

# QR Code and Barcode Generator

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**Abstract:** *Before we delve into the history of a QR Code, let's make sure it's clear what a QR Code is. A QR Code, or quick response Code, is a Code that is quickly readable by a cell phone (hence the word "quick" in the name). Using a combination of spacing as a type of Matrix Barcode (a 2-D Barcode), when a QR Code is scanned, it conveys a wide multitude of information. QR Codes have a wide range of uses across all types of industries such as retail, marketing, and logistics. A barcode, consisting of bars and spaces, is a machine-readable representation of numerals and characters. Today, stripes as shown below on packages of products sold at supermarkets, convenience stores and other stores are ubiquitous. These are barcodes. A barcode consists of bars and spaces of varying width that can be read with an optical barcode scanner. While QR Codes and Barcodes are similar in practice, QR Codes contain more information because they have the ability to hold information both horizontally and vertically. Barcodes only use horizontal information. While Barcodes work wonderfully for situations like scanning supermarket items, QR Codes have a much higher capability of transferring information, likely what has made them increasingly popular due to their versatility.*

**Keywords:** QR code, Barcode

## I. INTRODUCTION

A Quick Response Code' also known as QR code is a two-dimensional type of barcode that Denso Wave develops, a Japanese barcode developer, in 1994. QR codes are scan-able using smartphones devices, which are natively developed to scan/detect QR codes. These codes are generated using an online QR code generator that displays online information to the scanner when scanned.

Today, QR codes are generally used in advertising, business, health care, and education. However, business sectors, especially in the advertising and operations, most widely use QR codes. Aside from these sectors, the restaurant industry also employs an interactive restaurant menu QR code software and QR code generators to generate menu QR code for their business. You can find QR codes in brochures, flyers, posters, billboards, items and products, business cards, and even online websites such as social media and shopping sites. QR codes have become common in consumer advertising. Typically, a smartphone is used as a QR code scanner, displaying the code and converting it to some useful form (such as a standard URL for a website, thereby obviating the 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 the consumer, the importance of this capability is that it increases the conversion rate: the chance that contact with the advertisement will convert to a sale. It coaxes interested prospects further down the conversion funnel with little delay or effort, bringing the viewer to the advertiser's website immediately, whereas a longer and more targeted sales pitch may lose the viewer's interest. Although initially used to track parts in vehicle manufacturing, QR codes are used over a much wider range of applications. These include commercial tracking, entertainment and transport ticketing, product and loyalty marketing and in-store product labeling.

Examples of marketing include where a company's discounted and percent discount can be captured using a QR code decoder which is a mobile app, or storing a company's information such as address and related information alongside its alpha-numeric text data as can be seen in Yellow Pages directories. They can also be used in 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 URL, or compose an e-mail or text message after scanning QR codes. They can generate and print their own QR codes for others to scan and use by visiting one of several pay or free QR code-generating sites or apps. Google had an API, now deprecated, to generate QR codes, and apps for scanning QR codes can be found on nearly all smartphone devices. Barcode or bar code is a method of representing data in a visual, machine-readable form. Initially, barcodes represented data by varying the widths, spacings and sizes of parallel lines. These barcodes, now commonly referred to as linear or one-dimensional (1D), can be scanned by special optical scanners, called barcode readers, of which there are several types. Later, two-dimensional (2D) variants were developed, using rectangles,

dots, hexagons and other patterns, called matrix codes or 2D barcodes, although they do not use bars as such. 2D barcodes can be read using purpose-built 2D optical scanners, which exist in a few different forms. 2D barcodes can also be read by a digital camera connected to a running software that takes a photographic image of the barcode and analyzes the image to deconstruct and decode the 2D barcode.

A mobile device with an inbuilt camera, such as smartphone, can function as the latter type of 2D barcode reader using specialized application software (The same sort of mobile device could also read 1D barcodes, depending on the application software). The barcode was invented by Norman Joseph Woodland and Bernard Silver and patented in the US in 1952. Barcodes are widely used around the world in many contexts.

