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Secure Biometrics: Finger Knuckle Print

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ABSTRACT: **This paper contributes an idea about the distinct biometrics modality for authentication. Most of the popular biometrics modalities are available in market. The most of the biometrics technology provides strongest proof of the physical presence of a person. Confidentiality and safety are one of the most important challenges in current biometrics. The efforts are focused to choose distinctive modality (FKP) for the secure storage and verification of the biometric template. This paper focuses the unique characteristics of the FKP modality and how it can be perfect for secrete and safety for authentication.**

Keywords: FKP, authentication, safety, verification

I. INTRODUCTION

Authentication based on biometrics techniques are demanding in educational, research and industrial applications because of their reliability, high accuracy in the contemporary e-world. The need for dependable computerized user authentication techniques has been important [1].Many researchers have thoroughly explore the different biometrics traits like fingerprint, face, iris, palm print, hand geometry, voice, and gait, etc. [2]. Among all the traits the hand based modalities like palm print [5–6], hand geometry [7, 8], hand vein [9,10],fingerprint [3–4], finger knuckle [13,17] and finger vein[20] create a centre of attentions. such traits are highly accepted and user friendly .As per the study it has been seenthat researcher have less focus on the FKP and finger vein which is actually provide high level security to identifier. Finger-knuckle-print (FKP), the image pattern of skin present on the back surface of finger. Compared with fingerprint, FKP is not so popular.

II. Finger Knuckle Anatomy

Each finger has three joints .There are three bones in each finger called the proximal phalanx, the middle phalanx and the distal phalanx.The first joint is where the finger joins the hand called the proximal phalanx. The second joint is the proximal interphalangeal joint, or PIP joint.

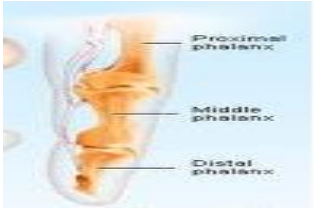

Fig. 1 Finger Knuckle Anatomy

A. The last joint of the finger is called the distal interphalangeal joint, or DIP as shown in fig.1[22]

B. Finger Knuckle

Choosing the biometrics is the challenging task for researcher. Biometrics based authentication is just impossible to help us if we don't know what are the requirements.Biometrics authentication must provide the security level, unattendedsystem, Spoofing and Reliability. [21] Among all the modalities FKP broadly explored which has not yet attracted significant attention of researchers. Finger knuckle is user-centric, contactless and unrestricted access control. As it is contactless hence no chance of proof of physical presence i.e. antispoofing.

Finger knuckle has High textured region. Many samples are available per hand and independent to any behavioural aspect. No stigma of potential criminal investigation associated with this approach. Table I shows the comparison between the biometrics traits

Table I
Comparison of Biometrics Traits

Biometric Technology	Accuracy	Cost	Devices	Social acceptability	Interference
FKP	High	High	contactless	High	
Iris recognition	High	High	Camera	Medium low	glasses
Retinal scan	High	High	Camera	Low	irritation
Facial recognition	Medium low	Medium	Camera	High	Accident etc
Voice recognition	Medium	Medium	Microphone Telephone	High	Noise ,cold
Hand geometry	Medium low	Low	Scanner	High	Arthiritis ,rheumatism
fingerprint	High	Medium	Scanner	High	Dirtiness,injury, roughness
Signature recognition	Low	Medium	Optic pen Touch panel	High	Changeable or easy signature

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Finger knuckle is the back surface of finger, it is also known as dorsum of the hand. The inherent skin patterns of the outer surface around the phalangeal joint of one's finger, has high capability to discriminate different individuals. Such image pattern of finger knuckle is unique and can be obtaining online, offline for authentication.[13]Extraction of features of knuckle for identification is totally depends upon the user. Some of the researcher extracted the features for authentication as shown in fig 2 and 3. Features are centre of phalangeal joint, U shaped line around the middle phalanx, Number of lines, length and Spacing between lines.

