l'm not a robot



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You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. Type of matrix barcode A QR code for the URL of the English Wikipedia Mobile main page A QR code, [1] is a type of two-dimensional matrix barcode invented in 1994 by Masahiro Hara of Japanese company Denso Wave for labelling automobile parts. [2][3] It features black squares on a white background with fiducial markers, readable by imaging devices like cameras, and processed using Reed-Solomon error correction until the image can be appropriately interpreted. The required data is then extracted from patterns that are present in both the horizontal and the vertical components of the QR image.[4] Whereas a barcode is a machine-readable optical image that contains information specific to the labeled item, the QR code contains the data for a locator, an identifier, and web-tracking. To store data efficiently, QR codes, the QR labeling system was applied beyond the automobile industry because of faster reading of the optical image and greater data-storage capacity in applications, time tracking, document management, and general marketing.[4] This section needs expansion. You can help by adding to it. (October 2021) The QR code system was invented in 1994, at the Denso Wave automotive products company, in Japan.[6][7][8] The initial alternating-square design presented by the black counters and the white counters played on a Go board;[9] the pattern of the position detection markers was determined by finding the least-used sequence of alternating black-white areas on printed matter, which was found to be (1:1:3:1:1).[10][6] The functional purpose of the QR code system was to facilitate keeping track of the types and numbers of automobile parts, by replacing individually-scanned bar-code labels on each box of auto parts with a single label that contained the data of each label. The quadrangular configuration of the QR code system consolidated the data of the various bar-code labels with Kanji, Kana, and alphanumeric codes printed onto a single label.[11][10][6] QR codes can be displayed on buildings, such as this one being painted in Cape Town. As of 2024,[update] QR codes are used in a much broader context, including both commercial tracking applications and convenience-oriented applications aimed at mobile tagging). QR codes may be used to display text to the user, to open a webpage on the user's device, to add a vCard contact to the user's device, to open a Uniform Resource Identifier (URI), to connect to a wireless network, or to compose an email or text message. There are a great many QR code generators available as software or as online tools that are either free or require a paid subscription.[12] The QR code has become one of the most-used types of two-dimensional code.[13] During June 2011, 14 million American 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 the 14 million users were men between the ages of 18 and 34.[14] In 2022, 89 million people in the United States scanned a QR code using their mobile devices, up by 26 percent compared to 2020. The majority of QR code users used them to make payments or to access product and menu information.[15] In September 2020, a survey found that 18.8 percent of consumers in the United Kingdom strongly agreed that they had noticed an increase in QR code user sused them to make payments or to access product and menu information.[15] In September 2020, a survey found that 18.8 percent of consumers in the United Kingdom strongly agreed that they had noticed an increase in QR code user such a survey found that 18.8 percent of consumers in the United Kingdom strongly agreed that they had noticed an increase in QR code user such as the United Kingdom strongly agreed that they had noticed an increase in QR code user such as the United Kingdom strongly agreed that they had noticed an increase in QR code user such as the United Kingdom strongly agreed that they had noticed an increase in QR code user such as the United Kingdom strongly agreed that they had noticed an increase in QR code user such as the United Kingdom strongly agreed that they had noticed an increase in QR code user such as the United Kingdom strongly agreed that they had noticed an increase in QR code user such as the United Kingdom strongly agreed that they had noticed an increase in QR code user such as the United Kingdom strongly agreed that they had not be agreed to the United Kingdom strongly agreed that they had not be agreed to the United Kingdom strongly several months prior.[16] Structure of a QR code (version 7), highlighting functional elements Several standards cover the encoding of data as QR codes:[17] October 1997 - AIM (Association for Automatic Identification and Mobility) International[18] January 1999 - JIS X 0510 June 2000 - ISO/IEC 18004:2000 Information technology - Automatic identification and data capture techniques - Bar code symbology - QR code (now withdrawn) Defines QR code models 1 and 2 symbols. 1 September 2006 - ISO/IEC 18004:2006 Information technology - Automatic identification and data capture techniques - QR Code 2005 bar code symbology specification (now withdrawn)[19] 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 and data capture techniques - QR Code barcode symbology specification (now withdrawn) Renames the QR Code 2005 symbol to QR Code and adds clarification to some procedures and minor corrections. It was withdrawn and updated to 18004:2024 in August 2024, which optimizes encoding efficiency, improves error correction, and refines structured append functionality.