In stores, UPC barcodes are pre-printed on most items other than fresh produce from a grocery store. This speeds up processing at check-outs and helps track items and also reduces instances of shoplifting involving price tag swapping, although shoplifters can now print their own barcodes.

Barcodes that encode a book's ISBN are also widely pre-printed on books, journals and other printed materials. In addition, retail chain membership cards use barcodes to identify customers, allowing for customized marketing and greater understanding of individual consumer shopping patterns. At the point of sale, shoppers can get product discounts or special marketing offers through the address or e-mail address provided at registration.

Barcodes are widely used in the healthcare and hospital settings, ranging from patient identification (to access patient data, including medical history, drug allergies, etc.) to creating SOAP Notes with barcodes to medication management. They are also used to facilitate the separation and indexing of documents that have been imaged in batch scanning applications, track the organization of species in biology, and integrate with in-motion check weighers to identify the item being weighed in a conveyor line for data collection.

They can also be used to keep track of objects and people; they are used to keep track of rental cars, airline luggage, nuclear waste, registered mail, express mail and parcels.

Barcoded tickets (which may be printed by the customer on their home printer, or stored on their mobile device) allow the holder to enter sports arenas, cinemas, theatres, fairgrounds, and transportation, and are used to record the arrival and departure of vehicles from rental facilities etc. This can allow proprietors to identify duplicate or fraudulent tickets more easily. Barcodes are widely used in shop floor control applications software where employees can scan work orders and track the time spent on a job.

Barcodes are also used in some kinds of non-contact 1D and 2D position sensors. A series of barcodes are used in some kinds of absolute 1D linear encoder. The barcodes are packed close enough together that the reader always has one or two barcodes in its field of view.

As a kind of fiducial marker, the relative position of the barcode in the field of view of the reader gives incremental precise positioning, in some cases with sub-pixel resolution. The data decoded from the barcode gives the absolute coarse position.

An "address carpet", such as Howell's binary pattern and the Anoto dot pattern, is a 2D barcode designed so that a reader, even though only a tiny portion of the complete carpet is in the field of view of the reader, can find its absolute X,Y position and rotation in the carpet.

2D barcodes can embed a hyperlink to a web page. A mobile device with an inbuilt camera might be used to read the pattern and browse the linked website, which can help a shopper find the best price for an item in the vicinity.

Since 2005, airlines use an IATA-standard 2D barcode on boarding passes (Bar Coded Boarding Pass (BCBP)), and since 2008 2D barcodes sent to mobile phones enable electronic boarding passes.

Some applications for barcodes have fallen out of use. In the 1970s and 1980s, software source code was occasionally

encoded in a barcode and printed on paper (Cauzin Softstrip and Paper byte are barcode symbologies specifically designed for this application), and the 1991 Barcode Battler computer game system used any standard barcode to generate combat statistics.

Artists have used barcodes in art, such as Scott Blake's Barcode Jesus, as part of the post-modernism movement.

## II. LITERATURE REVIEW

QR i.e. "Quick Response" code is a 2D matrix code that is designed by keeping two points under consideration, i.e. it must store large amount of data as compared to 1D barcodes and it must be decoded at high speed using any handheld device like phones.

QR code provides high data storage capacity, fast scanning, omnidirectional readability, and many other advantages including, error-correction (so that damaged code can also be read successfully) and different type of versions.

Different varieties of QR code symbols like logo QR code, encrypted QR code, QR Code are also available so that user can choose

among them according to their need. Now these days, a QR code is applied in different application streams related to marketing, security, academics etc. and gain popularity at a really high pace. Day by day more people are getting aware of this technology and use it accordingly.

The popularity of QR code grows rapidly with the growth of smartphone users and thus the QR code is rapidly arriving at high levels of acceptance worldwide. This software creates barcodes that can be printed and read on any product.

