

MEDICAL CERTIFICATE VERIFICATION
SYSTEM USING QR CODE

LAI CHONG LAN

BACHELOR OF COMPUTER SCIENCE
(GRAPHICS & MULTIMEDIA TECHNOLOGY)

UNIVERSITI MALAYSIA PAHANG

ABSTRACT

A medical certificate verification system based on QR technology is described in this project. Based on the problem statement, medical certificate is university used to as a record that an employee unable to attend to an office. It is simply too easy to obtain a sick certificate and to stay off work on full pay. Forged medical certificate has been used by students to absent their class. However, due to lack of integrity among the citizens, people tend to purchase or create forged medical certificates from various website that offers these documents. The objectives of this project are to study the QR technology and document authentication process, and also develop a medical certificate verification system using QR code and to validate the functionality of the system. The QR technology method is applied in this project for performing an easy way to check the verification of a medical certificate. The method that have been used is for encode the information data to protect the data from being forge. Thus, the end user can verify the medical certificate using any device with QR reader application to decode the data and get the real information from it.

Keyword: medical certificate verification system, QR code

ABSTRAK

Sistem pengesahan sijil cuti sakit berasaskan teknologi QR yang dinyatakan di dalam projek ini. Berdasarkan pernyataan masalah, sijil cuti sakit adalah universiti yang digunakan sebagai rekod bahawa pekerja tidak dapat hadir ke pejabat. Ini terlalu mudah untuk mendapatkan sijil cuti sakit dan untuk menuntut gaji penuh. Sijil sakit cuti yang palsu telah digunakan oleh pelajar untuk tidak menghadiri kelas mereka. Walau bagaimanapun, disebabkan oleh kekurangan integriti di kalangan rakyat, orang cenderung untuk membeli atau membuat sijil sakit cuti yang palsu dari pelbagai laman web yang menawarkan dokumen-dokumen ini. Objektif projek ini adalah untuk mengkaji QR teknologi dan pengesahan dokumen proses tersebut, dan juga membangunkan sistem pengesahan sijil perubatan menggunakan kod QR dan untuk mengesahkan fungsi sistem. QR kaedah teknologi digunakan dalam projek ini untuk melakukan satu cara yang mudah untuk memeriksa pengesahan sijil perubatan. Kaedah yang digunakan adalah untuk mengekod data maklumat untuk melindungi data daripada menjadi tergamak. Oleh itu, pengguna boleh mengesahkan sijil cuti sakit dengan menggunakan mana-mana peranti dengan pembaca QR aplikasi untuk mengesahkan data dan maklumat yang sebenar.

Kata kunci: Sistem pengesahan sijil cuti sakit, kod QR

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CHAPTER 1

INTRODUCTION

1.1 Introduction

A medical certificate also known as a doctor's certificate[1][2] is a statement from a physician or other health care provider that attests to the result of a medical examination of a patient[3]. It can serve as a "sick note" (documentation that an employee is unfit for work) or evidence of a health condition. With recent development in information technology, IT convergence has been achieved ubiquitously in all areas of industry. Medical certificates (MC) are importance in many cases. MC is university used to as a record that an employee unable to attend to an office. Also most universities in their guidelines state that a student having 65% attendance may be permitted to write their final semester exams on producing a medical certificate. However, due to lack of integrity among the citizens, people tend to purchase or create forged medical certificates from various website that offers these documents. This goes to show why it is important to check medical certificates. It is simply too easy to obtain a sick certificate and to stay off work on full pay. Forged medical certificate has been used by students to absent their class. Apart from fraudsters selling fake certificates, there are also doctors who either sell

certificates or who simply book malingerers off work when they are not ill. Not only can that but employees themselves create false certificates using Photoshop.

In this thesis, a QR code with medical certification method by cryptology is proposed. The effectiveness of the medical certificate verification system is ensured based on the information stored in the QR code generated that printed on the medical certificate. A QR reader application can be appear to be essential because it needed to scan QR code in order to obtain the information that stored in the code which is able to checking the authentication of the medical certification.

1.2 Problem Statement

At the present time, for the consumer when they want to check the authentication of certain medical certificate, they need to authenticate the number series in printed on medical certificate by contact the doctor or clinic/hospital to ensure that medical certificate is true. Thus, it will take time to check the medical certificate.

