RESEARCH ARTICLE

Development of Enhanced Biometric Secured E-Payment System for User Friendly Transaction

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ABSTRACT: There exist lot many methods of authentication for money transactions. The traditional method of e-payment especially debit card and credit card method of transaction has its own risk. Still necessity forces the people to use e- payment system for convenience. The novel method proposed in this work using LabVIEW platform using myRIO provides reliable firmware solution to this problem. Since fingerprint is the identified authentication used in this work for cashless transaction, theft involved is easy to identify. Every individual has unique fingerprint and hence fraudulent person is able to trace out easily. Transaction is possible only when the fingerprint matched with that of the user already stored in the database. This method is useful for banking sector, hospitals, and shopping malls.

KEYWORDS: E- transaction, Fingerprint recognition, myRIO, Banking Database

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1. INTRODUCTION

Biometric means an automatic detection of a person based on her behavioral and /or physical characteristics. The main reason for introducing biometric based E-payment system is to enhance the security. A cashless transaction becomes the need of the hour and 90% of the people prefer the same since it supports their work style. The most common way of making E- transaction is swiping the ATM card with authenticated password. Theft is possible either by hacking the password or card. Few miscreants even able to trace the password based on the hand movement while trying to withdraw the amount. The other problem is that the cardholder gets the message only after the card is swiped. Hence, such method of transaction is not trustworthy and insecure too. Bharati et al [1] discussed GPS based tracking system to trace the location of ATM in case the cash box of ATM is robbed. Fingerprint is used to identify and verify the authorized bank personnel. Sugandhi et al [2] developed GSM based module with provision to generate authenticated 3-digit code by the system to the registered mobile number. Having entered the valid OTP, the user can either withdraw or deposit cash and check the account balance. Incase of any fake attempt, the account is frozen.

Nabeel Ali Albahbooh and Patrick Bours [3] developed a protocol that provides more secure ATM authentication using biometrics (fingerprint or face) on a mobile phone device under the restriction that no changes is made to the existing physical infrastructure [3].

Gurpreet kaur and Navdeep Kanwal [4] developed a system, which confirms the transaction based on random 10-digit pin number called as One Time Password (OTP). Santhosh [5] has developed the real-time monitoring and controlling system implemented using raspberry pi and fingerprint module to make the system more secure. It serves web page on which video footage of ATM center was controlled. Joyce Soares and Gaikwad [6] proposed the system, which matches captured fingerprint and iris samples with the database. The system will distinguish between the real legitimate trait and fake self-manufactured synthetic or reconstructed samples by comparing it with the samples saved in the database during enrollment. After finding valid samples the system generates a 3 digit code which is received by the customer‘s registered mobile number. Moreover, Vaishnavi and Rajalakshmi [7] proposed the system which requires two phase security to authenticate the person. First providing an individual`s biometric identification, followed by personal identification number. This system also provide an alternative approach to access cash via OTP generation on user`s cell phone in case of loss of pin. Each has its own problem during money transaction. To get rid of such problem, in this work, we proposed a highly secured method based on biometric fingerprint authentication technology. Such biometric based solution is able to provide confidential financial transaction and personal data privacy. In addition, it does not require carrying ATM card everywhere.

2. BIOMETRIC MECHANISMS

Biometric is the technological term for the measurement and statistical analysis of people’s physical and behavioral characteristics. The physical characteristics include face recognition, fingerprints, DNA, iris recognition and palm veins. The behavioral characteristics include behavior of a person, their attitude, voice, gait of walking) and typical rhythm [9].

Fingerprint

Fingerprints are made of an arrangement of ridges called friction ridges. Each ridge contains pores, attached to the sweat glands under the skin. Fingerprints are registered on tables and just about anything else where we touch because of this sweat.

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Fingerprint Scanners

Fingerprint Scanners is a fingerprint recognition device works based on unique fingerprint biometric technology, installed with fingerprint recognition module featuring in computer for security, superior performance, accuracy and durability. Using such method, does not require password that is vulnerable to fraud and is hard to remember. Making use of this USB based fingerprint scanner/ reader let the fingerprints of individual acts like digital password that cannot be lost, forgotten or stolen. The main function of fingerprint scanner is to get an image of our finger and it needs to check whether the pattern of ridges and valleys in the image matches the pattern of ridges and valleys in already scanned images. The captured fingerprint not saved in the form of images and it saved in the form of series of numbers (a binary code) for verification. The binary code is not possible to reconvert into image, so no one can reuse the individual fingerprint.

