

Information Security on Quick Response code

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Abstract-QR code is also called Quick Response code are widely used in a around the world to keep information about all kind of product in industry .Initially which has been developed by the automotive industry to store information about the manufacturing product, but now which has been slowly moves to other fields like supermarket to learning from QR code in education field. These usage starts from automotive industry to all other commercial products because of its two big advantages are fast accessing of data and provide large storage area .Even though this growth in QR code which does not provide the facility of information security. By using a QR code reader any person can read the content of the QR code and modify it. In this paper we proposed a methodology which will overcome this security issues in information.

Key words-QR code,Encryption,Decryption,

1.INTRODUCTION

A QR code is an abbreviated of Quick Response code is a type of two dimensional codes seems like a matrix bar code. This QR code initially designed for automotive industry, day by day this design becomes more popular from the outside industry. There are two for most reason for becoming popular is which is fast readably comparing with other bar codes and another reason is which provide large storage area. The QR code is an arrangement which consist of black modules arranged in a square pattern on a white background. The information will be stored in a QR code through encoding of data which can be any one of four modes of data like numeric, alpha numeric, byte or binary and kanji. Initially this QR code in created in the year of 1994 by Toyota to do the purpose of track vehicles during the stage of manufacturing process day by day this QR code is the most popular that two dimensional bar code because of it has been designed to allow its contents to be decoded at high speed. QR usage is growing fastest in United States, Canada and Hong Kong etc.

2.BACKGROUND OF QR CODE

On seeing of QR code which not only consist of two dimensional shape and storage area, along with that which also has five important area are 1)Standards used for encoding of QR codes 2)Storage 3)Encryption 4)Information Recording

There are several standards in documents covering the physical encoding of QR codes. The standards are AIM, JIS X 0510, ISO/IEC 18004:2000, ISO/IEC 18004 in the year 1997, 1999, 2000, 2006 respectively. Finally Docomo as established defacto standards for the encoding of URLs, contact information, and several other data types to access application layer. The open-source "ZXing" project maintains a list of QR code data types.

The maximum amount of data storage in QR Code depends on the data types and version. Possibly there

are 1...40 versions in the error correction level of (L[ow], M[edium], Q[uality], and H[igh]).

For encryption and decryption operation in QR codes uses DES algorithms (56 bits).Reed Solomon error correction algorithm used for error correction at four level of error correction.

The information records format consist of 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 6×6 grid that is repeated as necessary to cover the whole symbol. Modules corresponding to the dark areas of the mask are inverted. The format information is protected from errors with a BCH code and two complete copies are included in each QR symbol.

3. ARCHITECTURE OF QR CODE

Figure 1 shows the structure of QR code which has the inner components of version indicator, data and error correction level, information etc.

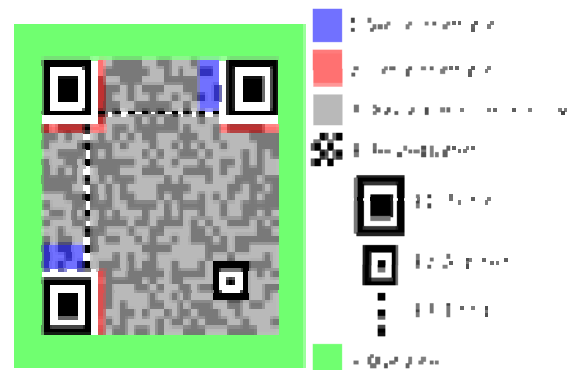


Fig 1 Structure of a QR code, highlighting functional elements

Version: The 40 different versions of QR Codes mainly differ in the number of modules. Version 1 consists of 21x21 modules, up to 133 (lowest error correction level) of which can be used for storing encoded data. The largest QR Code (Version 40) has a size of 177x177 modules and can store up to 23,648 data modules.

Data and Error Correction Level: Error Correction in QR Codes is based on Reed-Solomon Codes [14], a specific

Form of BCH error correction codes. There are four levels (Table 1) of error correction that can be chosen by the user at creation time.

L	7%
M	15%
Q	25%
H	30%

Table 1: Error Correction Levels

The message data is placed from right to left in a zigzag pattern, as shown figure 2 below. In larger symbols, this

is complicated by the presence of the alignment patterns and the use of multiple interleaved error-correction blocks.