Apart from that, based on the research that had done the last few years have seen a rise in the use forged medical certificates in students and employees. In addition, universities and companies need a medical certificate and ignored the process of authentication of medical certificate, so they take a shortcut. In present-day working conditions, employers expect employees to submit a medical certificate if they have been absent from work because of illness. Medical certificates serve as security for employers. However, the

incidence of fraud in the form of forged medical certificates is on the rise in workplaces. If an employee is unable to prove that a medical certificate is valid, disciplinary charges may be brought against him/her. Employers must make a concerted effort to ensure that the use of false medical certificates is prevented or stopped.

1.3 Objective

The objectives of the research are to:

- i. To study the QR code technology and document authentication process
- ii. To develop a medical certificate verification system using QR code
- iii. To validate the functionality of the system

1.4 Scope

This scope of this project is defined below:

- i. User
The target user of this system is the admin clinic and employers.
- ii. Medical Certificate

The information of medical certificate will be used for data entry that store inside a database in specific website. The information stored in the QR code generated that printed on the medical certificate.

iii. Retrieves data

QR reader is use to scan and decode to retrieve the input data from that particular website.

1.5 Summary

This chapter will discuss on introduction to our research and find out the problem. Meanwhile, it also to investigate what is our objective and scope for this research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In recent years, the proportion of mobile devices, especially smart phones among computing devices has gradually increased. Due to busy daily lives and explosive increase in a lot of information, mobile devices have widely been used in a more diversified way. Quick Response codes (QR codes) can be considered as encrypted messages; after all no human eye is able to decode it. Thus, the functionality of QR codes is so versatile that they have been used by so many people for a myriad of reasons, and list only continues to grow and expand across a number of industries. They are not very common, since most QR codes are used in marketing, and the developers of those codes want them to be accessible by everyone.

Besides that, applications that already exist are to use encrypted QR codes on products packaging, advertising, in show window display and more for business marketing. This application is built for customer guarantees that

any copyrights to any components of products, designs, trademarks that are employed for inclusion in the custom QR codes are either owned by customer.

Recently, security and authenticity of data is a big challenge. Medical certificate verification system using QR code was developed to increase the security of medical certificate. In this medical certificate verification system, the information that encrypted in the QR codes needs to be decoded by using QR reader applications. A QR reader application can be appear to be essential because it needed to scan QR code in order to obtain the information that stored in the code which is able to checking the authentication of the medical certification. Then based on the information the verification of medical certificate is checked.

2.2 Previous System

2.2.1 QR Code on the Prescription of Medicine

The first previous system is according to the research by Myung-Jae Lim, Dong-Keun Jang and Myung-Gwon Kim provides a new enhancing medical prescription design using QR code [4]. The main focus of this system is they want to use QR code to convert the form of the prescription issued to patients. According to the data of the National Health Insurance Corporation, the number of hospitals across the country was more than 82,300, that of medical personnel approximately 47 million, and that of admission days about 1 billion as of 2011, which indicates that the contents shown by above figures should be processed and kept in hospitals or pharmacies [5]. Thus, this paper proposes an order communication system using QR codes as a method to

ensure the confidentiality of the prescription that contains sensitive information to its disclosure and store information efficiently.

In this research it focuses on using the prescription that contains sensitive information to embed into QR code. The information in the form of QR code containing the name of treatment institution, treatment institution code, information for distinguishing patients, prescription code, prescription drug, data of registration and time. The information in the form of QR code is sent to the patient's contact number. When patients can take the medical certificate in the form of the QR code sent to their mobile phone to a pharmacy, a pharmacist there scans the QR code and refers as well as checks the prescription history based on the scanned information.

2.2.2 QR Code on the Identify Document

The second previous system is according to the research by RevathiM, Annapandi and Ramya a new enhancing security in identity documents using QR Code [6]. This system consists of QR reader and Biometrics finger print readers which are used to verify the certificate originality in order to eradicate fraudulent certificate. In this system, it focuses on using image of the certificate to generate into QR code and finger print of the person during the run time.

