

Smart Shopping using QR Codes

Dhanashree R. Sonawane¹ Anuradha L. Ingale² Komal S. Thorat³ Anam S. Zaidi⁴ Amruta A. Pundlik⁵

^{1,2,3,4,5}Department of Computer Engineering
^{1,2,3,4,5}LoGMIIER, Nashik, Maharashtra, India

Abstract— A product having societal acceptance is the one that helps comfort, provides efficiency and convenience in everyday life. Big shopping complexes are being developed in metro cities. Huge rush can be seen at these malls on holidays and weekends. People wanting to purchase products have to carry them in the trolleys. After finishing choosing the products, one proceeds to go to billing counter. At billing counter bill is generated by scanning the products manually using a hand assisted barcode scanner. This takes up a lot of time resulting in a long queue for billing. In this paper, we discuss a system which is being developed to aid a person in day-to-day shopping in terms of reduced time spent while purchasing. The main objective of proposed system is to provide a technology-oriented approach which is pocket friendly, scalable, and rugged system for assisting shopping.

Key words: Intelligent Shopping, Shopping Cart, User Interface, Server Communication, Automatic Billing

the product they wanted to buy, after selecting product they need to stand in a long queue for billing and payment. To try to solve the problems previously identified, we have developed our product. Another motivation is the use of smart phone for implementing shopping in shopping malls using better interface for users and to ease the process and to provide a technological view to solving the problem of manual shopping system.

Multiple schemes based on RFID have been explored to tackle authenticate products and identify counterfeits. RFID technology requires using specialized hardware to read RFID tags and might not be feasible for space-constrained packaging like pharmaceuticals. Printing a static code on a product for authentication is relatively simple and needs less specialized equipment. We chose to use a QR Code for its relative simplicity and ease of implementation. Additionally, a printed QR code can potentially have a larger bandwidth of data transfer than an RFID tag. We implemented the reader as a mobile application running on a smartphone due to their ubiquity with general users and easy access to hardware that can be used to read QR codes and perform network operations. We chose to implement this application on the Android OS due to the availability of multiple open source libraries and ease of implementation. . First, we identify various security issues that exist while authenticating products and design a scheme to address them. A hash chain of a one-way cryptographic hash function is most appropriate for this problem.

I. INTRODUCTION

Idea behind the Project being developed is to solve the problems of people they are facing in the current shopping scenarios. This product will assist a customer in his everyday shopping by reducing the shopping time. It also provides better assistance to the mall managers. This is an innovative product that will provide comfort and convenience to the shoppers and managers.

While surveying we found that most of the people prefer to leave the shopping mall instead of waiting in long queues to buy a few products. People find it difficult to locate

II. LITERATURE SURVEY

Parameter	Paper [1]
Paper Title	Paper-based Document Authentication using Digital Signature and QR Code
Year	2012
Methodology/ Algorithm	Elliptic Curve Digital Signature Algorithm (ECDSA), RSA digital signature algorithm, Digital Signature Algorithm
Advantages	Non-Repudiation, Integrity, Security
Disadvantages	1.Human inspection is required 2.It is not fully automatic
Parameter	Paper [2]
Paper Title	Hash-Chain Based Product Authentication Scheme
Year	2013
Methodology/ Algorithm	Client server technique
Advantages	1.User friendly 2.Authentication 3.Secure 4.cheaper
Disadvantages	1.More complex 2.It needs to sacrifice space complexity in favour of time complexity
Parameter	Paper [3]
Paper Title	Printed document authentication using two level Qr code
Year	2016
Methodology/ Algorithm	Pattern recognition algorithm, Error correction algorithm, Error detection algorithm
Advantages	1.low cost 2.Confidential
Disadvantages	1.It does not remove complete error 2% of false positive error is accepted
Parameter	Paper [4]
Paper Title	A Survey of RFID Authentication Protocols Based on Hash-Chain