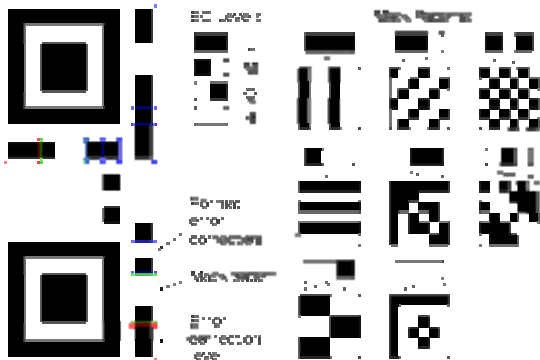


Fig 2 Meaning of format information

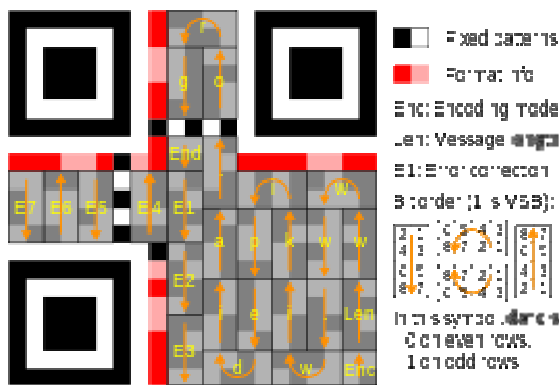


Fig 3 Message placement within a QR symbol

Four-bit indicators are used to select the encoding mode and convey other information. Encoding modes can be mixed as needed within a QR symbol.

Indicator Meaning

- 0001 Numeric encoding
- 0010 Alphanumeric encoding
- 0100 Byte encoding
- 1000 Kanji encoding
- 0011 Structured append
- 0111 Extended Channel Interpretation
- 0101 FNC1 in first position
- 1001 FNC1 in second position
- 0000 End of message

Next have to select the Encoding mode which says how many characters are encoded in this mode are shown

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, but cannot store lower-case letters and has only a limited selection of punctuation marks. Two characters are coded in an 11-bit value by this formula:

$$V = 45 \times C_1 + C_2$$

Alphanumeric character codes are as follows.

C	Ch	C	Ch	C	Ch	C	Ch	C	Ch
0	0	9	9	18	I	27	R	36	space
1	1	10	A	19	J	28	S	37	\$
2	2	11	B	20	K	29	T	38	%
3	3	12	C	21	L	30	U	39	*
4	4	13	D	22	M	31	V	40	+
5	5	14	E	23	N	32	W	41	-
6	6	15	F	24	O	33	X	42	.
7	7	16	G	25	P	34	Y	43	/
8	8	17	H	26	Q	35	Z	44	:

c-code
Ch –character.

4. RELATED WORK

4.1 QR code generator

The QR code generator is readily available which will be shown like below figure

QR - CODE GENERATOR

Top of form

Content type:

- URL
- Text
- Phone Number
- SMS

Content:

URL:

Size:

QR code generator can generate a QR code from URL, text, phone numbers etc .

Bottom of Form

4.2 QR code reader

QR code reader operation is the reader will be read a QR code through the mobile device can see the model is below



Top of form

4.3 Conventional Encryption/Decryption algorithm

Conventional encryption algorithm a common key is share between two parties for encryption and decryption process.

5. PROPOSED WORK

Our contribution to this paper we have taken of QR code usage in the field of super market. Assuming that, the entire sale product has the QR code sticker in which has the details of the product along with the price. If

anyone like a buyer can try to buy a product by stick a new QR code sticker which also have the same details but less price. Because the QR code generator is easily available. In this paper we try to avoid such a information security issues on the QR code. We introduce the security on the information is conventional encryption algorithm, a common key which QR code reader. Whenever the generator created a QR code before that the information is Encrypted by a common shared key then its generate a QR code .That generated QR code sticker will be pasted on the sale product. While the QR code reader reading time the reader will do the reverse process of decryption on the information to get the original information.

6. CONCLUSION

In this paper we conclude that the information stored in QR code is encrypted information which cannot be read by the unknown person by having a QR reader. Also cannot be replace by another QR code in the shopping mall.

7. FURTHER WORK

We proposed security on the QR code information which also be implemented in all kind of information security places where needed security on information.

REFERENCE

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