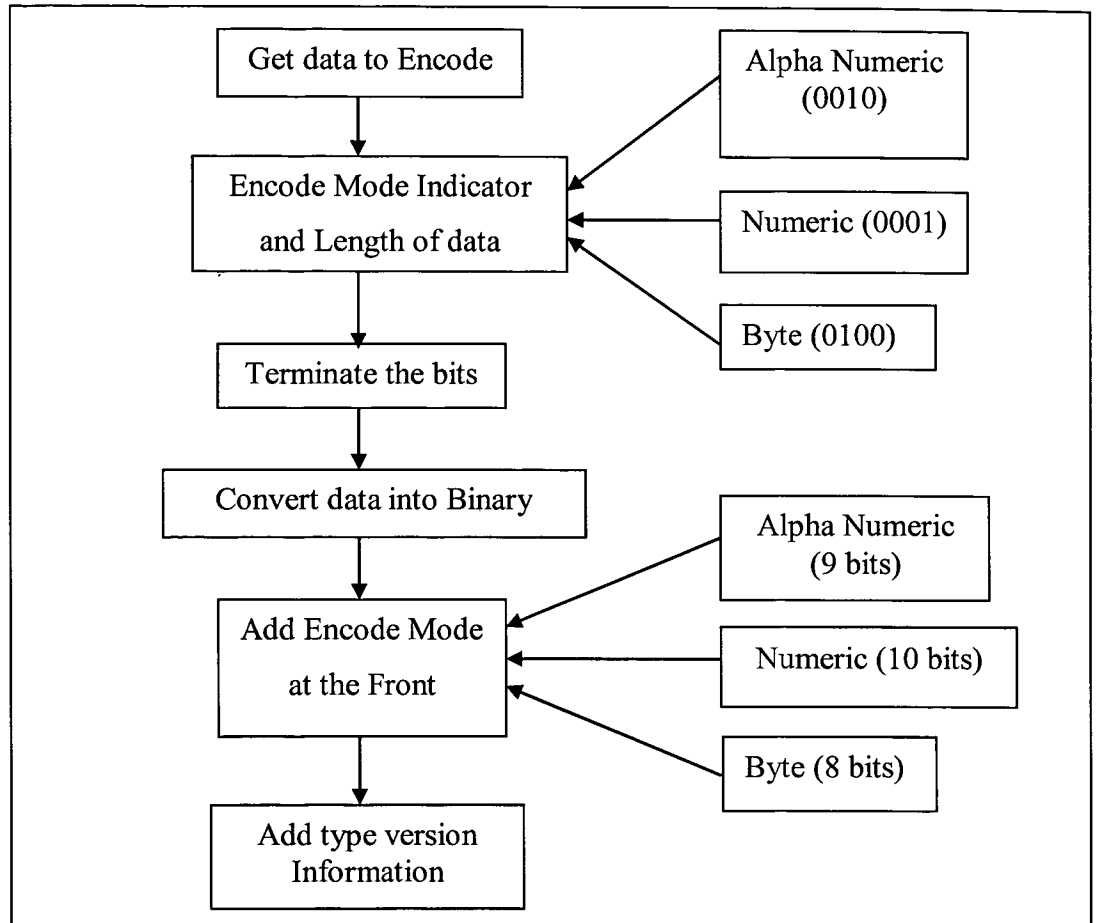


Figure 2.1: Algorithm to Create a QR code

Figure 2.1 shows the algorithm to create a QR code. Firstly input data is encoded in according to most efficient mode and formed bit stream. The bit streams are divided into code words. Then code words are divided into blocks, and add error correction code words to each block. All these code words are put into a matrix and are masked with mask pattern. Finally function patterns are added into the QR symbol. A QR Code symbol is formed. Alphanumeric encoding mode stores a message more compactly than the byte mode, but cannot store lower-case letters and has only a limited selection of punctuation marks. Two characters are coded in an 11-bit value by this formula: $V = 45 \times C1 + C2$