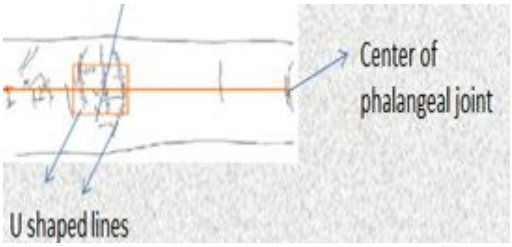

Fig. 2 Finger Knuckle Features

Knuckle crease patterns and stray marks as a means of photographic identification. Such features are unique and can use for identification.

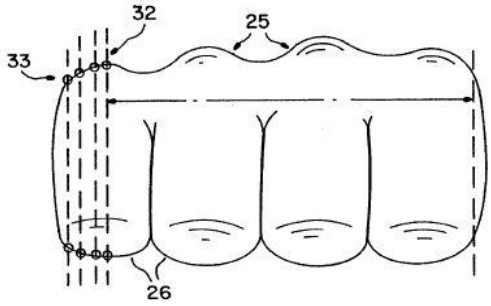

Fig. 3 Finger Knuckle Features

III. REALATED WORK

Many of researchers has been developed the finger knuckle capture devices. Considering the shortcoming of existing system we developed the new sensor for FKP. Table II shows the features of developed sensor along with existing one.
[12-16] The developed sensor is compact in size with high resolution as compare to others.

A. Existing FKR System

Many Finger knuckle authentication algorithms for feature extraction have been implemented with different techniques. Brief review is given in Table III 13, 15, 17-19

Table II

Parameter	Size (LxWxH)	Captured Image Size	Resolution	Distance between camera and finger knuckle	Background	Remark
FKP1	213mmX 413mm X271mm	640X180	NM	NM	Black	Large database of Hand
FKP2	NM	1600X1200	NM	20cm	White	little finger gave poor result
FKP3	160mmX125 mmX 100mm	768X576	140dpi	NM	NM	Computational time is high
FKP4	NM	640X480	13Mega pixel	NM	Black	Less number of users
FKP5	140mmX120 mmX 130mm	4300X3200	14Mega pixel	10cm	White	----

Features of FKP Sensor

Table III
Reviews of Finger Knuckle Algorithms

System	No. of user	Features	performance	Comment
Lin Zhang 2012	PolyU FKP(165)	Llocal features and globalfeature,	EER 0.358%.	Scope for improvement
GS Badrinath 2012	PolyU FKP(165)	Fusion of SIFT and SURF and	CRR 100% EER 0.215%	------
Kekre 2011	PolyU FKP(165)	Kekre's wavelet transform(P=2)	EER20%	-----
Ajay Kumar 2009	105	Knuckle region segmentation, finger ring detection, and the extraction of finger geometry features	Need more accurate knuckle segmentation	Degradation due to variations in the finger bending and diseases
Lin Zhang 2009	165 3,960	Band-Limited Phase-Only Correlation	EER1.68%,	----
Loris Nanni 2009	72 720	Radon transform and by Haar wavelet	EER(near zero)	-----

The survey of finger knuckle recognition concluded that the above algorithms are successful but high error equal rate. Failure to enrolment is causes due to the movement of finger knuckle. All these are monomodal (unimodal) authentication system.

IV. PROPOSED SYSTEM

Reflect on the above problem the propose authentication has a scope to prepare the own database and improve the quality of images using pre processing techniques so that

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it affect on the performance parameter EER .Database should be large enough of user along with classification as compares to the conventional. Consider more number of sample of each unit of finger knuckle so that possibility to increases the accuracy.

The proposed system focuses the Kekre's wavelet transform for feature extraction. [18] More number of features is extracted using this algorithm. It provided better accuracy than Haar transform. Lin Zhang, Lei Zhang , David Zhang , Zhenhua Guo presents the combination of local and global information (LGIC2)algorithm achieve the best verification result.[11] In future the proposed FKP can integrate at features or score level to form mutibiometrics that provide high accuracy with less EER.

V. CONCLUSION

This paper draws attention to the finger knuckle traits for secure authentication. The paper focuses an FKP capture device which is explained in the previous paper [16] and efficient algorithm is in process to fulfill the objectives of proposed system. The main intention of the proposed system is to provide high level security with less EER.

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Biography

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