

# A Review on the Biometric based Authentication System

ku. Purna D. Bhelkar\*1 Prof. A. P. Bagade\*2

Department of Electronics and Telecommunication Engineering\*1,2  
Bapurao Deshmukh College Of Engineering, Sevagram\*1,2  
Rashtrasant Tukadoji Maharaj Nagpur University, India\*1,2  
prerna.bhelkar@gmail.com \*1 abhaypbagade@yahoo.co.in\*2

**Abstract-** The newborn swapping and child abduction are challenging issue. Traditional methods have many drawbacks, a biometric pattern-recognition system recognizes a person based on feature vector derived from a specific biological characteristics such as Physiological biometric identifiers include fingerprints, hand geometry, ear patterns, eye patterns (iris and retina), facial features, and other physical characteristics. After reviewing of all the available biometric authentication systems, biometric identification techniques are a great tool to avoid the problems during newborn swapping and child abduction. Where matching of fingerprint and footprint of mother and infant is very effective because it is low cost solution to the newborn swapping. The use of various algorithms such as SIFT, Fingerprint enhancing algorithm, GUO, Hall's algorithm and RANSAC & implementation on raspberry pi enhances the overall performance to shoot out the problem.

**Keywords:-** Fingerprint, abduction, Infant, Raspberry pi etc.

\*\*\*\*\*

## I. INTRODUCTION

The newborn swapping and child abduction are challenging issues. Traditional methods of identification of such child have some drawbacks. Such as, method of practice is to tie a number band around the hands/legs of the newborn as a measure of identity. This number band is same as the one which is also tied to the mother of the infant. At the time child kidnapping or abduction, mixing of babies, multiple claims for an infant in any hospitals, birthing canters causes emotional breakdown and confusion. This raises a question on the effectiveness of the such offline methods and the method of tying number bands (ID bands). This eventually leads to the DNA test at times. Hence, biometrics can be used to solve such identity issues. In the online system, by a digital source and computers are used for processing and storage. The newborn's footprint images captured using a high resolution camera. The fingerprint of the newborn's mother acquired by a fingerprint scanner. wherein footprint of newborn and fingerprint of their mother is used for recognition.

Biometric system is a pattern-recognition system recognizes a person based on feature vector derived from a specific biological characteristics such as Physiological biometric identifiers include fingerprints, hand geometry, ear patterns, eye patterns (iris and retina), facial features, and other physical characteristics. Behavioural identifiers include voice, signature, key stroke, and others. The Present method of footprint, fingerprint acquisition in hospitals is inked footprint of the newborn along with the fingerprint of the mother. This is stored in a file which forms the medical database. This method of image acquisition is offline. The image acquisition done in the primary health centre. Further, implementation of bimodal authentication in hardware as embedded system enhances the overall performance of the system as a standalone device. A complex IC that integrates the major functional elements such as programmable processor, on-chip memory, accelerating function hardware eg: GPU, both hardware and software, analog components into a single chip

or chipset is called system on chip (SoC). Thus, reduce overall system cost, increase performance, lower power consumption and reduce size and draws low power.

## II. LITERATURE REVIEW

Weicheng shen, Marc surette and Rrajiv khanna works on the problems in identity of an individual. The technology used is automated biometric based identification. Method is classifying automated biometrics-based systems into two major categories: one-to-one systems and one-to-many systems. A one-to-one system compares the biometric information presented by an individual, these systems are designed to detect the identity of an individual when it is unknown or it is provided. One-to-many system compares the biometrics information presented by an individual with all the biometric information stored in a data base and decides whether a match can be declared. These systems typically contain a series of complex technologies that work together to provide the desired result.[1]

Oscar Coltell, JosC M. Badia and Guillermo Torres comes with the solution for problem that biometric authentication system have low result regarding computational and economic cost. Hence, suggested a first prototype of a software system to elicitate sets of 20 password stroke samples, named attacks, with a population of 10 different users totaling 200 attacks. The results obtained demonstrate that users follow generally certain patterns when they are writing their password, and are possible to reinforce the user's password authentication method by means of the analysis of user stroking patterns. This is very cost effective and need not require expensive device. In addition to, it is necessary to increase the population size and number of samples to establish standard and reliable rules. Finally, it is very difficult to find a general user pattern applied to every password and when password are letters and number without specific mean method is less effective.[2]

In this paper author implement a multimodal biometric identification system based on the features of the human hand,

Because single physical behavior characteristics can fail in identification. They describe a new biometric approach to personal identification using eigenfinger and eigenpalm features, with fusion applied at the matching-score level.

