

A MOBILE PAYMENT MODEL USING BIOMETRIC TECHNOLOGY

¹KAMRAN AHSAN, ²SARWAT IQBAL, ³MUHAMMAD AZHAR HUSSAIN, ⁴ADNAN NADEEM

¹Kamran Ahsan, Sarwat Iqbal, Muhammad Azhar Hussain, Adnan Nadeem

²Federal Urdu University of Arts, Science and Technology, Federal Urdu University of Arts,

³Science and Technology, Federal Urdu University of Arts, Science and Technology,

⁴Federal Urdu University of Arts, Science and Technology

E-mail: ¹kamran.ahsan@fuuast.edu.pk, ²s.iqbal@fuuast.edu.pk, ³a.hussain@fuuast.edu.pk,

⁴adnan.nadeem@fuuast.edu.pk

Abstract- As the world is witnessing a cosmic increase in mobile phone user and application of mobile devices in daily life problems this paper proposes a novel and secure mobile payment method for mobile users which help user to pay its bills at point of sale machine in extremely secure manner. This paper highlights the problems found in different mobile payment solution and describes the potential problems of mobile payment adaptation for mobile uses. By keeping mobile payment problems in context and the availability of certain biometric verification methods on latest mobile phone this paper propose a novel mobile payment system in order to provide a robust, quick and easy interface. The model proposed in this work is designed to provide a mobile payment mechanism which help user to pay bills securely in a stress free manner. Increase the system usability is the main idea behind this work. The proposed system provides an end to end blended approach for mobile payment.

Index Terms- Mobile Payment, Biometric Authentication, Secure Payment, User Authentication, Ease of Use, Usability

I. INTRODUCTION

User authentication is the most critical and perilous factor in a mobile payment scenario. Different mobile payment application use one factor, two-factor or multi factor authentication but the problem of these authentication mechanisms is that the user may do mistakes in completing the processes of authentication. A little mistake made by use leads him in a confused and undesirable situation. The problem of user authentication can effectively resolved by using biometric authentication techniques. As biometric-enabled mobile devices are being introduced by different manufacturers, mobile payment can be done securely without using any traditional password verification method [1].

It is observed that most of the mobile applications do not realize the requirement of usability and in the end use leave the use of application [2]. This problem also leads to avoid the use of mobile applications by users specially the user which are old in age or the user which are not technology aware. One of the most implicit cause of this predicament is that the designer of the product assume that all of the targeted users of the mobile application are same in their capabilities [3].

Different communities of the population are different in characteristics from each other as seen from the perspective of technology use. For example elderly population problems such as psychomotor, physical, cognitive and perceptual makes elderly avoid the use of mobile applications [4].

II. MOBILE PAYMENT

The payment which is made by using a mobile device such as PDA, Tablet PC, or smart phone is termed as mobile payment. It is a method to ensure direct or indirect monetary payment between two parties. Mobile payment requires the use of mobile devices instead of traditional exchange of notes and coins, cheques and plastic cards. Mobile payment is e-commerce method through which digitized payment can be send over open network in which buyer (payer) and seller (payee) do not have a physical contact.

In POS method the user can pay at POS (Point of sale) with a mobile device. The POS system can avail infrared, NFC, or RFID technology for transaction. This method requires installation of hardware and software on seller POS and requires mobile phone modification. A pre-paid account is required for this type of system. In Payment through mobile application the user have the choice to select the article of trade on mobile application. Through this a user can avail the advantage of having huge and different choice of buying through mobile phone. In only 5 SMS the application can conclude a transaction. In person to person method user can avail real time money transfer. It needs both parties to be registered to the service.

The payment which is made through mobile phone has different advantages. Mobile phones may offer a secure payment solution through different security layers such as TCO/IP channel over the internet, WAP channel over cellular network or short range communication such as Bluetooth and RFID etc.

Although there is possibility that unauthorized person may get access to user account so it is highly needed that mobile payment must ensure security measures at application level, in these scenarios SET should be maintained for application level.

III. PROBLEMS IN MOBILE PAYMENT

Mobile payment puts new challenges of usability due to some limitations of physical mobile devices like small screen size, small area for keyboard to input data, the context in which mobile phone is used and user mobility. Small screen size of mobile phone is a big hurdle to usability. This is a very difficult task to designer to accommodate necessary information in a small screen. For example designer cannot show a lot of option/ choices which he decides to show. Designer needs to be very specific and in some cases very limited while designing the interface. Designer cannot show the list of items available to shop in a screen which is typically in a range of 2.5 inches to maximum 7 inches.

If the user uses a mobile phone in which only numeric keypad is available then the process of input text values becomes tedious and error prone. The user has to be very careful while inputting data on numeric keypad. If voice recognition is used to take input then this is also an error prone process because voice input is not very developed field and chances of error are high. The voice input problem becomes worse when data has to be input in a noisy environment. Voice input is also a slow process and it consumes the time of user. A few solutions to mobile payment use hand written signature method which is also an error prone method.

