An Advanced Approach for Barcode Modulation Using High Capacity 2D Barcode Technique

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Abstract: Between handheld electronic gadgets in wireless data transmission for use the concept of HC2D barcode is of great relevance. In a typical setup, through an image series on the LCD there can be transferred any file on a phone to a second cell phone through the camera of the second cell phone which are then captured and decoded. In this study, in HC2D barcodes a new approach for data modulation is proposed, and to other standard methods of barcode modulation its performance is evaluated in comparison. In the new approach, within neighboring pixels of a LCD over adjacent blur, and light leakage, there is used the orthogonal frequency-division multiplexing (OFDM) modulation together with differential phase shift keying (DPSK).

Keywords— HC2D barcode, differential phase shift keying, data transfer, orthogonal frequency-division multiplexing (OFDM) modulation.

I. INTRODUCTION

In providing numerous identification processes Barcodes have played a different role since their invention in 1952 \cite{1}. In fact for machine readable digital data storing on paper or product packages, barcode is a cost-effective and easy method. Even faster data transfer as pressing needs and there have been many improvements with high reliability have emerged on the original barcode design that were made. For these cost effective codes as well as their applications opened a new front by invention of HC2D barcodes in scenarios like storing contact information which transfer high complex data, URLs among other things, there have become increasingly famous in which QR codes \cite{2}. There can be found the performance of camera phone applications in the comparison of 2D barcode in \cite{3}. In matrix barcode development there have been dedicated more of the efforts on a piece of paper to barcodes displayed they are normally used as that is the way. That replacement of the paper with LCD One could contemplate with tablets and electronics Book (e-Books) readers replacement with the books for broader applications of 2D barcodes may open another promising front as a mean of data transfer. Moreover for the eventual streams of data transfer, the LCD might display time-varying barcodes unlike the static paper to the receiving electronic device(s).

Through a series of HC2D barcode there transfer the data between two phones is studied, for state of the art mobile devices which achieving bit rates of under 10 kbps. With bit rates of more than 14 Mega bits per second later for reception and transmission, a digital camera and a computer monitor are used. Over distances of up to 4m which achieved in docked transmitter and receiver conditions. However, when the distance is increased to 14m this rate drops to just over 2 Mbps. Using a more effective coding and modulation scheme there is achieved the superior performance of the later implementation for mitigation of image and pixel blur to pixel light leakage. To modulate LCD pixels there used the inverse Fourier transform (IFT) of data like OFDM. The performance of QR decoders reduce by image light and blur leakage greatly. Furthermore to known portions of the decoded data there is confined their performance degradation. Based on data region as in \cite{5} on non-uniform error probability for adaptive error correction might be used coding this prior knowledge. In design as well as implementation of LCD-Camera based communication systems there is an increasing interest as shown in \cite{6},\cite{8}. For this type of innovative communications medium in determining optimal modulation and demodulation schemes this would require additional and advance investigations.

For transferring data, there uses orthogonal frequency subcarriers by the OFDM modulation and image blur can confine, to high frequency components which is essentially a low pass filter are transmitted intact. To find the data bits correctly this method requires high phase coherency. Through additional modifications this idea extends by the current study during capture of a single frame in a way on the modulation scheme for mitigating LCD...
camera relative movements, on the captured pictures which results in distortion of motion blur. As would be detailed later severely, the Quadrature Phase Shift Keying performance modulated signals of OFDM degrade due to this kind of distortion. From a single image which is shown on an LCD one should consider extracting maximum data to maximize the data transmission rate and then at which consecutive frames will be the rate decoded increase.

II. LITERATURE SURVEY

A. QR Code Detection in Arbitrarily Acquired Images

Through creation of links between physical objects and Internet resources, there enable rich context interaction by applications of QR codes. There are this kind of barcode applications are not common in spite of the widespread use for people and robots which are visually impaired because during picture acquisition that the symbol is properly by existing decoders framed are assumed. To perform exact detection of QR code symbols a two-stage component-based approach proposed by this work in arbitrarily acquired images.

![QR Code](image1.png)

Figure 1. Different versions of QR code

With the help of the framework which find the objects proposed by Viola-Jones to detect parts of the symbol is trained, a cascade classifier in first stage. In the second stage, in order to evaluate the detected patterns are aggregated if they are spatially arranged with the components of a QR code symbol in a way that is geometrically consistent. There was performed an extensive study of both stage parameter variation and in terms of computational efficiency, recall and precision the results were examined. With precision of 76.8% there achieved average recall of 91.7% by the proposed QR code detector while at 22 fps being capable of processing a 640 by 480 pixels video stream. For real-time applications, implementation these results supports which in mobile hardware assist visually impaired people and robots, through QR codes in multiple medium to the wealth of information available allowing them to have access.