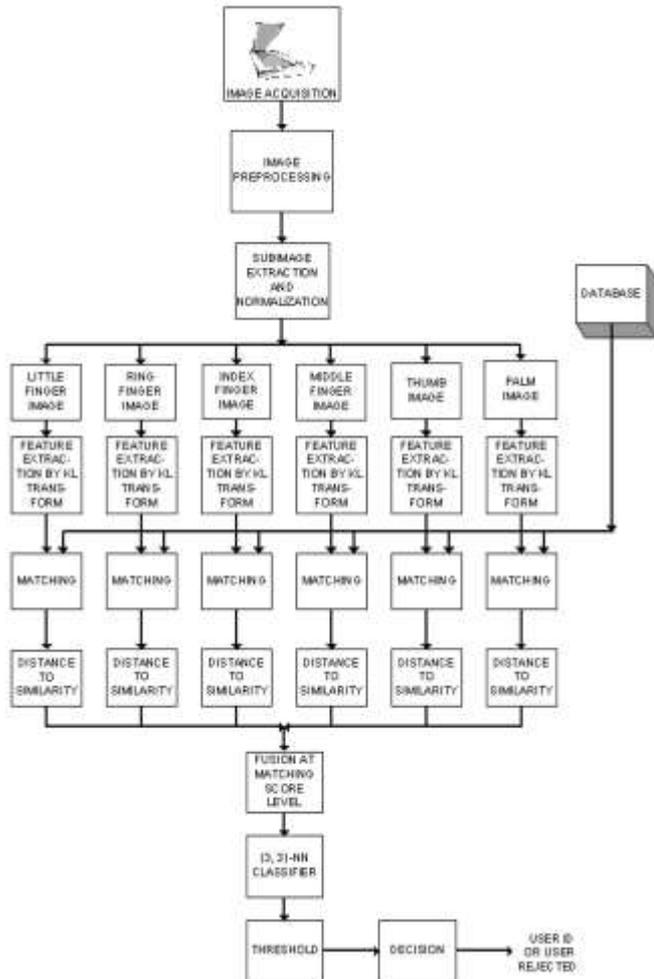


Figure1. Block diagram of implemented system

The identification process can be divided into the following phases: capturing the image, preprocessing, extracting and normalizing the palm and strip-like finger sub images, extracting the eigenpalm and eigenfinger features based on the K-L transform, matching and fusion and finally, a decision based on the (k, l)-NN classifier and thresholding. The system achieve better result in terms of total error rate. The time required for system is 0.565 sec [3]

The author recommended a system for reliable Tracking and identification of children in intensive health care. A widely suggested Bkiller application for the radio frequency identification (RFID) technology. Safety for patients is empowered by letting hospital staff know exactly the location of every patient inside the hospital. This information is also strongly connected to the correct identification of the patient, which is the base for every patient-driven healthcare management process.



Figure 2. Baby tag and Pilot area for system installation

A children's resuscitation is an interesting case patients' identity can easily be confused (in case of infants, they are still not recognizable even in the eyes of their parents). They use anti-collision algorithm also they have provided a planning method to correctly identify the technical solution that best responds to the design aims and constraints in a patients tracking applications. The activation frequency is 2.45 GHz and 433 MHz for communication but it is crucial that whole staff to be trained.[4]