[20] May 2022 - ISO/IEC 23941:2022 Information technology - Automatic identification and data capture techniques - Rectangular Micro QR Code (rMQR) bar code symbology specification[21]Defines the requirements for Micro QR Code. August 2024 - ISO/IEC 18004:2024 Information technology — Automatic identification and data capture techniques — QR code bar code symbology specification [At the application layer, there is some variation between most of the implementations. Japan's NTT DoCoMo has established de facto standards for the encoding of URLs, contact information, and several other data types.[23] A QR code used on a large billboard in Japan, linking to the sagasou.mobi website 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 codes have become a focus of advertising strategy to provide a way to access a brand's website more quickly than by manually entering a URL.[24][25] Beyond mere convenience to the consumer, the importance of this capability is the belief 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, warehouse stock control, entertainment and transport ticketing, product and loyalty marketing, and in-store product labeling.[citation needed] Examples of marketing include where a company's information such as address and related information alongside its alpha-numeric text data as can be seen in telephone directory yellow pages.[citation needed] They can also be used to store personal information for organizations. An example of this is the 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 QR code-generating sites or apps. Google had an API, now deprecated, to generate QR codes, [26] and apps for scanning QR codes can be found on nearly all smartphone devices.[27] QR codes have been used and printed on train tickets in China since 2010.[28] QR codes storing addresses and URLs may appear in magazines, on signs, on business cards, or on
almost any object about which users might want information. Users with a camera phone equipped with the correct reader application can scan the image of the QR code to display text and contact information, connect to a wireless network, or open a web page in the phone's browser. This act of linking from physical world objects is termed hardlinking or object hyperlinking. QR codes also may be linked to a location to track where a code has been scanned. Either the application that scans the QR code retrieves the geo information by using GPS and cell tower triangulation (aGPS) or the URL encoded in the QR code itself is associated with a location. In 2008, a Japanese stonemason announced plans to engrave QR codes on gravestones, allowing visitors to view information about the deceased, and family members to keep track of visits.[29] Psychologist Richard Wiseman was one of the first authors to include QR codes in a book, in Paranormality: Why We See What Isn't There (2011).[30][failed verification] Microsoft Office and LibreOffice have a functionality to insert QR code into documents.[31][32] QR codes have been incorporated into currency. In June 2011, The Royal Dutch Mint (Koninklijke Nederlandse Munt) issued the world's first official coin with a QR code to celebrate the centenary of its current building and premises. The coin can be scanned by a smartphone and originally linked to a special website with content about the historical event and design of the coin.[33] In 2014, the Central Bank of Nigeria issued a 100-naira banknote to commemorate its centennial, the first banknote to incorporate a QR code in its design. When scanned with an internet-enabled mobile device, the code goes to a website that tells the central Bank of Nigeria.[34] In 2015, the Central Bank of the Russian Federation issued a 100-rubles note to commemorate the annexation of Crimea by the Russian Federation.[35] It contains a QR code into its design, and when scanned with an internet-enabled mobile device, the code goes to a website that details the historical and technical background of the commemorative note. In 2017, the Bank of Ghana issued a 5-cedis banknote to commemorate 60 years of central banking in Ghana. It contains a QR code in its design which, when scanned with an internet-enabled mobile device, goes to the official Bank of Ghana website. Credit card functionality is under development. In September 2016, the Reserve Bank of India (RBI) launched the eponymously named BharatQR a common QR code jointly developed by all the four major card payments Corporation of India that runs RuPay cards along with Mastercard, Visa, and American Express. It will also have the capability of accepting payments on the Unified Payments Interface (UPI) platform.[36][37] QR codes are used in some augmented reality systems to determine the positions of objects in 3-dimensional space.[11] QR codes can be used on various mobile device operating systems. While initially requiring the installation and use of third-party apps, both Android and iOS (since iOS 11[38][39]) devices can now natively scan QR codes, without requiring an external app to be used.[40] The camera app can scan and display the kind of QR codes is presented to the customer, which allows QR codes to send metadata to existing applications on the device. QR codes have been used to establish "virtual stores", where a gallery of product information and QR codes is presented to the customer, e.g. on a train station wall. The customers scan the QR codes, and the products are delivered to their homes. This use started in South Korea,[41] and Argentina,[42] but is currently expanding globally.[43] Walmart, Procter & Gamble and Woolworths have already adopted the Virtual Store concept.[44] Main article: QR code payment QR codes can be used to store bank account information or credit card information, or they can be specifically designed to work with particular payment provider applications. There are several trial applications of QR code payments across the world. [45][46] In developing countries including China, [47][48] India [49] QR code payment is a very popular and convenient method of making payments. Since Alipay designed a QR code payment method in 2011,[50] mobile payment has been quickly adopted in China. As of 2018, around 83% of all payments were made via mobile payment.