3. TYPES OF FINGERPRINT PATTERNS

Two types of fingerprints namely unusual fingerprint and rare fingerprint. The less than 1 in 20 people have unusual fingerprint and it classified into arch, loop, whorl and composite. Different types of fingerprints shown in Figure.2. The less than one in100 people have a rare fingerprint such as double loop, peacock's eye and tented arch.

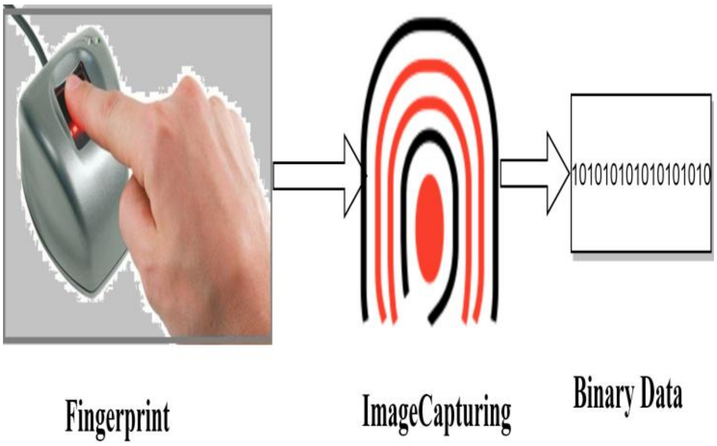


Fig. 1 Fingerprint Scanning Process

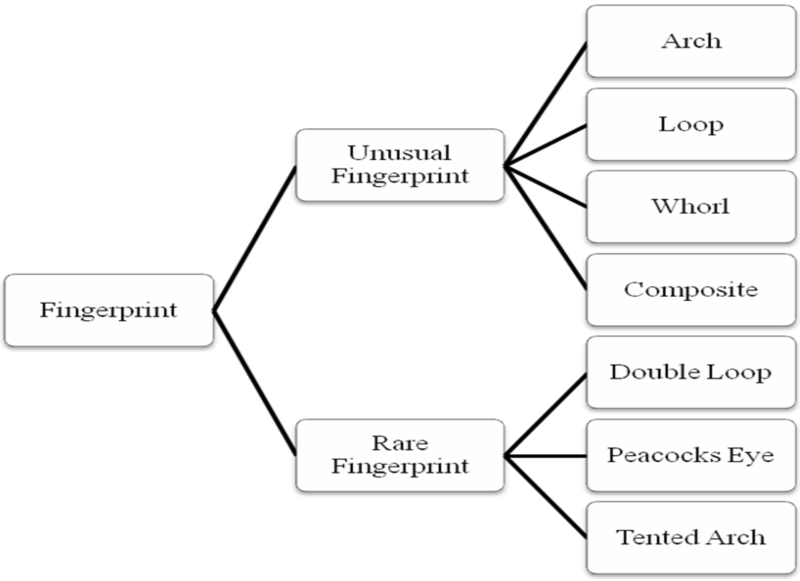


Fig.2 Fingerprint Types

a. Arches

Arches are to create a wave-like pattern and include plain arches and tented arches. Tented arches rise to a sharper point than plain arches. Arches make up about five percent of all pattern types. The ridges of the finger continuously run from one side of the finger to the other side with no recurving. Plain arch and tented arch are two types of arch.

b. Whorls

It forms circular or spiral patterns, like tiny whirlpools. There are four groups of whorls

- Plain: Concentric circles.
- Central pocket loop: A loop with a whorl at the end.
- Double loop: Two loops that creates an S-like pattern.
- Accidental loop: Irregular shaped loop.

c. Loops

Loop prints that resurvey back on themselve to form a loop shape. Divided into radial loops (pointing toward the radius bone, or thumb) and ulnar loops (pointing toward the ulna bone, or pinky), loops account for approximately 60% percent of pattern types. The ridges make a backward turn but do not twist and it begins on one side of the finger, curve around or upward and exit the other side. Radial loop and ulnar loop are the two types of loop. Radial loop: Slope start towards the thumb. Ulnar loop: Slope start towards the little finger.