Natasa Glisovic found difficulty in paternity identification because DNA test is costlier. Hence, proposed a system about mutations can involve large sections of DNA becoming duplicated, usually through genetic recombination. DNA profiling and mutation technology used. Novel genes are produced by several methods, commonly through the duplication and mutation of an ancestral gene, or by recombining parts of different genes to form new combinations with new functions. In the work, domains act as modules, each with a particular and independent function, that can be mixed together to produce genes encoding new proteins with novel properties. This allows one gene in the pair to acquire a new function while the other copy performs the original function. Other types of mutation occasionally create new genes from previously. Paternity can be determined pre-natally, or before a baby is born, from CVS samples or amniotic (fluid). Programming all done in C language and this software supports all possible combination. Excluding relative from paternity test result becomes difficult when mutation of STR in consideration.[5]

In this paper author find problem in locating missing people. Hence, suggest that face biometrics for helping with the identification of missing children. The basic underlying technologies involved in such situations are face recognition, identity verification and age progression As part of the efforts to deal with challenging aspects of face recognition a number of researchers considered the problem of age progression and age invariant face recognition (for a comprehensive review on this topic see ). Also special cases of face recognition, such as matching of sketches and mug shots to real images were considered in an attempt to develop face-matching algorithms that can be used for identity verification in law enforcement

applications also AAM, HOG Phog and FD algorithm used.

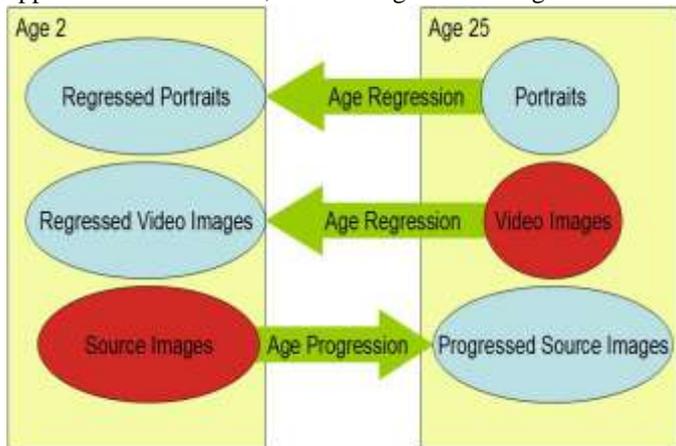


Figure 3. Distribution of real and synthetic sample

A real life scenario that involves identity verification of a missing child and provide important clues for software computation framework.[6]

S.Sivaranjani and S.Sumathi implemented a system for newborn swapping in which, required images are acquired for recognition consists of 6 samples of same newborn footprint and corresponding 6 samples of their mothers fingerprint. Then the collected samples undergoes 5 main steps namely (1) Image Acquisition (2) Image enhancement (3) Binarization (4) Thinning (5) Feature Extraction.



Figure 4. Thinning of fingerprint

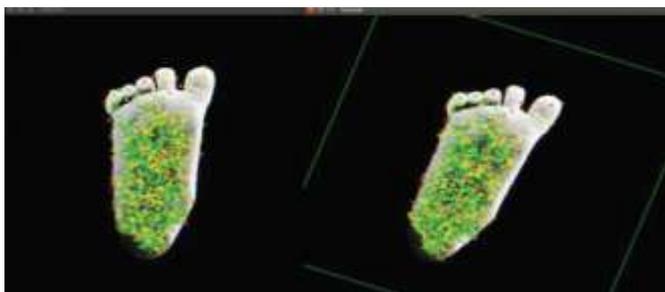


Figure 5. equalize image of footprint

The extracted features in the form of template are stored in database. When the input image is given to their system it undergoes all the pre-processing stage followed by pattern matching stage finally and uses SIFT, GUO, Hall's and RANSAC algorithm. A decision is made based on match score if the given input is authenticated or not. It is a low cost solution for child swapping.[7]

Mr. Ashish R. Dandekar and Prof. M. S. Nimbarte implemented system in which there are many social networking web sites used by people and number of photos is uploaded by them. But from photos it is difficult to predict the relationship among the people if necessary. So there is need of system for automatic identification and prediction of relationship among them, specifically kinship from photo. So, they implemented system, which uses Computer Vision, Face recognition, Feature extraction and classification to solve this problem. Implemented system first detects all the features from given photo then extracts them from the faces using Local binary Pattern.