[51] In November 2012, QR code payments were made via mobile payment.[51] In November 2012, QR code payments were made via mobile payment.[51] In November 2012, QR code payments were made via mobile payment.[51] In November 2012, QR code payments were made via mobile payment.[51] In November 2012, QR code payments were made via mobile payment.[51] In November 2012, QR code payment method in 2011,[50] mobile payment.[51] In November 2012, QR code payments were made via mobile payment.[51] In November 2012, QR code payments were made via mobile payment.[51] In November 2012, QR code payment method in 2011,[50] mobile payment.[51] In November 2012, QR code payment method in 2011,[50] mobile payment.[51] In November 2012, QR code payment.[51] In November 2012, QR code payment method in 2011,[50] mobile payment.[51] mobile payment.[51] In November 2012, QR code payment method in 2011,[50] mobile payment.[51] In November 2012, QR code payment.[51] mobile payment.[51] mobil - a Short Payment Descriptor - was introduced and endorsed by the Czech Banking Association as the official local solution for OR payments. [52][53] In 2013, the European Payment Council provided guidelines for the EPC OR code enabling SCT initiation within the European Payment Council provided guidelines for the EPC OR code enabling SCT initiation within the European Payment Council provided guidelines for the EPC OR code enabling SCT initiation within the European Payment Council provided guidelines for the EPC OR code enabling SCT initiation within the European Payment Council provided guidelines for the EPC OR code enabling SCT initiation within the European Payment Council provided guidelines for the EPC OR code enabling SCT initiation within the European Payment Council provided guidelines for the EPC OR code enabling SCT initiation within the European Payment Council provided guidelines for the EPC OR code enabling SCT initiation within the European Payment Council provided guidelines for the EPC OR code enabling SCT initiation within the European Payment Council provided guidelines for the EPC OR code enabling SCT initiation within the European Payment Council provided guidelines for the EPC OR code enabling SCT initiation within the European Payment Council provided guidelines for the EPC OR code enabling SCT initiation within the European Payment Council provided guidelines for the EPC OR code enabling SCT initiation within the European Payment Council provided guidelines for government agencies such as the Monetary Authority of Singapore and Infocomm Media Development Authority to spearhead a system for e-payments using standardized QR code specifications. These specifications are specialized for Singapore.[54] The e-payment system, Singapore [54] The e-payment system for e-payments using standardized QR code specifications. codes into one label that can be used by both parties in the payment system. This allows for various banking apps to facilitate payments between multiple customers and a merchant that displays a single QR code. The SGQR scheme is co-owned by MAS and IMDA.[55] A single SDQR label contains e-payments and combines multiple payment options People making purchases can scan the code and see which payment options the merchant accepts. [55] QR codes can be used to log into websites: a QR code is shown on the login page on a computer screen, and when a registered user scans it with a verified smartphone, they will automatically be logged in. Authentication is performed by the smartphone, which contacts the server. Google deployed such a login scheme in 2012.[56] There is a system whereby a QR code can be displayed on a device such as a smartphone and used as an admission ticket.[57][58] Its use is common for J1 League and Nippon Professional Baseball tickets in Japan.[59][60] In some cases, rights can be transferred via the Internet. In Latvia, QR codes can be scanned in Riga public transport to validate Rigas Satiksme e-tickets.[61] A sign with a QR code near the front door or at the table allowing guests to view an online menu, or even redirect them to an online ordering website or app allowing them to order or possibly pay for their meal without having to use a cashier or waiter. QR codes can also link to daily or weekly specials that are not printed on the standardized menus, [62] and enable the establishment to update the entire menu without needing to print copies. At table-serve restaurants, QR codes enable guests to order and pay for their meals without a waiter involved - the QR code contains the table number so servers know where to bring the food.[63] This application has grown especially since the need for social distancing during the 2020 COVID-19 pandemic prompted reduced contact between service staff and customers.[63] A QR code to automatically join a Wi-Fi network By specifying the SSID, encryption type, password/passphrase, and if the SSID is hidden or not, mobile device users can quickly scan and join networks without having to manually enter the data.[64] A MeCard-like format is supported by Android and iOS 11+.[65] Common format: WIFI:S:;T:;P:;H:;; Sample WIFI:S:MySSID;T:WPA;P:MyPassW0rd;; QR code tile next to the grave of Wing Commander Adrian Warburton at Durnbach War Cemetery in Gmund am Tegernsee, Germany. The code links to his Wikipedia entry. A QR code can link to an obituary and can be placed on a headstone. In 2008, Ishinokoe in Yamanashi Prefecture, Japan began to sell tombstones with QR codes produced by IT DeSign, where the code leads to a virtual grave site of the deceased.[66][67][68] Other