B. 1D bar code reading on camera phones

In this section, using a NOKIA 7650, VGA camera phone on the bar code reading algorithms we present the research effort. From poor-quality images to extract barcode characters knowledge based barcode segmentation and a wavelet-based bar code region location scheme is applied. For the recognition engine there are input all the characters which are segmented barcode, and the barcode character string as final recognition result with the smallest total distance is output of the bar code based on the recognition distance. For optimizing class reference vectors and a feature extraction matrix in order to train an efficient recognition engine, there is designed the modified Generalized Learning Vector Quantization method. By NOKIA 7650 from more than 1000 bar code images captured, 584 samples segmented are involved in the training process. By the same cell phone the testing on 292 bar code images taken, there reaches 85.62% the entire bar code set of the correct recognition rate.

![Bar Code Decoding System](image2.png)

Figure 3. Diagram of the bar code decoding system.
C. Detecting and Decoding Algorithm for 2D Barcode

There can be classified the 2D barcode in two types which are matrix 2D barcode stacked 2D barcode. The structure of types of 2D barcode is discuss in this section in brief. The flowchart of detecting 2D barcode propose this paper and the 2D barcode also decoding.

D. Linear barcode scanning system based on dynamic template matching for oof blurred images

In the spatial domain the propose system works entirely and from severe OOF blur have the low-resolution images is capable of reading Linear Barcodes. Under the perspective of deformed Binary waveform classification analysis, this paper treats linear barcode scanning. At any specific blur level for characterizing relationship between the waveform of blurred barcode and value of its corresponding symbol a directed graphical model is designed. For activating real-time decoding, retrieve the optimal state sequence there is designed a Dynamic programming-based inference algorithm on mobile devices of limited processing power.

E. Two-Dimensional Barcodes for Mobile Phones
For a high level data density barcode there are several potential applications by mobile phones, that can be easily decoded and photographed, but now no such symbology exists. As a result, for exploiting the camera phone channel’s low-pass characteristic a new barcode was designed and with mobile phones as a means of facilitating wireless optical communication is presented. With encoding completed in the Discrete Cosine Transform domain a channel model was established and subsequent simulation results led to the design of a color barcode.

There enhance performance by a water-filling process and while for rotational and size invariance a noise-shaping algorithm, a new fast acquisition method allows. According to spatial frequency with a rate varying an outer Accumulate-Repeat-Accumulate code is employed, by an inner Reed Muller code which followed.

To various impediments imposed by camera cell phones for the leading has proven and symbology robust there is 3.5 times greater the final barcode data-density.

**F. QR Inception: Barcode-in-Barcode Attacks**

![Figure 9. 2D barcodes](image)

In this paper, when especially crafted barcodes conform based on deliberately caused ambiguities we present novel attacks to different multiple standards. Which standard the decoder locks on decides by implementation details. This way, with different phones or apps two users scanning the same barcode which will receive different content. For various problems related to security this potentially opens way. For performing a phishing attacks as well as targeted exploits How embedding one barcode symbology into another is described In addition, for these barcode-in-barcode attacks on smart phones are susceptible popular 2D barcode reader applications is evaluate. Against this type of attack we discuss the mitigation techniques further.

III. PROPOSED SYSTEM

To develop a handy barcode generation and reading system so as to make its use for day to day life. The proposed barcode has a high capacity of encoding the large amount of data.

The proposed barcoding and barcode modulation technique makes use of the latest technology for generating and reading the barcodes and thereby avail users to securely transmit the data.

1. KeyExpansions
   For each round AES requires a separate 128-bit round key block plus one more.
2. InitialRound
   AddRoundKeyâ.â.with a block of the round key, each byte of the state is combined using bitwise xor.
3. Rounds
   SubBytes in this step each byte is replaced with another byte.
   ShiftRows for a certain number of steps, the last three rows of the state are shifted cyclically.
   MixColumns a mixing operation which operates on the columns of the state, combining the four bytes in each column.
   AddRoundKey