Integrating scanners are able to scan and analyse the information stored within these barcodes. Barcodes are typically scanned when products are sold or shipped from one location to another. Different industries and countries use different formats for barcodes, depending on their specific needs. Barcode software should offer various templates so users can print whichever format of barcode will fit a business' needs. These solutions are typically used in industries such as manufacturing and e-commerce.

## III. SCOPE OF A PROJECT

- Omnidirectional and Fast Scanning: QR code can be read much faster and within 360 degrees can be scanned from any angle i.e. no need to place the scanner as per the code symbol.
  - Small Size: QR code takes less space. A QR Code can hold the same volume of information contained in a 1-D barcode in only one-tenth the space.
  - Huge Data Storage Capacity: QR code has high data storage capacity. A single QR Code token can store up to 7,089 numerals (200 times the volume of information storage capacity of the traditional 1-D barcode).
  - Many Types of Data: The QR Code can handle numerals, alphanumeric characters, Japanese, Chinese or Korean letters and binary data.
  - Error correction: Error correction technique used in QR codes enables successful decoding of the code symbol even if up to 30% of the data is dirty or damaged.
  - Available for Everyone: Anyone can make their own QR code according to their need, for example, user can create QR code of the URL of its own website for advertising purpose.
  - Wide Range of Uses: There are lots of potential uses of QR codes. They can be implemented to extend the user experience in store, restaurants, websites and more.
- 4.2 Although QR code has many positive points on its side but, there are some demerits of the QR code too, such as, Need of QR code scanner; to decode the code users must have a QR reader app, which limits the audience; Security issues, the scanner never really knows where the code is going to lead the user before scanning a QR code; Lack of public awareness, large portion of population is still unaware of this technology.

## III. PROPOSED METHODOLOGY

Scientific research has been playing an important role in the progress and enrichment of new age technology. Research is invention or scientific investigation or scientific enquiry to extract truth or invent new concepts by scientific way. Descriptive research consists of fact-finding enquiries and surveys of various kinds. The main motive of descriptive analysis is explanation of the state of affairs as it currently exists. Research can be either applied to study or to



fundamental studies. The objective of applied analysis is to find a solution to an instant issue facing a community or an industrial/business organization, whereas basic study is primarily worried with generalizations and the formulation of a theory.

Quantitative research is based on quantity or quantity measurements. It applies to events that can be stated in quantity terms. On the other side, qualitative research is concerned with the phenomenon of quality.

Conceptual study involves some theory or abstract ideas. Theorist and thinkers typically use it to develop fresh thoughts or reinterpret current ones. However, inquiry relies on knowledge or examination alone, often without proper scheme and theory consideration. It is data-based study, resulting in judgments that can be checked through observation or experimentation. We did QR Code analysis with the assistance of all these techniques.

#### IV. PROBLEM DEFINITION/STATEMENT

While QR Codes are quite the sturdy technology and are easy to read with any smartphone, sometimes improper designs can render them unscannable. There are things to look out for such as colour mismatches, materials the QR Code will be used on, its size, and more. Here we've outlined the most common QR Code scanning problems and how they can be resolved. The quiet zone that distinguishes the QR Code from the surroundings is too small or nonexistent, so the QR Code can't be read. Because the design has left out the quiet zone, the scanner can't determine what is the graphic and what is the QR Code. Make sure to always leave enough space for the quiet zone. The ideal size would be if the quiet zone is at minimum four times larger than the width of your QR Code modules. When in original form, the modules are the black pixels that make up the QR Code (or also come in colour when customized).

The more data that you add to a QR Code, the smaller those pixels will become. Nevertheless, this is not a reason to reduce the quiet zone perimeter to compensate. Design QR Codes to match the background colours but not in a manner that the QR Code is lost in the design. Maintain the quiet zone and make sure that the pixels stand out against the background or any surrounding colour designs. In the example below, you can see that the design actually looks better when the QR Code colors contrast from the background, yet still, match with the overall design.