companies, such as Wisconsin-based Interactive Headstones, have also begun implementing QR codes for tombstones.[70] QR codes can be used to generate time-based one-time passwords for electronic authentication. QR codes for loyalty programs are accessed with an app that is loaded onto a phone and includes a process triggered by a QR code scan. The QR codes for loyalty programs are accessed with an app that is loaded onto a phone and includes a process triggered by a QR code scan. programs tend to be found printed on the receipt for a purchase or on the products themselves. Users in these schemes collect award points by scanning a code. Serialised QR codes have been used by brands[71] and governments[72] to let consumers, retailers and distributors verify the authenticity of the products and help with detecting counterfeit products, as part of a brand protection program.[73] However, the security level of a regular QR code is limited since QR code scanning can be used to detect counterfeiting and illicit activity.[74] A higher security level of a regular QR code is limited since QR code scanning can be used to detect counterfeiting and illicit activity.[74] A higher security level of a regular QR code is limited since QR code scanning can be used to detect counterfeiting and illicit activity.[74] A higher security level of a regular QR code is limited since QR code scanning can be used to detect counterfeiting and illicit activity.[74] A higher security level of a regular QR code is limited since QR code scanning can be used to detect counterfeiting and illicit activity.[74] A higher security level of a regular QR code is limited since QR code scanning can be used to detect counterfeiting and illicit activity.[74] A higher security level of a regular QR code scanning can be used to detect counterfeiting and illicit activity.[74] A higher security level of a regular QR code scanning can be used to detect counterfeiting and illicit activity.[74] A higher security level of a regular QR code scanning can be used to detect counterfeiting and illicit activity.[74] A higher security level of a regular QR code scanning can be used to detect counterfeiting and illicit activity.[74] A higher security level of a regular QR code scanning can be used to detect counterfeiting and illicit activity.[74] A higher security level of a regular QR code scanning can be used to detect counterfeiting activity.[74] A higher security level of a regular QR code scanning can be used to detect counterfeiting activity.[74] A higher security level of a regular QR code scanning can be used to detect counterfeiting activity.[74] A level can be attained by embedding a digital watermark or copy detection pattern into the image of the QR code. This makes the QR code which is counterfeit, although valid as a QR code, can be detected by scanning the secure QR code with the appropriate app.[75] The treaty regulating apostilles (documents bearing a seal of authenticity), has been updated to allow the issuance of digital apostilles by countries; a digital apostille is a PDF document with a cryptographic signature containing a QR code for a canonical URL of the original document, allowing users to verify the apostille from a printed version of the document. Further information: Produce traceability Different studies have been conducted to assess the effectiveness of QR codes as a means of conveying labelling information and their use as part of a food traceability system. In a field experiment, it was found that when provided free access to a smartphone with a QR code scanning app, 52.6% of face access to a smartphone with a QR code scanning app, 52.6% of a food traceability system. participants would use it to access labelling information.[76] A study made in South Korea showed that consumers appreciate QR code used in food traceability system, as they provide detailed information that helps them in their purchasing decision.[77] If QR codes are serialised, consumers appreciate QR code used in food traceability system, as they provide detailed information that helps them in their purchasing decision.[77] If QR codes are serialised, consumers appreciate QR code used in food traceability system, as they provide detailed information.[76] A study made in South Korea showed that consumers appreciate QR code used in food traceability system. showing the supply chain for each ingredient, as well as information specific to each related batch, including meat processors and manufacturers, which helps address the concerns they have about the origin of their food.[78] Two QR codes that link to German contact tracing app check-ins during the COVID-19 pandemic After the COVID-19 pandemic began spreading, QR codes began to be used as a "touchless" system to display information, show menus, or provide updated consumer information, especially in the hospitality industry. Restaurants replaced paper or laminated plastic menus with QR code decals on the table, which opened an online version of the menu. This prevented the need to dispose of single-use paper menus, or institute cleaning and sanitizing procedures for permanent menus after each use.[79] Local television stations have also begun to utilize codes on local newscasts to allow viewers quicker access to stories or information involving the pandemic, including testing and immunization scheduling websites, or for links within stories mentioned in the newscasts overall. In Australia, patrons were required to scan QR codes at shops, clubs, supermarkets, and other service and retail establishments on entry to assist contact tracing. Singapore, Taiwan, the United Kingdom, and New Zealand used similar systems.[80] QR codes at shops, clubs, supermarkets, and other service and retail establishments on entry to assist contact tracing. certificates in places such as Canada and the EU (EU Digital COVID certificate), where they can be scanned to verify the information on the certificate.