Year	2008
Methodology/ Algorithm	This paper introduce RFID authentications with hash chain method.
Advantages	1.Confidentiality 2.Integrity 3.Availability 4.Authenticity
Disadvantages	1.RFID tags are used hence they are expensive 2.Require special Hardware 3.complicated
Parameter	Paper [5]
Paper Title	Survey on information hiding techniques using Qr barcode
Year	2004
Methodology/ Algorithm	TTJSA symmetric key algorithm Method used is Information hiding method.
Advantages	1. Information Hiding 2.Online Information security 3. High Encoding Capacity 4. Small Size 5. Dirt and Damage resistant capability
Disadvantages	1.Slow technique 2.Effects on quality of data and image
Parameter	Paper [6]
Paper Title	An Overview of Cryptographic Hash Functions and Their Uses
Year	2003
Methodology/ Algorithm	HMAC Algorithm is used
Advantages	1.Data Integrity 2.Security
Disadvantages	1.Needs to examine history each time
Parameter	Paper [7]
Paper Title	Cryptographic hash function
Year	2006
Methodology/ Algorithm	Key exchange algorithm, Signature algorithm are used
Advantages	1.Security 2.Anti-Replay attack 3.Anti Insider Attack 4.Mutual Authentication
Disadvantages	Takes double encryption technique
Parameter	Paper [8]
Paper Title	Design and Implementation of an RFID-Based Customer Shopping Behavior Mining System
Year	2017
Methodology/ Algorithm	Reader scheduling algorithm, Clustering algorithm
Advantages	1.Robustness 2.Accuracy 3.High secure
Disadvantages	1.Expensive 2.Complicated 3.Need extra hardware cost
Parameter	Paper [9]
Paper Title	VLSI Characterization of the Cryptographic Hash Function BLAKE
Year	2008
Methodology/ Algorithm	BLAKE-32 and BLAKE-64 algorithm
Advantages	1.Low power 2.High Speed
Disadvantages	1.Complicated 2.memory unit is updated only once per compression 3.Slow technique
Parameter	Paper [10]
Paper Title	Image Based Password Authentication
Year	2015
Methodology/ Algorithm	Image based authentication technique
Advantages	1. Choose the number of pictures displayed 2. Determine how many categories users must remember 3. Define whether a user must identify their categories in a specific order.
Disadvantages	1.Needs Special type of hardware which increases the cost

Table 1: Literature Survey

A. Paper (1): Paper-based Document Authentication using Digital Signature and QR Code

This paper [1] says that authenticity of paper-based documents can be achieved by using digital signatures and QR codes without accessing the database. The verification process can be done automatically if the OCR is accurate.

Otherwise, human inspection is required. Even with this semi-automatic process, this proposed method facilitates the verification process. The inspector can see the differences between the printed message and the message in the QR code.

B. Paper (2): Hash- Chain Based Product Authentication Scheme

This paper [2] provides secure way of checking these tags and codes are what they are supposed to be. It says that it is not enough to just put an invisible label on a product. The invisible label needs to be verified. This is where the networking side of product authentication comes in as well as the scheme we are proposing here.

C. Paper (3): Printed document authentication using two level QR code

In this paper [3], we have presented a new authentication process dedicated to printed documents that uses a two level QR code. The 2LQR code has two levels of information storage: the public level, where information is stored in standard way, and the private level, where the black modules are replaced by specific textured patterns, that are sensitive to copying process.

D. Paper (4): A Survey of RFID Authentication Protocols Based on Hash-Chain Method

In paper [4] RFID authentication protocols in this study provide privacy and anonymity. Hash chain method is used in these RFID authentication protocols in various ways a unique solution for security and privacy problems of RFID technology. As a result, while problems in particular cases can be addressed, other problem is arising. Therefore, it can be concluded that recent RFID authentication protocols with hash chain failed to satisfy an integrated security and privacy solutions for RFID.

E. Paper (5): Survey on information hiding techniques using QR barcode

This paper [5] describes QR barcode and its use in different information hiding techniques. Such techniques employ traditional information hiding mechanisms like hash functions, image steganography, symmetric key algorithms, etc. in conjunction with QR barcodes. SD-EQR makes use of user entered password to formulate a private key and generates a QR barcode of the encrypted information. Finally the paper compares these techniques.

F. Paper (6): Design and Implementation of an RFID-Based Customer Shopping Behavior Mining System

In this paper [6], the design, implementation and evaluation of Shop Miner, an RFID-based shopping behavior mining system for physical clothing stores is presented. With an RFID tag attached to each garment, Shop Miner could detect which garments customers stop beside, pick out, turn around, or pair up. Such shopping behavior data could benefit retailers to discover popular categories, hot items, and correlated pairs for better trading strategies and tie-in promotions. In this paper the accuracy and robustness of Shop Miner in various testing scenarios is examined. Results show that Shop Miner achieves high accuracy in customer shopping behavior identification and holds potential for practical deployment.

G. Paper (7): VLSI Characterization of the Cryptographic Hash Function BLAKE

In this Paper [7] the future cryptographic hash standard SHA-3 should be suitable and flexible for a wide range of applications, featuring at the same time an optimal security strength. In this work, we presented a complete hardware characterization of the BLAKE candidate, using different design approaches to generate fully-autonomous high-speed and compact implementations. A round rescheduling technique and a special-purpose memory design are also proposed. Post-synthesis results of speed optimized architectures demonstrate a throughput improvement of up to 36% for 256-bit hashing and up to 16% for 512-bit compared to iterative bounded implementations of the current standard

SHA-2. Furthermore, a low-power compact implementation of BLAKE-32 has been fabricated in a 0.18 μ m CMOS. Measurements reveal a minimal power dissipation of 130 μ W at the RFID nominal frequency of 13.56MHz.

