

# Information Obscurity through Visual Cryptography using Quick Response Codes

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**Abstract**--QR Codes are two-dimensional or matrix bar codes developed in Japan by Denso Wave. This two-dimensional symbol was invented for tracking of automotive parts, but these codes are increasingly found in other fields as well. These small sized codes can also be hidden inside the images. It's been more than a decade that this technology has been invented and with the advent of Smartphones this technology has gained an edge over the barcode technology as they require scanners for decoding. As the information stored is in the binary form, so various types of information can be stored in the QR code. QR Code is a two dimensional, matrix type symbol which has a cell structure arranged in form of square comprising of four patterns namely finder patterns, timing patterns, alignment patterns, and a quiet zone also a data area exists where the data is present.

**Keywords:** Quick Response (QR) Code, 2D Bar Code and Smartphone.

## I. INTRODUCTION

“QR” is abbreviated as “quick response,” is a reference to the speed at which the huge amount of information it contains, can be decoded with scanners. QR Codes are two-dimensional or matrix bar codes developed in Japan by Denso Wave. They are sometimes referred to as 2d codes, 2d barcodes, or mobile codes. These are machine readable codes and comprise of black modules on white modules. It holds thousands of alphanumeric characters while the barcode comprises of only 20 characters. This two-dimensional symbol was invented for tracking of automotive parts, but these codes are increasingly found in other fields as well like linking to websites, product labels, advertising campaigns, SMS, contact details, email messages and much more. The information stored in codes varies from tracking information of the products produced in various industries to information of the business on a business card that redirects to the specific website. These small sized codes can also be hidden inside the images.

It's been more than a decade that this technology has been invented and with the advent of smart phones this technology has gained an edge over the barcode technology as they require scanners for decoding.

QR Codes support Kanji/Chinese characters, can be used by anyone free of cost and can be read easily with the help of smart phones, because of these characteristics of QR code, they are more popular over bar code.

## II. QR CODE STRUCTURE

QR Code is a two dimensional, matrix type symbol which has a cell structure arranged in form of square. It comprises of four different patterns namely finder patterns, timing patterns, alignment patterns, and a quiet zone which makes reading easy also a data area exists where the data is present.

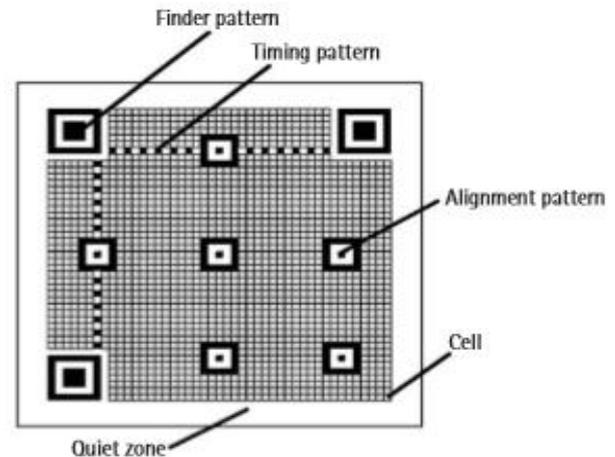


Fig. 1: Structure of QR code

### A. Finder Pattern:

This pattern is helpful in detecting the position of a QR Code. By arranging this pattern at three corners of a square the position, size, and angle can be detected. Finder pattern consists of a structure that can be detected in all directions.

### B. Alignment Pattern:

This pattern is helpful in correcting the distortion of a QR Code. It is very effective for correction of nonlinear distortions.

Its central coordinate will be identified for correcting the distortion of the symbol. So for this purpose, an isolated black cell is placed in this pattern, making it easier to detect the central coordinate.

### C. Timing Pattern:

This pattern is helpful in the identification of the central coordinate of each cell in the QR Code comprising of alternately arranged black and white patterns. In case of distortion or error in the cell pitch this pattern is used for correcting the central coordinate of data cell. It is arranged in both horizontal and vertical directions.

