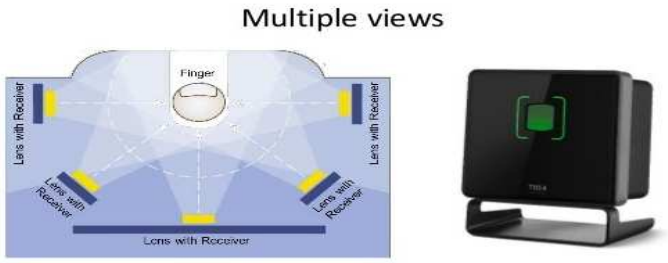

Fig5. Touchless Fingerprint

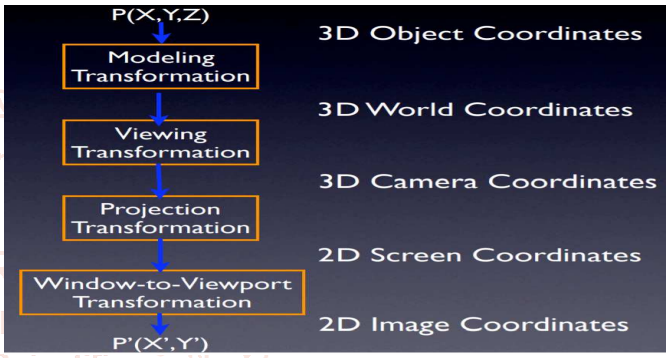

Fig6. 3D to 2D Image Mapping

Process used in this:

Preprocessing:- In pre-processing, we are improve the fingerprint image by enhancement process which is followed by segmentation, thinning, binarization, minutiae marking, remove false minutiae.

Minutia Extraction: Gabor filter is used to extract the minutia and ridge information of each fingerprint in process of minutia extraction.

Matching: Finally we save & match the template by using minimum distance classifier distance which s correlation based method

Algorithm:

Following are the steps of algorithm used in touchless fingerprint recognition system:-

1. Normalization -To minimize the non uniform lighting problem
2. Fingerprint Segmentation -To reduce the scale of the input image, to reduce unnecessary noisy part, to focus on the surface which is close to core part of fingerprint.
3. Fingerprint Enhancement -This algorithm enhances the clarity of ridge and a furrow structures of input fingerprint.
4. Core Point Detection -In fingerprint scanning and biometrics core point indicates the middle area of a fingerprint. It either contains zero core or more cores. The core point is also one among several sorts of pattern including whorl and loop pattern.

VI. ADVANTAGES OF TOUCHLESS FINGERPRINT

1. **Fast:-** Touchless fingerprint is fast because you can move your finger without struggling for exact finger impact.
2. **Accuracy**:-It can capture high definition image using Charged Couple Device sensor camera which have a higher resolution sensor.
3. **User-Friendly:-**Touchless fingerprint system captures the fingerprint movement using user-friendly device it means user don't have to remember how much pressure to be put on device whether it has been ideally placed around the sensor.
4. **Reliable:-**Due to high resolution sensor it ensure the large amount of data will be available for pattern matching for authentication and identification.
5. **Safe:-**Touchless fingerprint system are free from any environmental issues related to weather such as heatwaves, freezing weather etc.
6. **Low Maintenance Cost:-**The maintenance cost for touchless fingerprint system will be low because the person is not going to touch any sensor,so there is less chances of damaging the sensor hence the device will not get affected more and maintenance and service requirement is less

VII. CONCLUSION

In this way using touchless 3d fingerprint system user can be authenticated without touching to the surface of sensor.The 3D fingerprints prevents unequal pressure and unwanted motion of the finger.The touchless fingerprint system can be used for maintaining hygiene of people in the pandemic situations like corona virus.

VIII. REFERENCES

[1] Fingerprint Recognition System : Design & Analysis issued on 1st January 2011 (https://www.researchgate.net/publication/247773759_Fingerprint_Recognition_System_Design_Analysis)

[2] From 3d World To 2D Screen (https://www.evl.uic.edu/luc/488/slides/class7.pdf)

[3] Touchless Fingerprint Recognition System issued on 3rdfebruary2016.(https://www.ijltemas.in/DigitalLibrary/Vol.5Issue2/51-54.pdf)

[4] Types Of Fingerprint (https://attorneyatlawmagazine.com/various-types-fingerprints https://sciencestruck.com/identifying-types-of-fingerprints-patterns)

[5] Process of fingerprint recognition(http://www.thesisworkchd.com/biometric-recognition/)

[6] A Study of touchless Fingerprint system(https://link.springer.com/chapter/10.1007/11815921_39)

[7] Touchless Fingerprint System (https://www.youtube.com/watch?v=QAsNKkRBNOc)

[8] Feel the Difference with Touchless Biometric Systems(einfochips.com/blog/feel-the-difference-with-touchless-biometric-systems/)