# Review on QR codes security mechanism in ECommerce application

[1]Nidhi, Department of CSE, CBS GROUP OF INSTITUTIONS,  JHAJJAR ,HARYANA
[2]Nishika Gulia,  Assistant Professor, Department of CSE, CBS GROUP OF INSTITUTIONS,  JHAJJAR ,HARYANA

**Abstract:** This research take account of QR codes security mechanism in ecommerce application, its real time application in day to day life & research areas associated. With the technology of mobile phones constantly emerging, especially in the area of mobile internet access, QR codes seem to be an adequate tool to quickly & efficiently converse URLs to users. It also allows offline media such as magazines, newspapers, business cards, public transport vehicles, signs, t-shirts & any other medium that may embrace print of a QR code to be used as carriers for advertisements for online products. QR code being so versatile because of its structural flexibility that it leads to so many diverse field for research such as increasing data capacity, security applications such as different kinds of watermarking & steganography as well. Several experiments have also been done for better recognition of QR code image which consists of scratch removal techniques. QR codes have capability to symbolize same amount of data within approximately one tenth space of a traditional barcode statistically. Information like URL, SMS, contact information & plain text may be embedded into two dimensional matrix. Moreover, with explosive increment of trend to utilize smartphones has played a significant role within popularity of QR codes.

**Keywords—** QR code, E-Commerce, ATM, Universal Product Code (UPC), watermarking, security, data capacity, scratch removal

## [1] Introduction

QR code stands for Quick Response Code that is the trademark for the type of matrix barcode. It was first designed for the automotive industry by Denso Wave in Japan. QR Code system has become admired outside automotive industry because of its fast readability & greater storage capacity compared to standard UPC barcodes.

A barcode is an optical machine-readable exemplification of data relating to object to which it is committed. Primitively barcodes represented data by varying widths & spacings of parallel lines, & may be referred to as linear or one-dimensional. Later they evolved into rectangles, dots, hexagons & other geometric patterns in two dimensions. Albeit 2D systems use a variety of symbols, they are in general referred to as barcodes as well. QR code stands for Quick Response Code, Which is

trademark for type of matrix barcode which was invented by Japanese corporation Denso Wave. QR code has a number of features such as large capacity data encoding, dirt & damage resistant, high speed reading, small print out size, 360 degree reading & structural flexibility of application. QR codes have become common within consumer advertising. Typically, a smartphone is used as a QR code scanner, displaying code & converting it to some useful form (such as a standard URL for a website, thereby obviating need for a user to type it into a web

browser). QR code has become a focus of advertising strategy, since it provides a way to access a brand's website more quickly than by manually entering a URL. Beyond mere convenience to consumer, importance of this capability is that it increases the conversion rate (the chance that contact with advertisement will

convert to a sale), by coaxing interested prospects further down the conversion funnel with little delay or effort, bringing viewer to advertiser's website immediately, where a longer & more targeted sales pitch may lose viewer's interest. QR code system was invented within 1994 by Denso Wave. Its purpose was to track vehicles during manufacture; it was designed to allow high-speed component scanning. Although initially used for tracking parts within vehicle manufacturing, QR codes now are used within a much broader context, including both commercial tracking applications & convenience-oriented applications aimed at mobile-phone users. QR codes may be used to display text to user, to add a vCard contact to user's device, to open a Uniform Resource Identifier, or to compose an e-mail or text message. Users may generate & print their own QR codes for others to scan & use by visiting one of several paid & free QR code generating sites or apps. technology has since become one of most-used types of two-dimensional barcode.

**Standards**

There are several standards that cover encoding of data as QR codes:

- October 1997 – AIM (Association for Automatic Identification & Mobility) International

- January 1999 – JIS X 0510

- June 2000 – ISO/IEC 18004:2000 Information technology – Automatic identification & data capture techniques – Bar code symbology – QR code (now withdrawn)
  Defines QR code models 1 & 2 symbols.

- 1 September 2006 – ISO/IEC 18004:2006 Information technology – Automatic identification & data capture techniques – QR code 2005 bar code symbology specification
  Defines QR code 2005 symbols, an extension of QR code model 2. Does not specify how to read QR code model 1 symbols, or require this for compliance.