H. Paper (8): Image Based Password Authentication

In this paper[8] the user is having the choice to select minimum one and maximum N number of colour image block, therefore the user is having the flexibility to select the any kind of password i.e. sequence of selecting images from gallery. In this paper security is achieved because only legal user is known that what kind of color image block selected and in what sequence Image- based authentication techniques, although currently in their infancy, might have a wider applicability in future common security goal in password-based authentication systems is to maximize the effective password . We perceive it more user-friendly technique that helps to increase the password quality tremendously compared to a text-based approach. In this paper we have proposed simple secure authentication technique issues of how better to protect the available information.

III. SYSTEM ARCHITECTURE

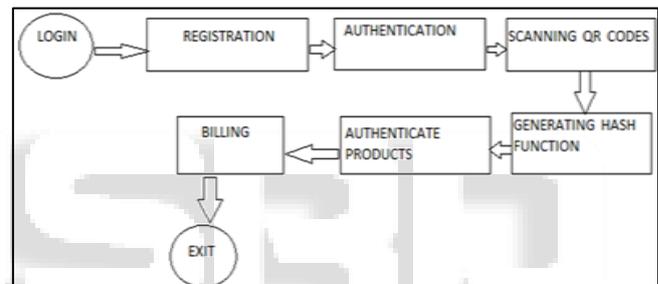


Fig. 1: System Architecture

IV. CONCLUSION

The proposed system is helpful to both user and mall managers. The system is developed considering all issues related to all users included. Variety of customers can use this system if they know how to operate android smartphones. The product is user friendly, low-cost and does not need any special training. Our scheme would prove time saving and ease the shopping process for many people using the system. The advantages of the system make it more robust.

REFERENCES

- [1] Paper-based Document Authentication using Digital Signature and QR Code 2012 4th International Conference on Computer Engineering and Technology (ICCET 2012) IPCSIT vol.40 (2012) © (2012) IACSIT Press, Singapore Maykin Warasart and Pramote Kuacharoen+Department of Computer Science, Graduate School of Applied Statistics National Institute of Development Administration 118 Serithai Rd. Bangkok, Bangkok 10240 Thailand
- [2] Hash- Chain Based Product Authentication Scheme. Montana Earle (SUNY Potsdam) Dr. MankiMin; Research Advisor Dr. Brian Logue; REU Site Director Dr. Alfred Boysen; Professor Assisted by Harshith Keni, Grad Student, SDS

- [3] Printed Document Authentication Using Two Level Qr Code Tkachenko^{1,2}, W. Puech¹, O. Strauss¹ Laboratory LIRMM, UMR CNRS 5506 University of Montpellier 860 rue de St Priest, 34090 Montpellier Cedex 5, France C. Destruel², J.-M. Gaudin² Authentication Industries CAP OMEGA, Rond-point Benjamin Franklin 34960 Montpellier Cedex 05, France protocol using a secret value,” Computer Communications, vol. 34, no. 3, pp. 391–397, 2011. [B. Song and C. J. Mitchell, “Rfid authentication protocol for low-cost tags,” in Proc. the first ACM conference on Wireless network security. ACM, 2008, pp. 140–147.
- [4] B. A. Logue, J. Kern, S. Altena, J. Petersen, S. Rasmusen, R. Oda, and J. J. Kellar, “Countering counterfeiting of drugs: Unique fluorescent inks for direct printing onto pharmaceuticals,” in Proc. NIP Digital Fabrication Conference, vol. 2015, no. 1, 2015, pp. 371–374.
- [5] A Survey of RFID Authentication Protocols Based on Hash-Chain Method Irfan Syamsuddina, Tharam Dillon^b, Elizabeth Chang^c, and Song Hand aState Polytechnic of Ujung Pandang, Indonesia b,c,dDEBI Institute, Curtin University of Technology, Australia irfans@ poliupg.ac.id, tharam@it.uts.edu.au, change@cbs.curtin.edu.au, song.han@cbs.curtin.edu.au
- [6] Survey On Information Hiding Techniques Using Qr Barcode Manoj S. Rewatkar¹ and Shital A. Raut² 1,2Department of Computer Science and Engineering, Visvesvaraya National Institute of Technology, Nagpur, Indiamanojrewatkar143@gmail.com saraut@cse.vnit.ac
- [7] Design and Implementation of an RFID-Based Customer Shopping Behavior Mining System Zimu Zhou, Student Member, IEEE, Longfei Shangguan, Student Member, IEEE, ACM, Xiaolong Zheng, Member, IEEE, ACM, Lei Yang, Member, IEEE, and Yunhao Liu, Fellow, IEEEVLSI Characterization of the Cryptographic Hash Function BLAKE
- [8] Luca Henzen, Student Member, IEEE, Jean-Philippe Aumasson, Willi Meier, and Raphael C.-W. Phan, Member, IEEE
- [9] Image Based Password Authentication Prafulla P. Chaudhari, Savita B. Hajare, Poonam S. Bhusare E & TC & Pune University Maharashtra, India