



QR Code Generator : A Security Perspective

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Abstract: Quick Response (QR) codes seem to appear everywhere these days. We can see them on posters, magazine ads, websites, product packaging and so on. Using the QR codes is one of the most intriguing ways of digitally connecting consumers to the internet via mobile phones since the mobile phones have become a basic necessity thing of everyone. In this paper, we present a methodology for creating QR codes by which the users enter text into a web browser and get the QR code generated. Drupal module was used in conjunction with the popular libqrencode C library to develop user interface on the web browser and encode data in a QR Code symbol. The experiment was conducted using single and multiple lines of text in both English and Thai languages. The result shows that all QR encoding outputs were successfully and correctly generated.

Key Words: QR code, Quick Response Code.

I. INTRODUCTION

The QR Code is a two-dimensional barcode which is categorized in matrix barcode that can store data information. QR stands for "Quick Response" as the creator intended the code to allow its contents to be decoded at high speed. It is introduced in Japan by Denso Corporation in 1994. This kind of barcode was initially used for tracking inventory in vehicle parts manufacturing and is now used in a variety of industries. Nowadays, mobile phones with built-in camera are widely used to recognize the QR code. There have been many URL shortening services that automatically generate QR code links to websites. Google is the first introduced URL shortening service that provides automatically generates QR codes. only 12 days after introducing Goo.gl, Bit.ly launched the same service. The URL shortening service shortens link and turn it into a QR code that, when scanned with a mobile QR code reader, automatically direct users to the shortened link. It really shows that QR codes are going to become more and more popular[1].

QR Code has been approved as an AIM Standard, a JIS Standard and an ISO standard. In 2000 years, QR Code is being issued as National standard in China. The QR code provides 40 specifications and correct grade such as L, M, Q, H. A QR Code can hold a considerably greater volume of information: 7,089 characters for numeric only, 4,296 characters for alphanumeric data, 2,953 bytes of binary (8 bits) and 1,817 characters of Japanese Kanji/Kana symbols. QR Code also has error correction capability. Data can be restored even when substantial parts of the code are distorted or damaged [2].

QR Code structure QR Code is comprised of black and white patterns on geometric plane surface in the two dimensions. It uses black pattern to stand for binary number 1, and white pattern to represent binary number 0. The QR code is capable of 360 degrees (Omni-directional). There are three finder patterns located at the corners. QR Code contains information in both the vertical and horizontal directions, whereas a bar code contains data in one direction only. QR Code holds a considerably greater volume of information than a bar code as shown in Fig1 shown below.



Fig 1: Representation of QR code and Bar Code

The symbol versions of the QR Code range from Version 1 to Version 40. Each version has a different module configuration or number of modules. (The module refers to the black and white dots that make up QR Code.) "Module configuration" refers to the number of modules contained in a symbol, commencing with Version 1 (21×21 modules) up to Version 40 (177×177 modules). The following figure 2 shows the module configuration of the basic QR codes [3].

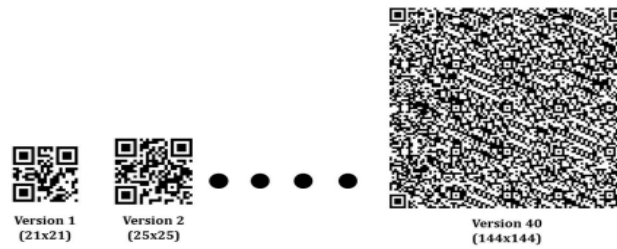


Fig. 2 Version module configuration of the QR Codes

Each QR Code symbol shall be built of square modules arranged in a regular square array and shall consist of function patterns and encoding region. And the whole symbol shall be surrounded on all four sides by a quiet zone border [5]. Function patterns are the shapes that must be placed in specific areas of the QR code to ensure that QR code scanners can correctly identify and orient the code for decoding. There are 4 types of function patterns; they are finder pattern, separator, timing patterns, and alignment patterns. Encoding region contains data, which represents version information, format information, data and error correction codewords. Fig 3 illustrates the structure of a QR Code symbol.

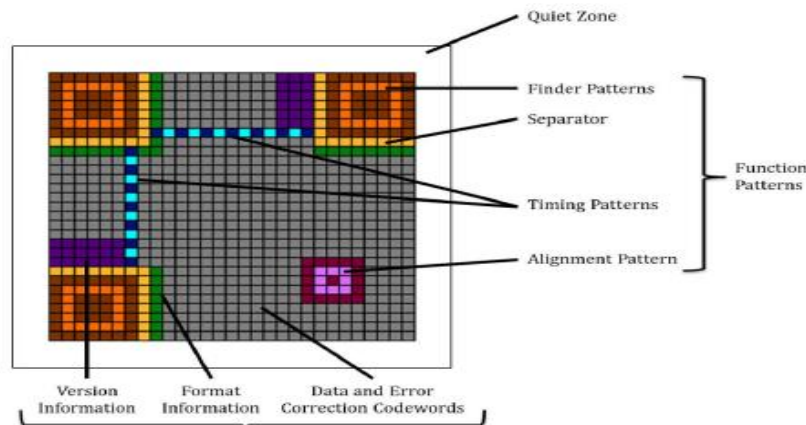


Fig 3: Structure of a QR Code symbol

II. METHODOLOGY

The project is a QR code generator with which a user can simply just by providing a link to a specific target webpage can create a QR code that points to that webpage. For doing this we are using a google charts of infographic APIs.