#### V. REQUIREMENT

##### 5.1 Hardware Requirements

Dual core x86-64 CPU with 2.0GHz or faster. 4 GB of system memory GPU

##### 5.2 Software Requirements

- XAMPP v3.3.0 as my local web server that has a PHP Version 8.0.7
- PHP Language MySQL Database HTML
- CSS
- JavaScript jQuery
- PicQer PHP Barcode Generator PHP QR Code

#### VI. DESIGN



Figure 2. Structure of QR Code<sup>[3]</sup>



Finder Pattern (1): The finder pattern comprises of three identical structures that are situated in all corners of the QR Code except the bottom right one. Each pattern is based on a black module matrix of 3x3 encircled by white modules that are again surrounded by black modules. The Finder Patterns allows the decoder software to identify the QR Code and determine the exact orientation.

Separators (2): The white separators have a width of one pixel and boost the recognition of the Finder Patterns as they isolate them from the actual data.

Timing Pattern (3): In the Timing Pattern, alternating black and white modules allows the decoder software to determine a single module's width.

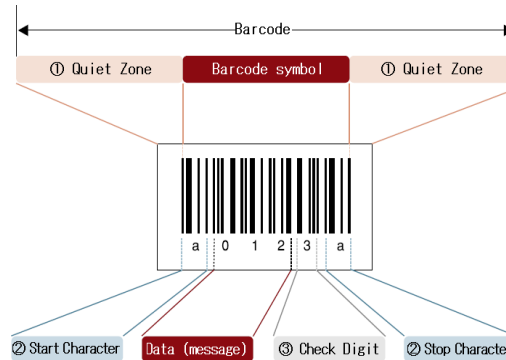
Alignment Patterns (4): Alignment Patterns helps to reimburse the decoder software for mild picture deformation. Version 1 QR codes have no Alignment Patterns. With increased code size, more Alignment Patterns are added.

Format Information (5): The Formation Information section is made up of 15 bits next to the separators and stores data about the QR code error correction rate and the masking model selected.

Data (6): Data is converted into a bit stream and then stored in information segment in 8 bit sections (known as codewords).

Error Correction (7): Similar to the data section, error correction codes are stored in 8 bit long code-words in the error correction section.

Remainder Bits (8): This section consists of empty bits, if data and error correction bits cannot be split into 8 bit codewords without remainder. To enhance code recognition by the decoder software, the entire QR code must be encircled by the so called Quiet Zone, an area in the identical color shade as white modules.



5.3 Quiet Zone (Margin)

Quiet Zone is a blank margin located at either end of a barcode. The minimal margin between barcodes (distance from the outermost bar of one barcode to the outermost bar of another barcode) is 2.5 mm. If the width of a Quiet Zone is insufficient, barcodes are hard for a scanner to read.

Start Character/Stop Character

The Start Character and the Stop Character are characters representing the start and the end of the data, respectively.

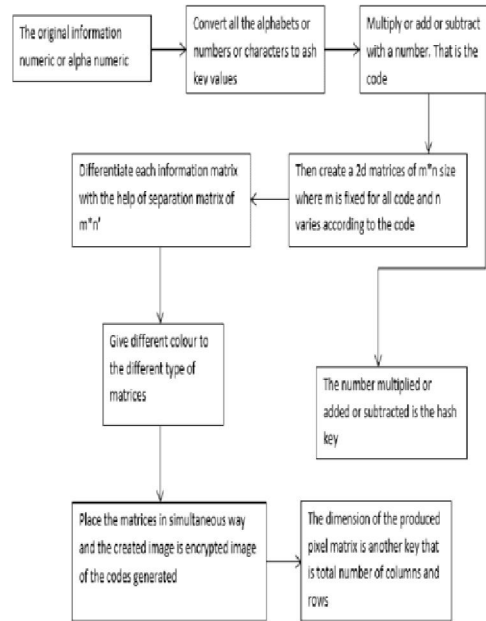
The characters differ depending on the barcode type.