[81] Unlike the older, one-dimensional barcodes that were designed to be mechanically scanned by a narrow beam of light, a QR code is detected by a two-dimensional digital image sensor and then digitally analyzed by a programmed processor. The processor locates the three distinctive squares at the corners of the QR code image, using a smaller squares) near the fourth corner to normalize the image for size, orientation, and angle of viewing. and validated with an error-correcting algorithm. The amount of data that can be represented by a QR code symbol depends on the data type (mode, or input character set), version (1, ..., 40, indicating the overall dimensions of the symbol, i.e. 4 × version number + 17 dots on each side), and error correction level. The maximum storage capacities occur for version 40 and error correction level L (low), denoted by 40-L:[13][82] Maximum character storage capacity (40-L) Characters Bits/char. Possible characters, default encoding Numeric only 7,089 31/3 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 Alphanumeric 4,296 51/2 0-9, A-Z (upper-case only), space, \$, %, *, +, -, ., /, : Binary/byte 2,953 8 ISO/IEC 8859-1 Kanji/kana 1,817 13 Shift JIS X 0208 Here are some samples of QR code; up to 50 char" Version 2 (25×25). Content: "Version 2 (25×25). Version 10 (57×57). Content: "VERSION 10 QR CODE, UP TO 174 CHAR AT H LEVEL, WITH 57X57 MODULES AND PLENTY OF ERROR CORRECTION TO GO AROUND. NOTE THAT THERE ARE ADDITIONAL TRACKING BOXES" (actually encoded in all capital letters). (Tracking boxes are more commonly called alignment patterns.) Version 25 (117×117). Content: 1,269 characters of ASCII text describing QR codes). The text refers to a QR Code with a "Level H" error correction. Other levels provide higher capacity. Damaged but still decodable QR code, link to Example of a QR code with artistic embellishment that will still scan correctly thanks to error correction over the finite field F 256 {\displaystyle \mathbb {F} _{{256}} or GF(28), the elements of which are encoded as bytes of 8 bits; the byte b 7 b 6 b 5 b 4 b 3 b 2 b 1 b 0 { $displaystyle \ {1}b {0}$ with a standard numerical value $\sum i = 0.7 b i \alpha i$ where $\alpha \in F$ 256 {\displaystyle \alpha \in \mathbb {F} {256}} is taken to be a primitive element satisfying α 8 + α 4 + α 3 + α 2 + 1 = 0 {\displaystyle \alpha^{2}+1=0}. The primitive polynomial is x 8 + x 4 + x 3 + x 2 + 1 {\displaystyle x^{2}+1}, corresponding to the polynomial number 285, with initial root = 0 to obtain generator polynomials. The Reed-Solomon code uses one of 37 different polynomials over F 256 {\displaystyle \mathbb {F}_{256}}, with degrees ranging from 7 to 68, depending on how many error correction bytes the code adds. It is implied by the form of Reed-Solomon used (systematic BCH view) that these polynomials are all on the form $\prod i = 0 n - 1 (x - \alpha i) \{ \text{textstyle } \text{or correction bytes are used, is: } g(x) = x 7 + \alpha 87 x 6 + \alpha 87 x$ $229 \times 5 + \alpha 146 \times 4 + \alpha 149 \times 3 + \alpha 238 \times 2 + \alpha 102 \times + \alpha 21$ (x + $\alpha 2) (x + \alpha 3) (x + \alpha 4) (x + \alpha 4)$ + α 5) (x + α 6) {\displaystyle g(x) = (x+1)(x+\alpha ^{2})(x+\alpha ^{2})(x+\alpha ^{6})}. The same may also be expressed using decimal coefficients (over F 256 {\displaystyle \mathbb {F} _{256}}), as: g(x) = x 7 + 127 x 6 + 122 x 5 + 154 x 4 + 164 x 3 + 11 x 2 + 68 x + 117 {\displaystyle \mathbb {F} _{256}}. $g(x)=x^{7}+127x^{6}+122x^{5}+154x^{4}+164x^{3}+11x^{2}+68x+117}$. The highest power of x {\displaystyle x} in the polynomial (the degree is 7. When discussing the Reed-Solomon code phase there is some risk for confusion, in that the QR ISO/IEC standard uses the term codeword for the elements of F 256 {\displaystyle \mathbb {F} _{256}}, which with respect to the Reed-Solomon code are the codewords. The number of data versus error correction bytes within each block depends on (i)
the version (side length) of the QR symbol and (ii) the error correction level, of which there are four. The higher the error correction levels: Level L (Low) 7% of data bytes can be restored. Level M (Medium) 15% of data bytes can be restored. Level H (High) 30% of data bytes can be restored. Level H (High) 30% of data bytes can be restored. In larger QR symbols, the message is broken up into several Reed-Solomon code blocks. The block size is chosen so that no attempt is made at correcting more than 15 errors per block; this limits the complexity of the decoding algorithm. The code blocks are then interleaved together, making it less likely that localized damage to a QR symbol with level L error correction, for example, consists of a single error correction block with a total of 26 code bytes (made of 19 message bytes and seven error correction bytes). It can correct up to 2 byte errors. Hence, this code is known as a (26,19,2) error correction, it is possible to create artistic QR codes with embellishments to make them more readable or attractive to the human eye, and to incorporate colors, logos, and other features into the QR code block; the embellishments are treated as errors, but the codes still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible to design artistic QR code still scan correctly.[84][85] It is also possible algorithms are also used to reduce errors in QR-code.