Syntax

Root URL: <https://chart.googleapis.com/chart?>

The infographics server returns an image in response to a URL GET or POST request. All the data required to create the graphic is included in the URL, including the image type and size. For example, copy and paste the following URL in your browser:

<https://chart.googleapis.com/chart?chs=150x150&cht=qr&chl=Hello%20world>

The image you see is a QR code representation of the phrase "Hello World". Try changing the phrase to your own name and refresh your browser. That's all it takes!

As we know QR codes are very secure but there are some potential security issues with a QR like phishing, malicious software creating fake QRs, QRs that takes you to any harmful websites, So to overcome some of the potential threats to the QR's users we integrated a security measure with only which an authenticated user can access the service. We created a module which authenticates users I.e. a user who want to use the service can create an account on our web-app and his/her data will be stored in our database, with which when a user tries to login we would validate if it is our registered customer.

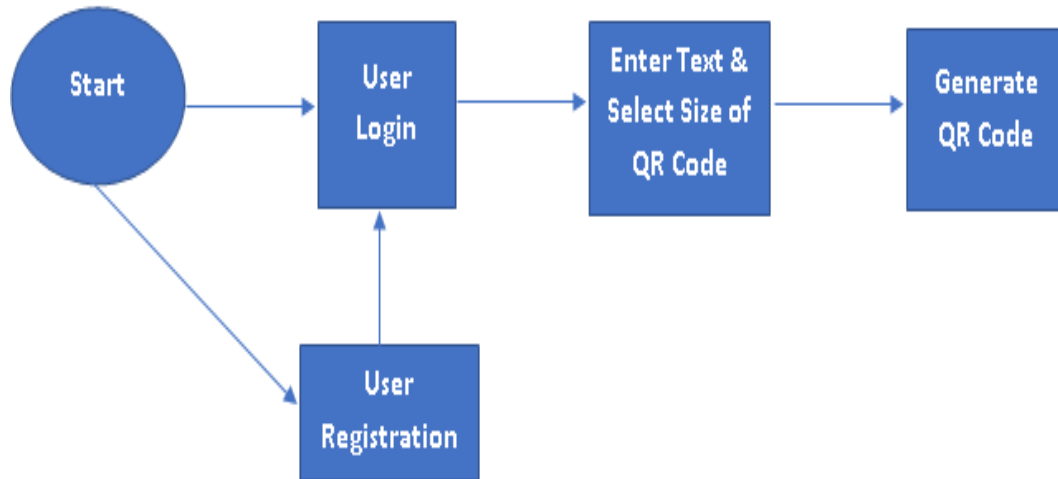
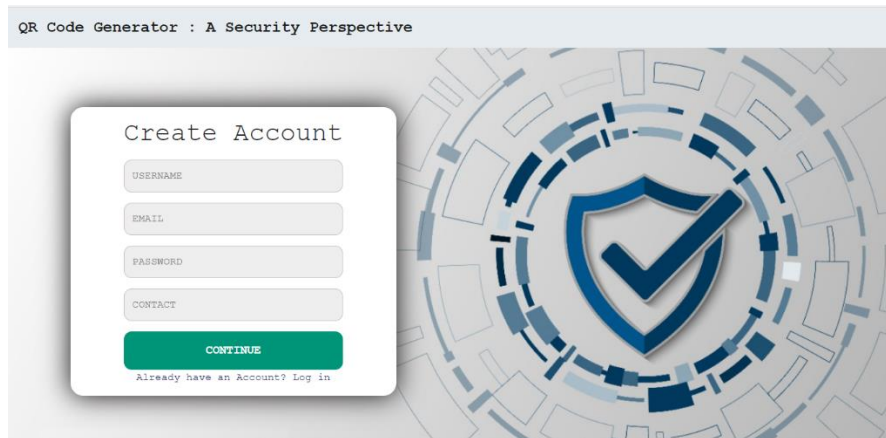