- 1 February 2015 – ISO/IEC 18004:2015 Information – Automatic identification & data capture techniques – QR Code barcode symbology specification Renames QR Code 2005 symbol to QR Code & adds clarification to some procedures & minor corrections.

## [2] Benefits of QR Code

QR codes have become common within consumer advertising. Typically, a smart phone is used as a QR code scanner, displaying code & converting it to some useful form (such as a standard URL for a website, thereby obviating need for a user to type it into a web browser). QR code has become a focus of advertising strategy, since it provides a way to access a brand's website more quickly than by manually entering a URL. Beyond mere convenience to consumer, importance of this capability is that it increases the conversion rate (the chance that contact with advertisement will convert to a sale), by coaxing interested prospects further down the conversion funnel with little delay or effort, bringing viewer to advertiser's website immediately, where a longer & more targeted sales pitch may lose viewer's interest.

Although initially used to track parts within vehicle manufacturing, QR codes are now used over a much wider range of applications, including commercial tracking, entertainment & transport ticketing, product/loyalty marketing (examples: mobile couponing where a company's discounted & percent discount may be captured using a QR code decoder which is a mobile app, or storing a company's information such as address & related information alongside its alpha-numeric text data as may be seen within Yellow Pages directory), & in-store product labeling. It may also be used within storing personal information for use by organizations. An example of this is Philippines National Bureau of Investigation (NBI) where NBI clearances now come with a QR code. Many of these applications target

mobile-phone users (via mobile tagging). Users may receive text, add a vCard contact to their device, open a URI, or compose an e-mail or text message after scanning QR codes. They may generate & print their own QR codes for others to scan & use by visiting one of several pay or free QR code-generating sites or apps. Google had a popular API to generate QR codes, and apps for scanning QR codes may be found on nearly all smart phone devices. QR codes storing addresses & URLs may appear within magazines, on signs, on buses, on business cards, or on almost any object about which users might want information. Users with a camera phone equipped with correct reader application may scan image of QR code to display text, contact information, connect to a wireless network, or open a web page within telephone's browser. This act of linking from physical world objects is termed hard linking or object hyper linking. QR codes also may be linked to a location to track where a code has been scanned. Either application that scans QR code retrieves geo information by using GPS & cell tower triangulation (aGPS) or URL encoded within QR code itself is associated with a location.

## [3] LITERATURE REVIEW

### [1] Kinjal H. Pandya1 , Hiren J. Galiyawala(2014) made A Survey on QR Codes: within context of Research & Application

This paper take account of QR codes basics, its real time application within day to day life & research areas associated. With technology of mobile phones constantly emerging, especially within area of mobile internet access, QR codes seem to be an adequate tool to quickly & efficiently converse URLs to users. This also allows offline media such as magazines, newspapers, business cards, public transport vehicles, signs, t-shirts & any other medium that may embrace print of a QR code to be used as carriers for advertisements for online products. QR code being so versatile because of its structural flexibility that it leads to so many diverse field for research such as increasing data

capacity, security applications such as different kinds of watermarking & steganography as well. Some experiments have also been done for better recognition of QR code image that includes scratch removal techniques. Thus, this paper is an attempt to highlight some of possible research areas while considering QR codes.

**This paper concludes** that there are so many possibilities for QR code's use within different areas that is yet to be explored. technology has a firm ground for research aspects. More & more experiments are done with QR codes within different aspects like enhancing security, better recognition, reducing redundancy within order to save space, possibility of encoding different kind of data like audio, etc. As QR code provides structural flexibility, it opens up huge platform for researchers to explore possibilities to enhance performance of QR code or to merge QR code with different technologies, like Experiments may be done to improve data capacity of QR codes, To find out possibility of use of coding techniques other than RS coding, Use encryption to encode data first, & then encode it to QR code for better security solutions.

### [2] TAN SHIANG-YEN, LONG YOON FOO, ROSNAH IDRUS wrote paper on "Application of Quick Response (QR) Codes within Mobile Tagging System for Retrieving Information about Genetically Modified Food"

The purpose of this paper is to introduce an integrated mobile tagging system, which may be used by consumers to retrieve product information about Genetically Modified Food (GMF) products within market. within proposed mobile tagging system, 2 dimensional Quick Response (QR) codes are adopted as tag for identification purpose. Consumers may use camera on their mobile phone to capture image of QR codes & send to server for decoding. Subsequently, server sends back details of GMF product within form of Multimedia Message Service (MMS). This paper reviews & discusses various available tagging

techniques, & thus justifies appropriateness of QR codes to be used within proposed system. Additionally, paper presents overall system architecture & system design of proposed mobile tagging system.