4. DIFFERENT TYPES OF BIOMETRICS

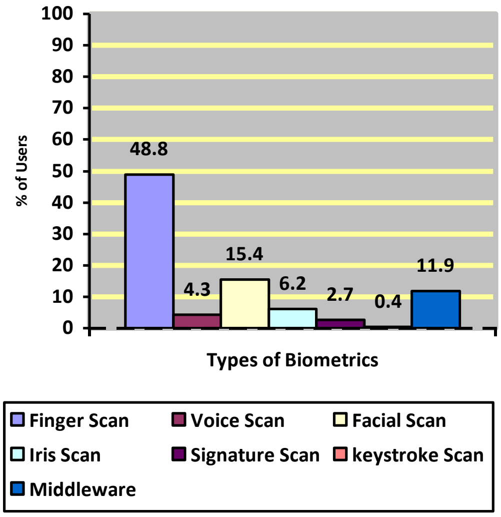


Fig. 2.1 Statistics of different type of biometrics and percentage of users: for the year 2016

Fig. 2.1 depicts the statistics of different type of biometrics and percentage of users for the year 2016. It is shown clearly that, the finger print recognition is most commonly used which used finger print recognition accompanied with one time password (OTP). It is difficult for the uneducated people to complete their transactions and even difficult to use the mobile for tracing the password. When the mobile is off due to low battery or network problems, it is impossible to make transaction during emergency needs. These setbacks necessitate the use of only finger print authentication whose efficiency is higher comparatively, less cost of implementation and high security.

4.1 TYPES OF ATM FRAUD

There are several kinds of ATM frauds and researchers have been able to place them into categories. Using a report on global ATM frauds conducted in 2007, ATM attacks and frauds further classified into three categories:

a) ***ATM Malware:*** This is an attack which requires an insider such as an ATM technician who has a key to the machine to place the malware on the ATM. After this act, the attacker inserts a control card into the machine card reader that act as a malware. This gives him/her control of the ATM and the ATM's keypad. Malware captures magnetic stripe data and PIN codes from the private memory space of the transaction processing application installed on an ATM.

b) ***ATM Hacking:*** In this case, an attacker uses sophisticated programming techniques to break into a website, which resides on a financial institution network. Bank systems may access to locate the ATM database and to collect card information, which may further to use and to make a clone card.

c) Physical Attack: Physical attacks are attempts on the safe inside the ATM through mechanical means with the intention of breaking the safe to collect the money.

4.2 myRIO

MyRIO is a real-time embedded evaluation board made by National Instruments. It may use to develop applications that utilize its onboard FPGA and microprocessor supported by LabVIEW. It is also useful for teaching applications to improve learning in engineering education. Whether used alone or paired with add-ons, NI mini systems, or third-party sensors, NI myRIO help the engineers learn multiple engineering concepts on one device.

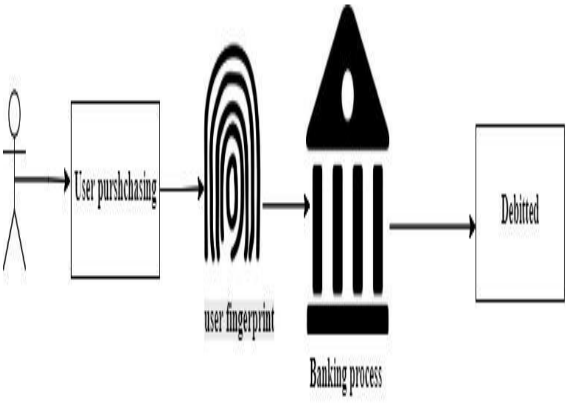


Fig .4 Working process of e-pay machine

4.3 Biometric based E – payment System

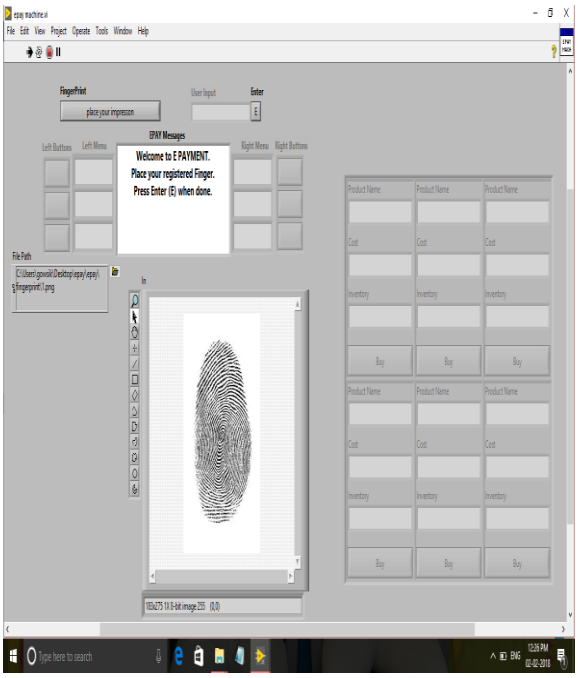
E-payment system, which includes cash transaction, cheque, debit card and so on, becomes part of our day today life. The common problem what we are facing is inability to differentiate the authorized and non-authorized persons. Traditional techniques of accessing the e- payment have its own drawbacks since it involves password or security PIN that is easily traceable by anyone. This drawback is easy to arrest using biometric authentication. Biometric system matches the human physiological characteristics to access the account. Even in such case, others can use the generated OTP if the mobile is hacked by anyone.