Fig. 4 : Flowchart of QR ode Generation

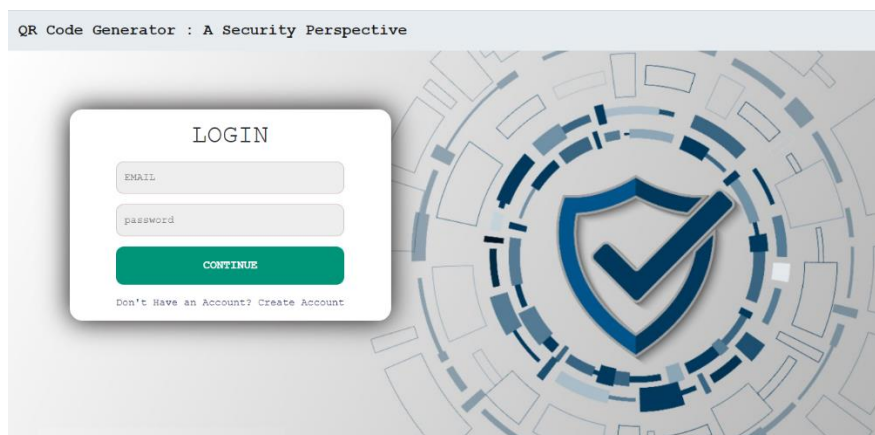
There is a login form structured with HTML styled with CSS and its functionality are being handled with the JS in front end part of the application. If a user is new to the web-app they can register themselves and get access to the services we provide.

III. WORKING OF THE PROJECT

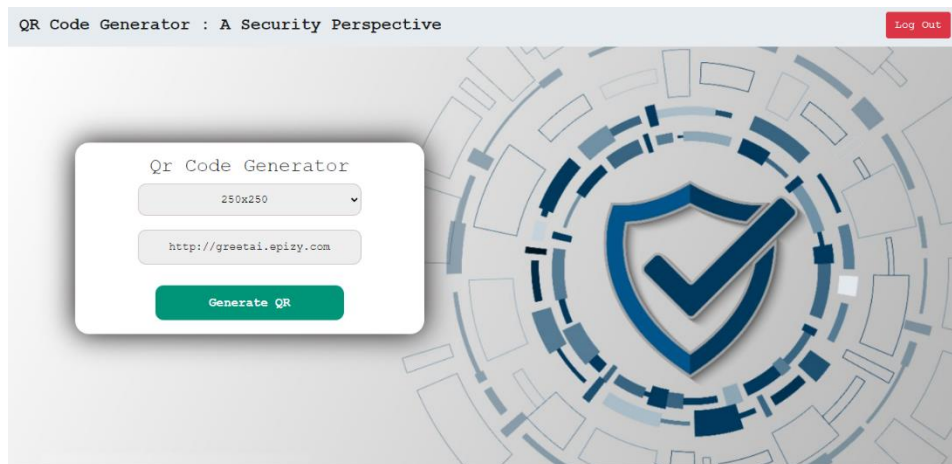
STEP 1 : Create Account using username, email, Password and contact number.



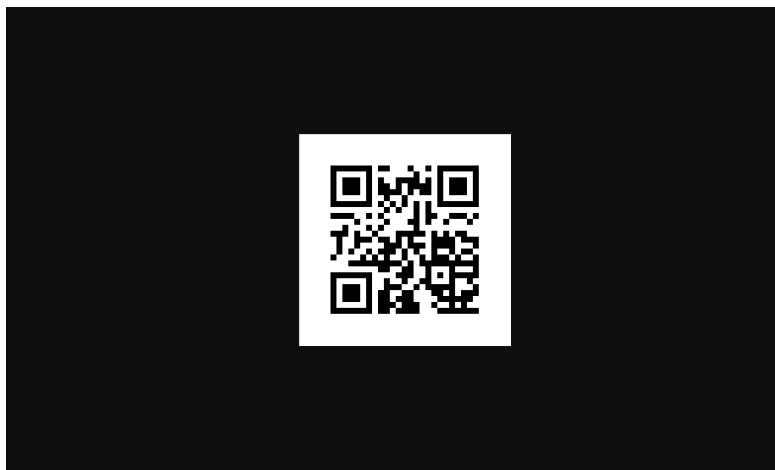
STEP 2 : Login Using registered email and password.



STEP 3 : After Successful Login , A new page will open with certain input field. i.e. size of Qr Code and Text(URL) field.



STEP 4 : After selecting size and fill text field, just click on Generate QR button.



Above figure shows the Generated QR for given URL. Also, we can create and share QR for any text URL etc.

IV. CONCLUSION

In this paper, we have illustrated that how we can easily generate the QR codes and can incorporate these QR codes to implement security features in any application by converting plain text or URL into QR codes. The QR code technique is getting popular day by day and at the same time it is becoming increasingly secure as the technology is enhancing. Once, the awareness about these codes increases, it will get a wide spectrum to evaluate its significance. In near future, this technology will be used in wide public domains. Firstly, QR codes were used to store the information about inventory products but nowadays it is being used in the huge industries like marketing, secure payment systems, advertising, education systems etc. In the past decade or so, the application of QR codes in public domains like supermarkets and in educational purposes like book scanning or stationary scanning has been increased rapidly and it will continue to thrive in more fields as the awareness will increase.

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BIOGRAPHY



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Mr. Utkarsh Gupta is scholar of final year of graduation with computer science from Dr Rammanohar Lohia Avadh University, Ayodhya, India. He has developed several mini projects based on data security during his graduation. His research interests are Data Security and data science.



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