### D. Quiet Zone:

It is a margin space which is necessary for reading the QR Code. It requires four or more cells

### E. Data Area

The data is stored and encoded in the data area. The grey part in the centre of the figure represents the data area. Based on the encoding rules the data is encoded into binary digits '0' and '1'. Then the binary digits '0' and '1' are converted into black and white cells and then arranged. For the stored data, the Data area comprises of the Reed-Solomon and also has the error correction functionality.

As the information stored is in the binary form, so various types of information can be stored in the QR code. Images and sounds cannot be stored directly into the QR

Code as its storage capacity is limited to a maximum of 3 kB. So as a solution to this limitation QR code redirects the user to a specific website comprising of images , sounds, text and video.

### III. HOW QR CODE WORKS?

Scanning and Decoding QR Code is quite easy. All an individual requires for decoding is a smart phone, a QR code scanning application, and an internet connection.

#### A. The Phone:

A cell phone should be capable of running the decoding software. A Smartphone is a phone which is equipped with cameras, can access Internet, can download applications and install applications. Android phones, Blackberries and iPhones are examples of Smart phones.

#### B. The Application:

Various applications exist for decoding of a QR Code. Few may be free while the others may be paid. Firstly the applications is downloaded and then installed and then it runs.

#### C. The Connection:

There are two ways to connect a Smartphone to the Internet: through Wi-Fi or through a data connection.

Figure below provides a graphical summary of how QR codes work.

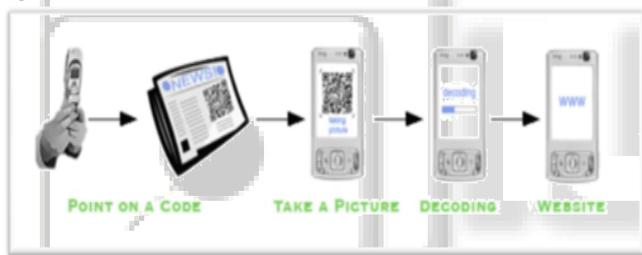


Fig. 2: Working of QR code

Mobile tagging refers to the process of scanning and decoding the QR Code using a Smartphone. The QR Code application takes a picture of the code and then converts it into readable text. The code might contain a URL of a company's website or some information. In order to create an interactive customer experience, QR codes can also be programmed to start up few applications like emails, IM, SMS, web browsers and even streaming video.

By scanning a QR code, an individual can go through all the information provided with no extra charges. These QR codes can directly take you to the specific website or product information or even a video advertisement of the product.

### IV. STEPS FOR GENERATING A QR CODE

*Step. 1 :* Finding a QR Code Generator: Generating a QR code is quite a simple process .There exists many QR Code generators, one can choose an appropriate generator according to one's own requirements. Few important things to keep in mind before choosing a particular generator is to ensure whether it allows you to design codes that are unique to your brand , whether it is compatible with popular QR code readers and whether one can

track and analyze the performance. It may have free as well as paid versions.

*Step. 2 :* Creating, Designing, and Linking It Up:QR codes can be customised according to your brand.

*Step. 3 :* Testing It: Before finalising the QR code it is important to test it and check whether it reads correctly or not. Testing should be done with the help of more than one reader. If any of the reader fails to read it then proper rework should be done.

*Step. 4 :* Tracking and Analyzing: Like any marketing drive, tracking and analysis should be done to verify that how much of the traffic comes from each specific code. Where do people quit? "Not even compelled to scan your QR code", People do scan the code but don't redeem the offer after reaching the home page. Taking this entire analysis task into consideration one can improve the poor performing QR code into the one that works well.

### CONCLUSION

We may conclude that the data hidden inside QR codes will enable users to exchange information in a secretive and effective manner thereby saving the printing and stationary costs. With the usage of this technology, the users will exchange images in order to exchange data and this aspect shall yield benefits for both B2B and B2C communications.

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