4. Final Round (no MixColumns)
   SubBytes
   ShiftRows
   AddRoundKey.
   The SubBytes step
   In the SubBytes step, using an 8-bit substitution box, each byte in the state matrix is replaced with a SubByte. In the cipher, the nonlinearity provided by this operation. The S-box used is derived from the multiplicative inverse over GF (28), known to have good non-linearity properties. The S-box is constructed by combining the inverse function with an invertible transformation to avoid attacks based on simple algebraic properties. To avoid any fixed points, the S-box is also chosen, and also any opposite fixed points. For performing the decryption, SubBytes step is used inversely, for that, first taking the affine transformation and then finding the multiplicative inverse.
   The ShiftRows step
   On the rows of the state, the ShiftRows step operates; it shifts the bytes in each row cyclically by a certain offset. The first row is left unchanged, for AES. Each
byte is shifted one to the left of the second row. Similarly, by the offsets of two and three the third and fourth rows are shifted. The shifting pattern is the same, for blocks of sizes 128 bits and 192 bits, by n-1 bytes, row n is shifted left circularly. In this way, each column of the output state of the ShiftRows step is composed of bytes from each column of the input state. The first row is unchanged, for a 256-bit block and the shifting for the second, third and fourth row is 1 byte, 3 bytes and 4 bytes respectively. When used with a 256-bit block, this change only applies for the Rijndael cipher, as AES does not use 256-bit blocks. The case like to avoid the columns being linearly independent, is the importance of this step. AES degenerates into four independent block ciphers.

The MixColumns step
Each column of the state is multiplied with a fixed polynomial in the MixColumns step. In the MixColumns step, combined Using an invertible linear transformation, the four bytes of each column of the state are. The MixColumns function takes four bytes as input and outputs four bytes, where all four output bytes affect by each input byte. MixColumns provides diffusion in the cipher, together with ShiftRows.

The AddRoundKey step
In this step, the subkey is combined with the state. A subkey is derived from the main key, for each round using Rijndael’s key schedule; each subkey is the same size as the state. Using bitwise XOR, the subkey is added by combining each byte of the state with the corresponding byte of the subkey.

IV. MATHEMATICAL MODULE

Set Theory Applied To the Project

Sender Module : (Barcode Generation)

Set (S) = {s0, co, s1, s2, s3, s4, c1, s5, s6, s7}
S0- send login credentials to server
S2- select file to be encode
S3- generate hash value of input file
S4- send hash value for validation
S5- encrypt the input data
S6- generate barcode
S7- upload barcode to server

Receiver Module : (Barcode Decoding)

Set (R) = {r0, c0, r1, c4, r2, c5, r3, c4, r5}
R0- send login credentials to server
R1- select barcode from uploaded barcode list
R2- decode hash value from barcode
R3- send hash value for data existence
R4- decrypt the received encrypted data
R5- download decrypted data

Server Module:

Set (C) = {s0, r0, c0, s4, s7, c1, c2, c3, r1, c4, r3, c5}
C0- send login status to sender and receiver
C1- send comparison status to sender
C2- check for same hash value is present or not
C3- make entry log for encoded barcode
C4- send selected barcode to receiver
C5- send encrypted data to receiver

Union and Intersection of sets:

Set (S) = {s0, co, s1, s2, s3, s4, c1, s5, s6, s7}
Set (R) = {r0, c0, r1, c4, r2, r3, c5, r4, r5}
Set (C) = {s0, r0, c0, s4, s7, c1, c2, c3, r1, c4, r3, c5}
Set (S U C) = {s0, co, s1, s2, s3, s4, c1, s5, s6, s7, c2, c3, c4, c5, r0, r1, r3}
Set (R U C) = {r0, c0, r1, c4, r2, r3, c5, r4, r5, s0, c0, s4, s7, c1, c2, c3, c4, c5}
S C = {s0, c0, s4, s7, c1}
R C = {r0, c0, r1, c4, r3, c5}

Venn Diagrams:

Fig 11 S intersection C

Fig 12 R intersection C

V. COMPARISON AND SYSTEM ANALYSIS

VI. RESULTS

Home Page:
Settings Save Page:

Barcode File Loading Page:

Login Page:

Data Read FromFile:
In this system in order to data stream modulate into visual HC2D barcodes, the combination of High capacity novel barcode generation and barcode decoding technique is carried out. As the proposed algorithm for barcode generation is quite a new technique, hardware barcode gun for decoding the barcode is not yet available and as the system is still under research, only software decoding of the generated barcode will be carried out in the proposed system. The proposed system makes the use of encrypted data modulation on to the barcodes and hence the security of the data being encoded in barcode is maintained and thus makes user convenient to transfer the large amount of data.
through a single barcode over the transmission medium. Thus the proposed system provides high level security to the data being modulated and transmitted with minimum network usage for larger data too.

VII. CONCLUSION

In this paper in order to data stream modulate into visual HC2D barcodes, there are combined the Differential Phase Shift Keying with Orthogonal Frequency Division Multiplexing. In the mitigation of camera LCD movements there has serious shortcomings that QPSK-OFDM modulation is it indicated where there continuously changes the each element phase. On the other hand, from the ideal phase before OFDM a differential phase modulator addition in the receive signal because of its change in gradual from element to element, to a small deviation contributing, into phase differences of adjacent elements DPSK-OFDM to modulate the data stream causes the effect of motion to increasingly weaken.

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