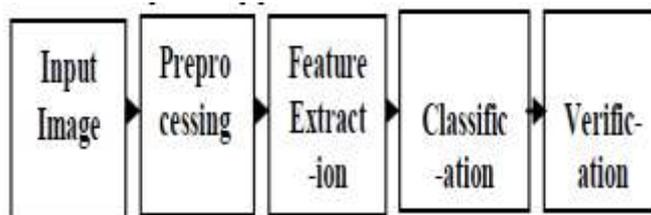


Figure 6. Block diagram of verification

They observe in experiment that LBP features perform stably and robustly over a useful range of less resolutions of facial images. They implemented an algorithm to predict the most likely kin relationships embedded in an image from three input images of child, mother and father. Experimental results have shown their system can effectively annotate the verification of family relation. time required for system is 12.499sec.[8]

In this paper author investigates a novel method in order to extract the optimal discriminant features from FKP images. This method use the 1D-Log Gabor filter, the Gabor filter bank and the Linear Discriminant Analysis (LDA). In the first step, the Region of Interest (ROI) of a FKP images is analysis with a 1D Log-Gabor wavelet to extract the preliminary feature which is presented by the real parts of the filtered image. In the second step, a Gabor filter bank is applied on the preliminary feature in order to selection only the discriminative features of FKP image. Finally, in the third step, the LDA technique is used to reduce the dimensionality of this feature and enhance its discriminatory power.

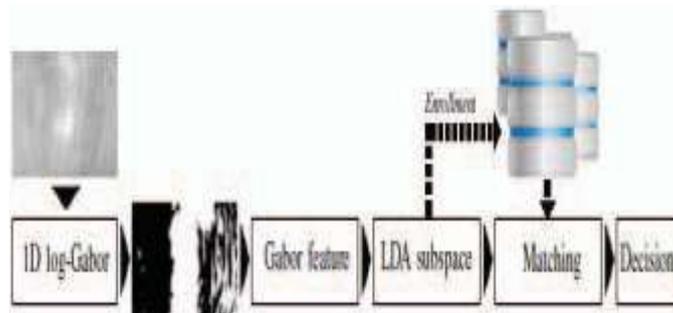


Figure 7. Block diagram of proposed system

Their biometric system is based on Nearest Neighbor classifier which uses the cosine Mahalanobis distance for the matching process. the method achieves higher accuracy but

single finger types yield not give better result compare to multiple finger.[9]

### III. COMPARISON TABLE

Papers	1	2	3	4	5	6	7	8	9
Problem Definition	Difficulty in identity of an individual	Biometric authentication System have low result regarding computational and economic cost	Single physical behaviour characteristics can fail in identification	Reliable identification And tracking of child in intensive care	For paternity test DNA test is costlier	Load-in missing people	New born swapping child abduct-ion	Difficult to predict relation among people from photo	FKP technique have great attention these day
Technology	Automated biometric identification	Keystroke analysis	Multimodal biometric identification feature extracted from hand	RFID	DNA profiling and mutation	Face biometric based identification	Finger-print matching	Face recognition kinship verification	Finger knuckle print system
Tools used	Evaluation methodology based fundamental statistic	Intel running PC MS windows 9x	K-L transform K-MN rule	Active RFID anticollision algorithm	Programming done in C language	AAM, HOG, pHOG, FD	SIFT algorithm Ransac algorithm	LBP and tan trig algorithm	1D log gabor filter bank and LDA technique
Parameters	Biometric data	Password stroke sample	Eigenpalm and eigenfinger	-	Mutation in STR loci	-	Mother fingerprint and newborn footprint	Facial digital image	FKP image
Evolution Time	-	-	0.565 second	-	-	-	-	12.499 second	-
Efficiency	-	70%	About 100%	-	11-72%	-	-	92%	100%
Findings	It is practical tool for evaluation	The validity of method is very larger in easily stroking password	System achieve better result in terms of total error rate	-	-	Provides imp clues used in computation framework	Raspberry pi enhances the performance	Kinship verification via facial images	FKP is efficient method
Result	System meets the user specified requirement	This is very cost effective need not require expensive device	Achieve very high reorganization rate	Improve medical performance and health care	This software support all possible combination	DNA test can not substitute with biometric test	Low cost solution to newborn swapping	LBP is powerful method	It achieve higher accuracy
Drawback	-	When password are letters and numbers without specific mean method is less effective	-	It is crucial that whole staff to be trained	Excluding relative from test result difficulty	Face recognition and age progression	-	Give result based on the similarities Between faces	For Single types finger not give better result