The idea proposed in this work is purely using only biometric authentication. Since, it does not ask for security PIN or OTP. The hardware used is MyRIO under the labVIEW 2017 platform. Highly secured money transaction, purchase of any items using credit card assured using this proposed system. The challenge is that is it bit cumbersome to access the account during emergencies since biometric is the only way to release the account.

This system is useful at different places like hospitals, malls, petrol bunk and not necessary to carry the card and cash hence it naturally reduces risk of loss and theft.

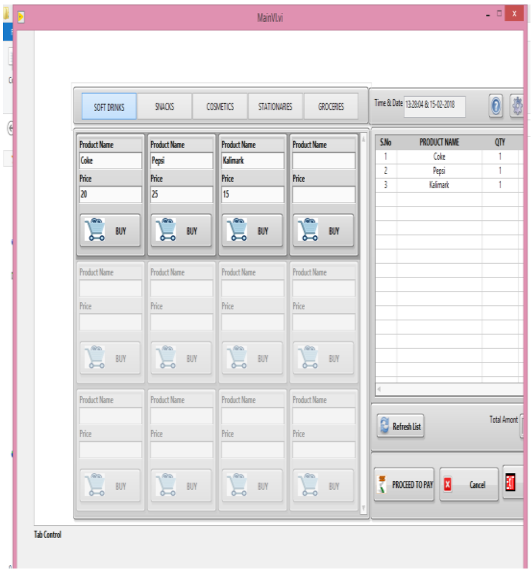
5. RESULTS AND DISCUSSIONS

The development of enhanced biometric secured E-payment system for user-friendly transaction reported in Fig4. The scanned image of the fingerprint easily compared with the prestored user profile. When it matched, the person is liable to make transaction or purchase.



Welcome to E PAYMENT.
Place your registered Finger.
Press Enter (E) when done.

Fig 4 Result of money transaction via fingerprint

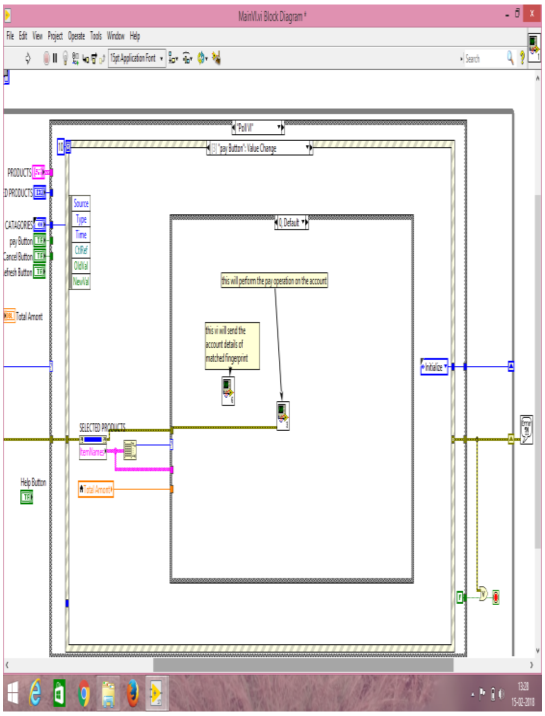


Time & Date 13:28:04 & 15-02-2018

Product Name	Price
Coke	20
Pepsi	25
Kalimark	15

S.No	PRODUCT NAME	QTY
1	Coke	1
2	Pepsi	1
3	Kalimark	1

Fig. 5 Purchase of items – Front panel view



this will perform the pay operation on the account

this vi will send the account details of matched fingerprint

Fig. 6 Block diagram of E- Payment transaction

6. CONCLUSION

This paper concludes that the conventional transaction system highly useful to replace with biometric systems, which makes transaction process easier, reliable, and secure and beyond all it eliminates the need of carrying any kind of swipe card. A highly secured e- payment system avoids the use of ATM card, which is prone to hack ATM PIN/ATM card. Such biometric based E-Payment system developed using myRIO hardware presents enhanced technology with which financial services to an increasing segment of the population in many countries is possible. The fraudster may easily match everything but they can never match the biometric samples.

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