This system has potential to change existing way of retrieving shopping information & advertising. Nonetheless, major challenge of implementing this system is need of collaboration across various parties within supply chain & government agencies as well. Thus, it is important to ensure system will grow to incorporate more sophisticate functions & introducing attractive revenue stream to participants of system. within terms of academic & research, this paper proposed an application of mobile tagging technology within genetically modified food, which is an emerging trend, especially within developing country. This study provide a foundation for future study to propose more comprehensive application & solution within application area of genetically modified food tagging, which is much neglected within computer science study.

**[3] Katharina Krombholz, Peter Fr¨uhwirt, Peter Kieseberg, Ioannis Kapsalis wrote on "QR Code Security: A Survey of Attacks & Challenges for Usable Security"**

QR (Quick Response) codes are two-dimensional barcodes with ability to encode different types of information. Because of their high information density & robustness, QR codes have gained popularity within various fields of application. Even though they offer a broad range of advantages, QR codes pose significant security risks. Attackers may encode malicious links that lead e.g. to phishing sites.

## 4.PROBLEM FORMULATION

### Virtual stores

During month of June 2011, according to one study, 14 million mobile users scanned a QR code or a barcode. Some 58% of those users scanned a QR or barcode from their homes, while 39% scanned from retail stores; 53% of 14

million users were men between ages of 18 & 34. use of QR codes for "virtual store" formats started within South Korea, & Argentina, but is currently expanding globally. Walmart, Procter & Gamble & Woolworths have already adopted Virtual Store concept.

### Mobile operating systems

QR codes may be used on various mobile device operating systems. These devices support URL redirection, which allows QR codes to send metadata to existing applications on device. Many paid or free apps are available with ability to scan codes & hard-link to an external URL.

### Website login

QR codes may be used to log within into websites: a QR Code is shown on login page on a computer screen, & when a registered user scans it with a verified smar tphone, they will automatically be logged in. Authentication is performed by smart phone which contacts server. Google tested such a login method within January 2012.

### Encryption

Encrypted QR codes, which are not very common, have a few implementations. An Android app, for example, manages encryption & decryption of QR codes using DES algorithm (56 bits). Japanese immigration system uses encrypted QR codes when issuing visa within passports as shown within figure to right

### DESIGN

Unlike older, one-dimensional barcodes that were designed to be mechanically scanned by a narrow beam of light, a QR code is detected by a 2-dimensional digital image sensor & then digitally analyzed by a programmed processor. processor locates three distinctive squares at corners of QR code image, using a smaller square near fourth corner to normalize image for size, orientation, & angle of viewing. small dots throughout QR code are then converted to binary numbers & validated with an error-correcting algorithm.

### Storage

The amount of data that may be stored within QR code symbol depends on data type (mode, or input character set), version (1, …, 40, indicating overall dimensions of symbol), & error correction level. maximum storage capacities occur for 40-L symbols.

Here we will discuss use role of QR Code within securing details of items that are represented on e-commerce based site.

## [5] OBJECTIVES OF RESEARCH

This research security issues within E-commerce system related to QR Codes. Objectives of research are as follow:

1. During our research we will investigate security threats to Ecommerce system.
2. What are existing security mechanisms & what are their loop holes.
3. How QR Code will enhance security of Ecommerce system.
4. How It would be better than classical bar coding mechanisms
5. Our work includes different attack schemes on QR Codes aiming to retrieve an alternated content when decoded, by repainting parts of QR Code.
6. This thesis also examines how easy it is to trick users into scanning QR Codes.
7. Investigation of users' level of security awareness against threats related to QR Codes.
8. QR Codes could be used to prevent phishing attacks.

## [6] METHODOLOGY/ PLANNING OF WORK

**Existing threats to E-Commerce base system**

**There are several threats to e-commerce based system.**

A hacker is someone who seeks & exploits weaknesses within a computer system or computer network. Hackers may be motivated by a multitude of reasons, such as profit, protest, or challenge. subculture that has evolved around hackers is often referred to as computer underground & is now a known community. While other uses of word hacker exist that are not related to computer security, such as referring to someone with an advanced understanding of computers & computer networks, they are rarely used within mainstream context. They are subject to longstanding hacker definition controversy about term's true meaning.