### IV. DISCUSSION

Biometric identification technique is very effective to solve identity issue. There are various parameters on which we can categorize biometric identification techniques, some of them is based on hand geometry include finger knuckle print, keystroke analysis eigenpalm and eigenfinger, infant and mother fingerprint matching among these techniques, finger print

matching of mother and infant is very effective because it uses raspberry pi which enhances the performance and uses various algorithm such as SIFT, GUO, Hall's and RANSAC. There are some technology which based on facial features such as face recognition by using age progression and facial digital image out of which age progression is very effective as it provide importance clues used in computing framework and uses algorithm such as AAM, HOG, Phog and FD.

## V. CONCLUSION

To avoid the problems facing during matching of kids and mother after the newborn swapping and child abduction Biometric identification techniques is a great tool. While discussing of all the available biometric authentication systems, technique of matching of fingerprint and footprint of mother and infant is very effective because it is low cost solution to the newborn swapping. The use of various algorithms such as SIFT, Fingerprint enhancing algorithm, GUO, Hall's algorithm and RANSAC & implementation on raspberry pi enhances the overall performance to shoot out the problem.

## VI. ACKNOWLEDGEMENT

I would like to thanks Prof. A. P. Bagade Assistant Professor, Electronics and Telecommunication department, B.D.C.E for his valuable suggestion. I would thank to my college for providing valuable facilities which helps me in my research work. I also express thanks to my parents, friends and colleagues.

## REFERENCES

- [1] Weicheng shen, Marc surette and Rrajiv khanna, "Evaluation of Automated Biometrics-Based Identification and Verification Systems" proceedings of the ieeee, vol. 85, no. 9, september 1997.
- [2] Oscar Coltell, JosC M. Badia and Guillermo Torres "Biometric Identification System Based in Keyboard Filtering" IEEE1999.
- [3] Slobodan Ribaric and Ivan Fratric "A Biometric Identification System Based on Eigenpalm and Eigenfinger Features" IEEE transactions on pattern analysis and machine intelligence, nov 2005.
- [4] Guido Biffi Gentili, Fabrizio Dori and Ernesto Iadanza. "Dual-Frequency Active RFID Solution for Tracking Patients in a Children's Hospital. Design Method, Test Procedure, Risk Analysis, and Technical Solution." Proceedings of the IEEE . 9, September 2010.
- [5] Natasa Glisovic "Support system in deciding paternity test which involves mutations" IEEE 10th Jubilee International Symposium on Intelligent Systems and Informatics • September 20-22, 2012, Subotica, Serbia.
- [6] Andreas Lanitis and Nicolas Tsapatsoulis "lessons learned from the application of biometric-tests on a real case involving identity verification of a missing child", 2014 IEEE.
- [7] Sivaranjani, S.Sumathi. "A Review on Implementation of Bimodal Newborn Authentication using Raspberry Pi", Proceedings of 2015 Global Conference on Communication Technologies (GCCT 2015) 2015.
- [8] Mr. Ashish R. Dandekar, Prof. M. S. Nimbarte "Verification of Family Relation from Parents and Child Facial Images" IEEE 2015.
- [9] Mourad chaa, Naceur-Eddine Boukezzoula, Abdallah Meraoumia and Maarouf Korichi "An Efficient Biometric Based Personal Authentication System Using Finger Knuckle Prints Features" 2016 IEEE.