sCheck Digit (Symbol check character)

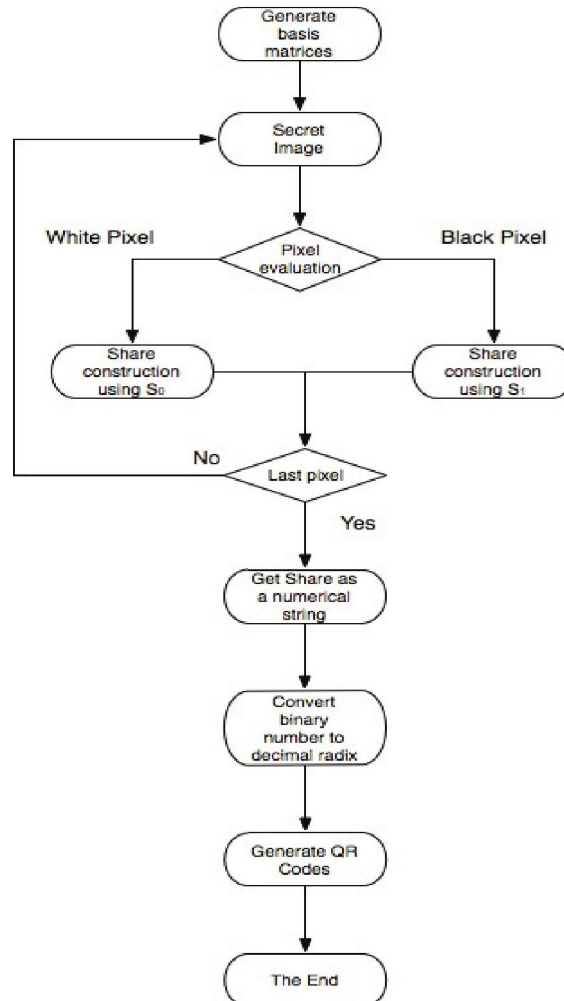
The Check Digit is a digit for checking whether the encoded barcode data are correct.



VII. BARCODE GENERATOR BLOCK DIAGRAM



VIII. QR CODE GENERATOR BLOCK DIAGRAM





### **IX. APPLICATION**

Barcodes save time and money because they can be read by a scanner, either a handheld device or one built into a checkout station, instead of an employee having to manually key in product information.

There are two primary types of barcodes: one-dimensional (1D), like those found on food packaging or a shampoo bottle, and two-dimensional (2D), like a QR code on an advertisement that directs the user to that company's website. Most scanners can only read 1D, or linear, barcodes, and they remain the most popular format; more on 1D vs. 2D codes later.

Two of the most common types of linear barcodes are the Universal Product Code (UPC) in the U.S. and the European Article Number (EAN) in Europe.

1. Direct customers to a landing page/website Scanning a QR code can lead to a signup page or any landing page/website. This removes the hassle of going through the process of accessing the website and navigating your way around the page. Make sure that you use a unique URL matched with your QR code to measure it accurately.

2. Dial your business number

In business conferences, you'll surely engage and interact with a crowd. If you use QR codes for your booth or station, then interested business partners can just scan the code and receive your business details such as your business contact number. Sometimes, you can even tweak the QR code to dial the number on the receiver's phone directly.

3. Send a message

This is exciting because the user will only receive the message once the QR code has been scanned. Sending messages through QR codes benefits SMS marketing the most. It can be used for sales, user support, on-request product upgrades, and opt-in SMS registration.

4. Send an email

Much like sending messages, QR codes for sending emails will help you read and monitor data for newsletters, email marketing, and your email's performance rates (e.g. open and bounce rates).

Aside from that, the user can also continue reading the said email on his mobile phone by scanning the QR code. In this manner, your email will be accessible on any platform.

Barcodes encode product information into bars and alphanumeric characters, making it much faster and easier to ring up items at a store or track inventory in a warehouse.

Besides ease and speed, bar codes' major business benefits include accuracy, inventory control and cost savings.