In this controversy, term hacker is reclaimed by computer programmers who argue that someone who breaks into computers, whether computer criminal (black hats) or computer security expert (white hats), is more appropriately called a cracker instead. Some white hat hackers claim that they also deserve title hacker, & that only black hats should be called crackers.

**Security exploits**

A security exploit is a prepared application that takes advantage of a known weakness. Common examples of security exploits are SQL injection, Cross Site Scripting & Cross Site Request Forgery which abuse security holes that may result from substandard programming practice. Other exploits would be able to be used through FTP, HTTP, PHP, SSH, Telnet & some web-pages. These are very common within website/domain hacking.

**Techniques**

**Vulnerability scanner**

A vulnerability scanner is a tool used to quickly check computers on a network for known weaknesses. Hackers also commonly use port scanners. These check to see which ports on a specified computer are "open" or available to access computer, & sometimes will detect what program or service is listening on that port, & its version number. (Firewalls defend computers from intruders by limiting access to ports & machines, but they may still be circumvented.)

**Password cracking**

Password cracking is process of recovering passwords from data that has been stored within or transmitted by a computer system. A common approach is to repeatedly try guesses for password.

**Spoofing attack (Phishing)**

A spoofing attack involves one program, system or website that successfully masquerades as another by falsifying data & is thereby treated as a trusted system by a user or another program—usually to fool programs, systems or users into revealing confidential information, such as user names & passwords.

**[7] CONCLUSION**

Existing threats to E-Commerce base system have several threats. Firewalls defend computers from intruders by limiting access to ports & machines, but they may still be circumvented. QR Codes could be used to prevent phishing attacks. It also allows offline media such as magazines, newspapers, business cards, public transport vehicles, signs, t-shirts & any other medium that may embrace print of a QR code to be used as carriers for advertisements for online products. It would be better than classical bar coding mechanisms.

**References:**

1. H. Kato & K.T. Tan, "2D barcodes for mobile phones," Proc. Mobile Technology, Applications & Systems, 2005 2nd International Conference on, 2005, pp. 8 pp.-8.

2. E. Toye, et al., "Interacting with mobile services: an evaluation of camera-phones & visual tags," Personal Ubiquitous Comput., vol. 11, no. 2, 2007, pp. 97-106.

3. T.S. Parikh, "Using mobile phones for secure, distributed document processing within developing world," Pervasive Computing, IEEE, vol. 4, no. 2, 2005, pp. 74-81.

4. S.N. Junaini & J. Abdullah, "MyMobiHalal 2.0: Malaysian mobile halal product verification using camera phone barcode scanning & MMS," Proc. Computer & Communication Engineering, 2008. ICCCE 2008, 2008, pp. 528-532.

5. E. O'Neill, et al., "Reach Out & Touch: Using NFC & 2D Barcodes for Service Discovery & Interaction with Mobile Devices," Pervasive Computing, Lecture Notes within Computer Science 4480, A. LaMarca, et al., eds., Springer Berlin / Heidelberg, 2007, pp. 19-36.

6. Jose Rouillard, "Contextual QR Codes," iccgi, pp.50-55, 2008 Third International Multi-Conference on Computing within Global Information Technology (iccgi2008), 2008

7. BarcodeContents: A rough guide to standard encoding of information within barcodes Updates June 28, 2010 http://code.google.com/p/zxing/wiki/BarcodeContents

8. Denso-Wave a Toyota subsidiary & Inventors of QR Code. http://www.denso-wave.com/qrcode/qrstandard-e.html

9. QR Code Features. http://www.denso-wave.com/qrcode/qrfeature-e.html

10. Triple DES Algorithm: http://tools.ietf.org/html/rfc2420

11. Investigator's Guide to Steganography Gregory Kipper Auerbach Publications 2004 Print ISBN: 978-0-8493-2433-8 eBook ISBN: 978-0-203-50476-5

12. Birgit P_tzmann, Information Hiding Terminology, First Workshop of Information Hiding Proceedings, Cambridge, U.K. May 30 - June 1, 1996. Lecture Notes within Computer Science, Vol.1174, pp 347-350. Springer-Verlag (1996).