[88] The format information records two things: the error correction level and the mask pattern used for the symbol. Masking is used to break up patterns in the data area that might confuse a scanner, such as large blank areas or misleading features that look like the locator marks. The mask patterns are defined on a grid that is repeated as necessary to cover the whole symbol. Modules corresponding to the dark areas of the mask are inverted. The 5-bit format information is protected from errors with a BCH code, and two complete copies are included in each QR symbol. [4] A (15,5) triple error-correcting BCH code over GF(24) is used having the generator polynomial g (x) = x 10 + x 8 + x 5 + x 4 + x 2 + x + 1 {\displaystyle g(x)=x^{{1}+x^{{2}+x^ pattern (101010000010010) to prevent an all-zero string. To obtain the error correction (EC) bytes for a message is 17 bytes long, hence it can be encoded using a (26,19,2) Reed-Solomon code to fit in a Ver1 (21×21) symbol, which has a maximum capacity of 19 bytes (for L level error correction). The generator polynomial specified for the (26,19,2) code, is: g (x) = x 7 + 127 x 6 + 122 x 5 + 154 x 4 + 164 x 3 + 11 x 2 + 68 x + 117{\displaystyle g(x)= $x^{7}+127x^{6}+122x^{7}+127x^{6}+122x^{7}+127x^{6}+122x^{7}+127x^{6}+122x^{7}+127x^{6}+122x^{7}+127x^{6}+122x^{7}+127x^{6}+122x^{7}+127x^{6}+122x^{7}+127x^{6}+122x^{7}+127x^{6}+122x^{7}+127x^{6}+122x^{7}+127x^{6}+122x^{7}+127x^{6}+122x^{7}+127x^{6}+122x^{7}+127x^{7}+12$ 154 164 11 68 117] The 17-byte long message "www.wikipedia.org" as hexadecimal coefficients (ASCII values), denoted by M1 through M17 is: [77 77 72 E 77 69 6B 69 70 65 64 69 61 2E 6F 72 67] The encoding mode is "Byte encoding". Hence the 'Enc' field is [0100] (4 bits). The length of the above message is 17 bytes hence 'Len' field is [00010001] (8 bits). The 'End' field is End of message marker [0000] (4 bits). The message code word (without EC bytes) is of the form: ['Enc' 'Len' w w w . w i k i p e d i a . o r g 'End'] Substituting the hexadecimal values, it can be expressed as: [4 11 77 77 77 2E 77 69 6B 69 70 65 64 69 61 2E 6F 72 67 0] This is rearranged as 19-byte blocks of 8 bitters. each: [41 17 77 77 72 E7 76 96 B6 97 06 56 46 96 12 E6 F7 26 70] Using the procedure for Reed-Solomon systematic encoding, the 7 EC bytes obtained (E1 through E7, as shown in the symbol) which are the coefficients (in decimal) of the remainder after polynomial division are: [174 173 239 6 151 143 37] or in hexadecimal values: [AE AD EF 06 97 8F 25] These 7 EC bytes are then appended to the 19-byte message has 26 bytes (in hexadecimal): [41 17 77 77 72 E7 76 96 B6 97 06 56 46 96 12 E6 F7 26 70 AE AD EF 06 97 8F 25] Note: The bit values shown in the Ver1 QR symbol below do not match with the above values, as the symbol has been masked using a mask pattern (001). The message dataset is placed from right to left in a zigzag pattern, as shown below. In larger symbols, this is complicated by a (15,5) BCH code, which can correct up to 3 bit errors. The total length of the code is 15 bits, of which 5 are data bits (2 EC level + 3 mask pattern) and 10 are extra bits is: [101010000010010]. Note that we map the masked values directly to its meaning here, in contrast to image 4 "Levels & Masks' where the mask pattern numbers are the
result of putting the 3rd to 5th mask bit, [101], over the 3rd to 5th format info bit of the QR code. Message placement within a Ver 1 QR symbol (21×21). The message is encoded using a (255,248) Reed Solomon code (shortened to (26,19) code by using "padding") that can correct up to 2 byte-errors. A total of 26 code-words consist of 7 error-correction bytes, and 17 data bytes, in addition to the "Len" (4 bit field), "Enc" (4 bit field), and "End" (4 bit field), and "End" (4 bit field). The symbol is capable of level L error correction. The EC level is 01(L), and mask pattern is 001. Hence the first 5 bits of the format mask). After masking, the 5 bits become 11100, as seen here. Larger symbol (Ver 3, 29×29) illustrating interleaved blocks. The message has 26 data bytes and is encoded using two Reed-Solomon code (shortened to (35,13) code), which can correct up to 11 byte-errors in a single burst, containing 13 data bytes and 22 "parity" bytes appended to the data bytes. The two 35-byte Reed-Solomon code blocks are interleaved (resulting in a total of 70 code bytes), so it can correct up to 22 byte-errors. The symbol achieves level H error correction. The general structure of a QR encoding is as a sequence of 4 bit indicators with payload length dependent on the indicator mode (e.g. byte encoding payload length is dependent on the first byte).[89] Mode indicator Description Typical structure '[type : sizes in bits]' 1 = 0b0001 Numeric [0001 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Count Indicator : variable] [Data Bit Stream : 31/3 × charcount] 2 = 0b0010 Alphanumeric [0010 : 4] [Character Cou 51/2 × charcount] 4 = 0b0100 Byte encoding [0100 : 4] [Character Count Indicator : variable] [Data Bit Stream : 8 × charcount] 8 = 0b1000 Kanji encoding [1000 : 4] [Character Count Indicator : variable] [Data Bit Stream : 13 × charcount] 3 = 0b0011 Structured append [0011 : 4] [Symbol Position : 4] [Total Symbols: 4] [Parity : 8] 7 = 0b0111 ECI [0111:4] [ECI Assignment number: variable] 5 = 0b0101 FNC1 in first position [1001:4] [Numeric/Alphanumeric/Byte/Kanji payload: variable] 9 = 0b1001 FNC1 in first position [1001:4] [Note: Character Count Indicator depends on how many modules are in a QR code (Symbol Version). ECI Assignment Bitstream starts with '10' 8 × 3 bits if ECI Ass other information. Encoding modes Indicator Meaning 0001 Numeric encoding (10 bits per 2 character) 1000 Kanji encoding (13 bits per character) 0011 Structured append (used to split a message across multiple QR symbols) 0111 Extended Channel Interpretation (select alternate character set or encoding) 0101 FNC1 in first position (see Code 128 for more information) 1001 FNC1 in second position (one characters) [Mode bitstream] --> Mode Indicator][Mode bitstream] --> etc... --> [0000 End of message (Terminator)] After every indicator that selects an encoding mode is a length field (Character Count Indicator) Encoding Ver. 1-9 10-26 27-40 Numeric 10 12 14 Alphanumeric 9 11 13 Byte 8 16 16 Kanji 8 10 12 Alphanumeric encoding mode stores a message more compactly than the byte mode can, but cannot store lower-case letters and has only a limited selection of punctuation marks, which are sufficient for rudimentary web addresses. Two characters are coded in an 11-bit value by this formula: V = 45 × C1 + C2 This has the exception that the last character code Character Code Character Code Character Code Character 00 0 09 9 18 I 27 R 36 Space 01 1 10 A 19 J 28 S 37 \$ 02 2 11 B 20 K 29 T 38 % 03 3 12 C 21 L 30 U 39 * 04 4 13 D 22 M 31 V 40 + 05 5 14 E 23 N 32 W 41 - 06 6 15 F 24 O 33 X 42 . 