There are many types of barcodes, but they all fall into two categories: linear codes, including widely used formats like UPC and EAN, and matrix codes, like QR codes.

Barcoding has a low barrier to entry—all a business needs is a printer, scanner and basic inventory management software.

### **X. FUTURE SCOPE**

QR codes are becoming one of the most prime facet in cashless transactions. They were already hugely popular and in use in the European countries as well as in America but in past few years, they are gaining momentum in South and East Asia. In China, the implementation of QR code has even surpassed cash and card based transactions. This has to be one of the biggest achievements so far for these QR codes. In India, there is a rapid hike in the usage of QR codes and the new era of cashless India is ushering upon the country's horizon. Many people argue with the fact that QR codes are used as a second fiddle while doing money related transactions. These codes are slowly becoming first preference for many users in the recent times. The main limitation of QR codes is that they are only being used to redirect to a webpage or website but they are not collecting any information on their own. If in this hugely data driven world, if these codes start to collect information and start a two-way transaction then it will surely stabilize in this technology market for future years. Another limitation regarding the application of QR codes is that one must have a QR code reader or scanner installed in their mobile or tablet to be able to scan and read the data held by the QR code. Instead of this, we can create and integrate the QR code scanners in our smartphone's camera itself so that we don't need any other third party application to scan the QR codes. QR codes have been scrutinized by many of the technology and security pundits but still it has been loved and accepted by the normal people at a high context. They have been literally used everywhere as far as promotional events are concerned like mobile payments, coupons, air ticket coupons, business

cards, new business profile promotions etc. There are new technologies launching in the last couple of years who are better or more secure than QR codes, but still QR codes will be there for many more years to come because of the ease of their use and many people in the developing countries already adapting them in the recent past. So it is a rare possibility that they will again turn to a new technology after taking so much years to get used to the QR codes.

#### XI. CONCLUSION

We have discussed about the analysis of QR codes as well as their applications. The capacity of these codes to store data is very high plus they are damage resistance which makes them overcome one of the key concerns of security. 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. 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.

#### REFERENCES

- [1]. Phaisarn Sutheebanjard, Wichian Premchaiswadi QR-Code Generator|
- [2]. Techniques Pooja Shejwal\*, Amita Wankhede\*, Vivek Shimpi\*, Ajit Wale\* , Prof.A.D.Sawant —A Survey on Existing Barcodes and Barcode Generation| Keystone School of Engineering, Hadapsar, Savitribai Phule University
- [3]. Ihekweaba Chukwugoziem, Aru Okereke Eze, Chiaghana Chukwunonso .E. —A Quick Response (QR) Code Generator with Mobile Scan Application for Mobile Network Recharge Operations| International Journal of Scientific and Engineering Research IJSER Volume 10, Issue 7, July 2019 ISSN 2229-5518
- [4]. Simple Bar and QR (Quick Response) Code Generator Web App in PHP <https://www.sourcecodester.com/php/15123/simple-bar-and-qr-quick-response-code-generator-web-app-php-code.html>
- [5]. Roberts, Sam (11 December 2019). "George Laurer, Who Developed the Bar Code, Is Dead at 94". The New York Times. Retrieved 13 December 2019.
- [6]. Joe Waters. "How to Use the Top QR Code Generators". Dummies.com. Archived from the original on 11 September 2017. Retrieved 5 June 2017.
- [7]. Jenny Lee (4 January 2012). "Tesco's cool QR code advertising campaign". Archived from the original on 3 June 2016. Retrieved 26 May 2016.
- [8]. David, H (28 November 2018), "Barcodes – Validation vs Verification in GS1", Labeling News, retrieved 6 June 2020.
- [9]. "What about barcodes and 666: The Mark of the Beast?". Av1611.org. 1999. Retrieved 14 March 2014.
- [10]. "2D Color Barcodes for Mobile Phones" (PDF). Archived from the original (PDF) on 4 March 2016.