One of the most considerable issue for the designer of mobile payment system is security issue. Data breaches may occur while mobile payment system is used. This is a possibility that sensitive, confidential, or protected data may be used by unauthorized way. As the result of data breaches confidential information such as credit card number, user identity, merchant information, billing information and other different types of information may be stolen by unapproved party. And as the result as well as merchant may be a victim of fraud [5].

Accountability and privacy policy is a challenge found in designing process while creating a secure mobile payment protocol. Due to the limited capabilities of mobile phone devices such as the use of wireless network, makes the problem difficult to solve. The methods based on public key cryptography do not provide a viable solution to security. The idea of symmetric key cryptography has been exploited in order to make secure transaction using mobile network operator. The design improved using symmetric key cryptography. Minimizing the computational

operation and creating a dialogue between payer and payee and ensure a secure transaction and also provide the easy operations. The proposed mechanism requires that payer and payee both must be registered earlier to transaction. The method provides a layer of security using symmetric key by using a two factor authentication. One of the mean is that the user uses mobile wallet application and the other is using password so by comparing of payer number and payer password. Both are encrypted and payee ID is computed by taking the hash of payer number and payer password [6].

User authentication, security and ease of use are the well understood problems in electronic payment systems. The payments which are made through credit card number is also defenseless because if once the credit card number is disclosed then credit number may allow any person use the card. Debit cards also vulnerable in the sense that if the pin is disclosed to any other person then fraud is possible. Other than the electronic payment systems mobile payment has been emerged as a more secure solution and made the customer free from keeping different credit cards and debit cards in his/her wallet.

IV. SUCCESS FACTOR OF MOBILE PAYMENT

Mobile payment can provide tranquility, comfort, ease and satisfaction especially in the scenario when user wants hassle free shopping and do not want to disturb itself from other task. For example in a situation where user is enjoying pizza/coffee with friends at café or having dinner with family outside and paying bills through long process may take the user in a boring situation. Mobile payment can serve a very polite and obliging tool when user want to pay bills in physical shopping sides with real cash because security issues will be in front of him. Both micro and macro payments are possible through real shopping but a person who likes/ needs to be secure may face it inconvenient.

In these consequences where real cash payments and payment through credit cards is seen normally mobile payment acceptance for the population will also be challenging. One of the other intention to use mobile payment is that no user want to stand in queues to pay its bills specially when he/she is already tired of shopping or in a full stomach position after a meal. Mobile payment saves time of buyer and provides merchant a substantial comfort.

Due to the involvement of main actors of mobile payment success factor is dependable to different issues. The main issues which hinder the acceptance of mobile payment is the Ease of use. If installing the application is easy and the interface of mobile payment involves less interaction of user then user finds it

attractive to use [7]. Security is the main concern about mobile payment acceptance. The main ingredient of security should be observed in a mobile payment system. User feels uprightness if mobile payment solution demands less fee in term of set up, transaction fee and subscription. At last mobile payment solution should provide technical acceptability in term of integration, interoperability, scalability, remote access and performance.

V. PROPOSED MODEL

This work proposes that biometric verification can be a very effective tool if applied at POS at the time of

payment through mobile phone. Biometric verification relies on what you have instead of what you know hence no need to remember traditional password. Once the system has been set up properly biological characteristics like fingerprints, retinal scan, facial recognition, hand geometry, iris scan and vascular patterns can provide a completely unique data set that cannot be provided by false means. This property of biometric make a system entirely authorizes and makes a user free from fear that its identity can be stolen, guessed by any unauthorized party. The proposed model is depicted in Figure-1.