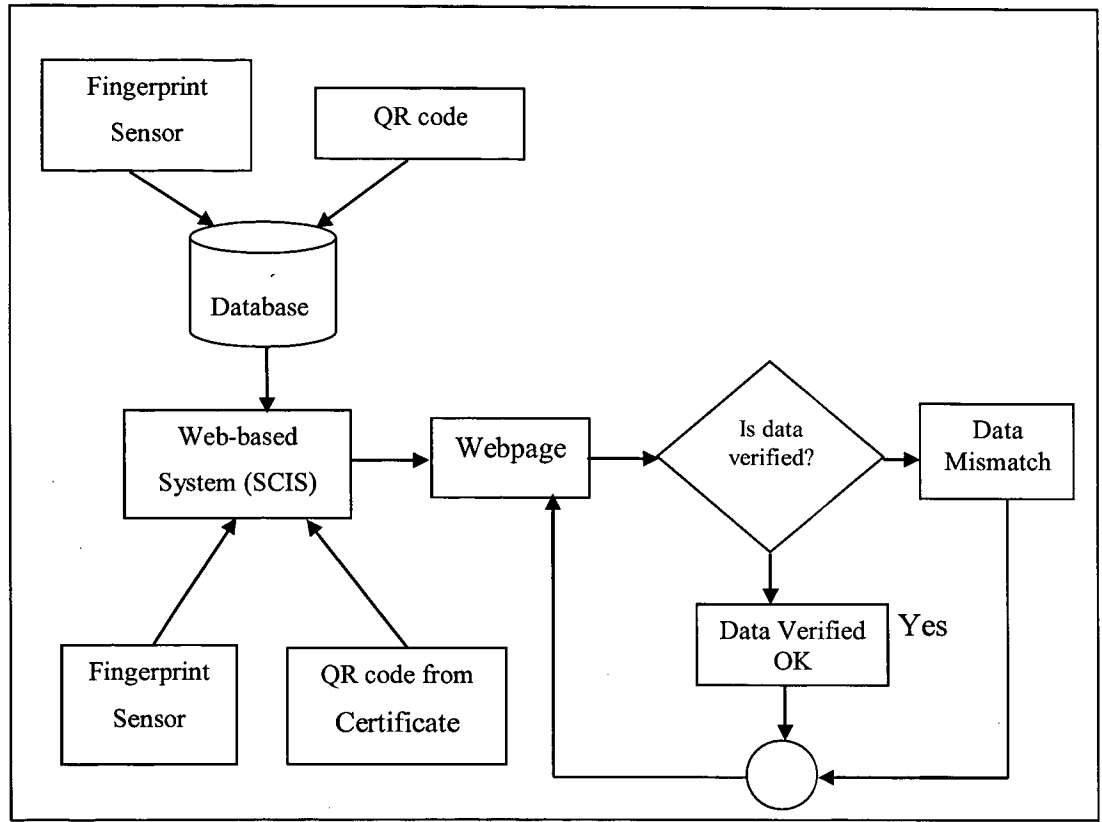


Figure 2.2: Overview Certificate Creation of Proposed Algorithm

In figure 2.2 shows the overview of proposed algorithm. The QR Code image consists of all the certificate details. The details embedded in the QR Code using the Alpha Numeric encoding techniques. Up to 7,089 characters can be encoded in one symbol. The name of the person, date of birth, register number, marks and fingerprint string are used for generate the QR Code. The fingerprints are enrolled from all the students and stored in the database. The fingerprint is differed from person to person. Fingerprint recognition refers to the automated method of verifying a match between two human fingerprints. During the runtime the QR Code is read from the certificate. The decoded details are compared with database. If the details are matched means the certificate was displayed.

2.2.3 Confidential Encrypted Data Hiding and Retrieval Using QR Authentication System

The third previous system is according to the research of Somdip Dey, Asoke Nath and Shalabh Agarwal to develop a new Confidential Encrypted Data Hiding and Retrieval Using QR Authentication System [7]. In this system, they save the essential data of each student in the QR Code, like the student's name, roll number, registration number, semester and year of study, marks obtained in different subjects and grades secured. But, all the data saved and embedded in the QR Code, are encrypted, and then the QR Codes are printed in the mark-sheet of the student. So, in future if the student or any other person wants to see their marks digitally or wants to send their academic information to any University or Organization in digital format, then they can just scan the QR Code and decrypt the embedded information and send the authentic data. This research is proposed a new method, where the marks obtained by a candidate will also be encoded in QR Code in encrypted form, so that if an intruder tries to change the marks in the mark sheet then he cannot do that in the QR Code, because the encryption key is unknown to him. In this method, they encrypt the mark sheet data using the TTJSA encryption algorithm. The encrypted marks are entered inside QR code and that QR code is also printed with the original data of the mark sheet. The marks can then be retrieved from the QR code and can be decrypted using TTJSA decryption algorithm and then it can be verified with marks already there in the mark sheet.

2.3 Table Of Comparison

The table 2.1 below shows the comparison between the three previous systems.

Table 2.1: The comparison of previous systems

Name of author	Name of system	Method used in system
Myung-Jae Lim, Dong-Keun Jang and Myung-Gwon Kim	Medical prescription design using QR Codes	This system is they want to use QR code to convert the form of the prescription issued to patients
RevathiM , Annapandi and Ramya	Enhancing Security in Identity Documents Using QR Code	This system is getting the QR code the certificate and finger print of the person during the run time.
Somdip Dey, Asoke Nath and Shalabh Agarwal	Confidential Encrypted Data Hiding and Retrieval Using QR Authentification System	The TTJSA encryption algorithm method is used to encrypt the mark sheet data