07 7 16 G 25 P 34 Y 43 / 08 8 17 H 26 Q 35 Z 44 : The following images offer more information about the QR code. 1 - Introduction 2 - Structure 3 - Layout & Encoding 4 - Levels & Masks 5 - Protocols Mode 1 QR code is an older version of the specification. It is visually similar to the widely seen model 2 codes, but lacks alignment patterns. Differences are in the bottom right corner, and in the midsections of the bottom Right corner, and in the midsections of the bottom and right corner, and in the midsections of the bottom right corner, and in the midsections of the bottom and right corner. smaller version of the QR code standard for applications where symbol size is limited. There are four different versions (sizes) of Micro QR codes: the smallest is 11×11 modules; the largest can hold 35 numeric characters, [90] or 21 ASCII alphanumeric characters, [91] or 21 ASCII alphanumeric characters, [92] or 21 ASCII alphanumeric characters, [93] or 21 ASCII alphanumeric characters, [94] or 21 ASCII alphanumeric characters, [96] or 21 ASCII article: Rectangular Micro QR Code (also known as rMQR Code) is a two-dimensional (2D) matrix barcode invented and standardized in 2022 by Denso Wave as ISO/IEC 23941. rMQR Code is designed as a rectangular variation of the QR code is designed as a rectangular variation of the QR code (also known as rMQR Code) is a two-dimensional (2D) matrix barcode invented and standardized in 2022 by Denso Wave as ISO/IEC 23941. rMQR Code is designed as a rectangular variation of the QR code (also known as rMQR code) is a two-dimensional (2D) matrix barcode invented and standardized in 2022 by Denso Wave as ISO/IEC 23941. rMQR code is designed as a rectangular
variation of the QR code (also known as rMQR code) is a two-dimensional (2D) matrix barcode invented and standardized in 2022 by Denso Wave as ISO/IEC 23941. rMQR code is designed as a rectangular variation of the QR code (also known as rMQR code) is a two-dimensional (2D) matrix barcode invented and standardized in 2022 by Denso Wave as ISO/IEC 23941. rMQR code is designed as a rectangular variation of the QR code (also known as rMQR code) is a two-dimensional (2D) matrix barcode invented and standardized in 2022 by Denso Wave as ISO/IEC 23941. rMQR code is designed as a rectangular variation of the QR code (also known as rMQR code) is a two-dimensional (2D) matrix barcode invented and standardized in 2022 by Denso Wave as ISO/IEC 23941. rMQR code is designed as a rectangular variation of the QR code (also known as rMQR code) is a two-dimensional (2D) matrix barcode invented and standardized in 2022 by Denso Wave as ISO/IEC 23941. rMQR code (also known as rMQR code) is a two-dimensional (2D) matrix barcode invented and standardized in 2022 by Denso Wave as ISO/IEC 23941. rMQR code (also known as rMQR code) is a two-dimensional (2D) matrix barcode invented and standardized in 2022 by Denso Wave as ISO/IEC 23941. rMQR code) is a two-dimensional (2D) matrix barcode invented and standardized in 2022 by Denso Wave as ISO/IEC 23941. rMQR code) is a two-dimensional (2D) matr rMQR Code is more suitable for rectangular areas, and has a difference between width and height up to 19 in the R7x139 version. Rectangular Micro QR Code is an alternative to existing square QR code is an alternative to existing square QR code. situations where a longer and narrower rectangular shape is more suitable, such as on cylindrical objects. iQR codes can fit the same amount of information in 30% less space. There are 61 versions of square iQR codes, and 15 versions of rectangular codes. For squares, the minimum size is 9 × 9 modules; rectangles have a minimum of 19 × 5 modules. iQR codes add error correction level S, which allows for 50% error correction.[91] iQR Codes had not been given an ISO/IEC specification as of 2015, and only proprietary Denso Wave products could create or read iQR codes.[92] iQR code shad not been given an ISO/IEC specification as of 2015, and only proprietary Denso Wave products could create or read iQR codes.[92] iQR code shad not been given an ISO/IEC specification as of 2015, and only proprietary Denso Wave products could create or read iQR codes.[92] iQR code shad not been given an ISO/IEC specification as of 2015, and only proprietary Denso Wave products could create or read iQR codes.[92] iQR code shad not been given an ISO/IEC specification as of 2015, and only proprietary Denso Wave products could create or read iQR codes.[92] iQR code shad not been given an ISO/IEC specification as of 2015, and only proprietary Denso Wave products could create or read iQR codes.[92] iQR code shad not been given an ISO/IEC specification as of 2015, and only proprietary Denso Wave products could create or read iQR codes.[92] iQR code shad not been given an ISO/IEC specification as of 2015, and only proprietary Denso Wave products could create or read iQR codes.[92] iQR code shad not been given an ISO/IEC specification as of 2015, and only proprietary Denso Wave products could create or read iQR codes.[92] iQR code shad not been given an ISO/IEC specification as of 2015, and only proprietary Denso Wave products could create or read iQR codes.[92] iQR codes.[92] iQR code shad not been given an ISO/IEC specification as of 2015, and only proprietary Denso Wave products could create or read iQR codes.[92] iQR codes.[92] iQR code shad not been given an ISO/IEC specification as of 2015, and only proprietary Denso Wave products could create or read iQR codes.