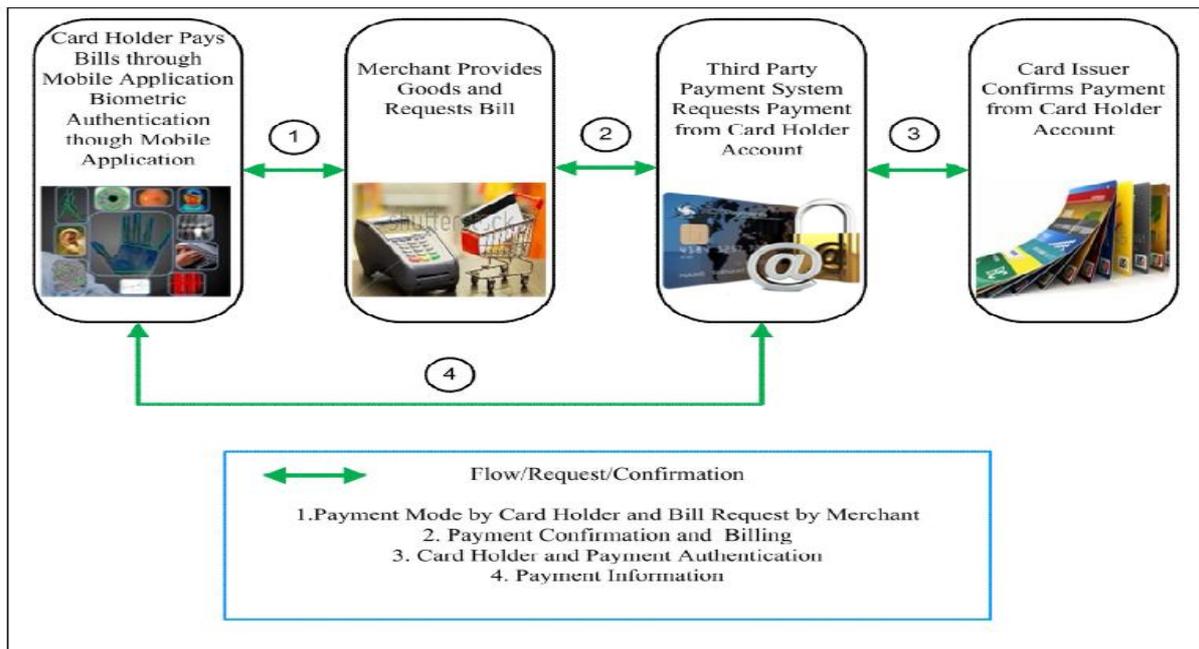


Figure-1 Mobile Payment through Biometric Verification Technology

In the proposed mechanism the user first needs to install mobile payment application and then provides its biometric data through an easy to use interface. The biometric verification method may vary from device to device. Different biometric verification can be adopted according to the availability of the appropriate method on device.

Once a user has set up the device then this biometric information can be used at POS at the time of bill payment. Beside from the advantages of using biometric verification this work suggests that no extra hardware is needed at user side. The mobile payment will be done using the facilities already available on mobile phone. No extra NFC card and specialized hardware will be needed. Once user has selected the card for which it wants to pay the bill the information of user as well as merchant will be send to trusted third party through user mobile phone hence this mechanism will not require a lot of internet traffic. Trusted third party will then communicate to the

financial organization in order to facilitate payment and authenticate user. After authenticating user and payment approval the third party will send confirmation messages to merchant as well as user.

The main idea of the proposed work is to make user feel free while paying bill at POS. User does not have to put all his credit cards in its pocket all the time so the problem of physical loss of the card eliminated. User does not need to remember passwords and in case if a user is unable to complete the transaction while using traditional mobile payment methods due to its any disability then it can avail the facility.

Adaptation of biometric verification in the proposed work also settle the matter of identity theft because if mobile phone is theft or accidentally left on any place by user then despite of the presence of application on elderly mobile nobody can use the phone for billing purpose. All the data of user will be saved on application by using standard cryptography techniques.

CONCLUSION

This paper proposes a novel mobile payment models which uses biometric verification in order to provide an easy, hassle free and most secure method by which user can enjoy the facility of mobile payment anytime anywhere. No extra hardware needs to be installed on mobile phone as the proposed work does not require any specialized card module on mobile device. By the proposed mechanism the user may avail the shopping facility having its mobile phone only in hand by a highly secure manner. The proposed model is user friendly and provides high level of security against the issues such as card carrying problem, cards lost problem, hard to remember password problems, and password administration cost. Increased security, reduced fraud, reduced password administration costs, eliminates problems caused by lost IDs or forgotten passwords are some of the other obvious advantages of the proposed technique.

REFERENCES

- [1] W. Yang, J. Hu, S. Wang, J. Yang, L. Shu. "Biometrics for securing mobile payments: Benefits, challenges and solutions". In Image and Signal Processing (CISP), 6th International Congress IEEE, Vol. 3, pp. 1699-1704, Dec 2013
- [2] Y. E. Lee & I. Benbasat. "Interface design for Mobile Commerce". Communications of the ACM, 46, pp.49 – 52, 2003
- [3] W. Galitz. "The essential guide to user interface design: An introduction to GUI design principles and techniques". New York: John Wiley & Sons, Inc. 2007
- [4] A. Newell. "User-Sensitive Design for Older and Disabled People." The Engineering Handbook of Smart Technology for Aging, Disability, and Independence, pp.785-802, 2008
- [5] Y. Wang, C. Hahn, K. Sutrave. "Mobile payment security, threats, and challenges". Second International Conference on Mobile and Secure Services (MobiSecServ), pp. 1-5, Feb 2016
- [6] S. Kumar, R. Britto , A. A. Gnana Raj and S. A. Rabara. "A framework for mobile payment consortia system (MPCS)." International Conference on Computer Science and Software Engineering IEEE, vol. 2, pp. 43-47. 2008.
- [7] W. Guo. "Design of architecture for mobile payments system". Chinese Control and Decision Conference IEEE, pp. 1732-1735, Jul 2008

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