[92] iQR codes.[92 the terminator instead of the specified filler bytes "ec 11".[93] This private data segment must be deciphered with an encryption key. This can be used to store private information.[94] Sample of a Frame QR that encodes a text message saying "This is a specimen for the Wikimedia Foundation". This shows how FrameQR can combine both the code and the image together and that the frame doesn't have to be square but could be a circle as well. Frame QR is a QR code with a "canvas area" that can be flexibly used. In the center of this code is the canvas area" that can be flexibly used. In the center of this code is the canvas area well. the code without losing the design of illustrations, photos, etc.[95] Samples of the High Capacity Colored 2-Dimensional (HCC2D) code and (b) 8-color HCC2D code and (c) 8-color HCC2D distortions and uses colors for increasing data density (as of 2014 it is still in the prototyping phase). The HCC2D code cells are described in details in Querini et al. (2011),[96] while techniques for color classification of HCC2D code specification is described in details in Querini et al. (2014),[97] which is an extended version of Querini and Italiano (2013).[98] Introducing colors into QR codes requires addressing additional issues. In particular, during QR code reading only the brightness information is taken into account, while HCC2D codes have to cope with chromatic distortions during the decoding phase. In order to ensure adaptation to chromatic distortions that arise in each scanned code, HCC2D codes make use of an additional field: the Color Palette Pattern. This is because color cells of the Encoding Region. Replicated color palettes are used for training machine-learning classifiers. Accessible QR is a type of QR code that combines are used for training machine-learning classifiers. standard QR code with a dot-dash pattern positioned around one corner of the code to provide product information for people who are blind and partially sighted. The codes, announce product details such as instructions, ingredients, safety warnings, and recycling information. The data is structured for the needs of users who are blind or partially sighted and offers larger text or audio output. It can read QR codes from a metre away, activating the smartphone's accessibility features like VoiceOver to announce product details. The use of QR code technology is freely licensed as long as users follow the standards for QR code documented with JIS or ISO/IEC. Nonstandardized codes may require special licensing. [99] Denso Wave owns a number of patents on OR code technology, but has chosen to exercise them in a limited fashion. [99] In order to promote widespread usage of the technology, but has chosen to exercise them in a limited fashion. granted QR code patent, 5726435, expired on March 14, 2015. In Japan, the corresponding patent, 2938338, expired on March 14, 2014. The European Patents, all of which expired in March 2015. [100] The text QR Code itself is a registered trademark and wordmark of Denso Wave Incorporated.[101] In UK, the trademark is registered as E921775, the term QR Code, on 3 September 1998.[102] The UK version of the trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark, filed as Trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki Kaisha Denso (DENSO CORPORATION) trademark is based on the Kabushiki 1998 and registered on 16 December 1999 with the European Union OHIM (Office for Harmonization in the Internal Market).[103] The U.S. Trademark for the term QR Code is Trademark for term QR Code is Trademark for term QR Code is Trademark for term PR Code is Trademark fore trademark application filed on 18 November 2011 was refused at 20 March 2012, because the Korean Intellectual Property Office viewed that the phrase was genericized among South Korean people to refer to matrix barcodes in general. [105] The only context in which common QR codes can carry executable data is the URL data type. These URLs may host JavaScript code, which can be used to exploit vulnerabilities in applications on the host system, such as the reader, the web browser, or the image viewer, since a reader will typically send the data to the application associated with the data to the application associated wit permissive reader can still put a computer's contents and user's privacy at risk. This practice is known as "attagging", a portmanteau of "attack tagging", a portmanteau of "attack tagging". [106] They are easily created and can be affixed over legitimate QR codes. [107] [failed verification] [108] On a smartphone, the reader's permissions may allow use of the camera, full Internet access, read/write contact data, GPS, read browser
history, read/write local storage, and global system changes.[109][110][111][improper synthesis?] Risks include linking to dangerous web sites with browser exploits, enabling the microphone/camera/GPS, and then streaming those feeds to a remote server, analysis of sensitive data (passwords, files, contacts, transactions),[112] and sending email/SMS/IM messages or packets for DDoS as part of a botnet, corrupting privacy settings, stealing identity,[113] and even containing malicious logic themselves such as JavaScript[114] or a virus.[115][116] These actions could occur in the background while the user is only seeing the reader opening a seemingly harmless web page.[117] In Russia, a malicious QR code caused phones that scanned it to send premium texts at a fee of \$6 each.[106] QR codes have also been linked to scams in which stickers are placed on parking meters and other cities across the United States and Australia.[118][119][120] Aztec Code Data Matrix High Capacity Color Barcode JAB Code PDF417 QRpedia SnapTag SPARQCode Touchatag MaxiCode ^ Hara, Masahiro (1 October 2024). 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