

DWT-IDWT Based Barcode Modulation Method for Verification

G. G. Rathod

Department of Electronics Engineering
 Amrutvahini College of Engineering,
 Sangamner, India.
 gajanan.rathod@gmail.com

V. S. Ubale

Department of Electronics Engineering
 Amrutvahini College of Engineering,
 Sangamner, India.
 vilasubale1978@gmail.com

Abstract

There are several wireless data transmission techniques in which barcodes are of great relevance. In this new approach 2D barcode is forward and its enactment may be contrasted with different standard systems. For analysis purpose, the low-pass trademark of a camera phone channel and has been exhibited for encouraging wireless optical communication with versatile handheld mobile telephones. In this method, orthogonal frequency-division multiplexing (OFDM) modulation is utilized together with differential phase shift (DPSK) through contiguous frequency dominion components. Proposed method aims furthermore to create an arrangement that is accepting camera activities in different variations, image fuzziness along with light spillage inside neighboring pixels of an LCD.

Keywords: 2D barcode, blur image, OFDM, DPSK, LCD.

I. INTRODUCTION

Orthogonal Frequency Division Multiplexing (OFDM) is an equivalent transmission scheme at the place a high-rate serial information stream will be separated fixed amount of low-rate sub streams which is adjusted and modulated around a differentiate subcarrier depends on Frequency Division Multiplexing (FDM) method. Over typical correspondences, parallel information system, the total signal frequency band may be separated under non-overlapping frequency sub-channels. Each sub-channel will be adjusted for a separate symbol and then, sub channels are multiplexed in frequency domain.

It may be beneficial with stay away from ghashtly cover from overlapping channels to dispose of inter-channel obstruction and distortions.

Conversely, this prompts wasteful utilization of the accessible spectrum. The data transfer capacity ineffectiveness, the thoughts recommended the place to utilize parallel information data along with FDM with covering sub-channels to which every transporting a signaling rate in frequency to escape utilization for high secondary equalization adjustment reducing battle incautious of multipath distortion, and also will fully utilize the accessible data transfer capacity. The block diagram of the base band OFDM model is demonstrated in Figure 1.

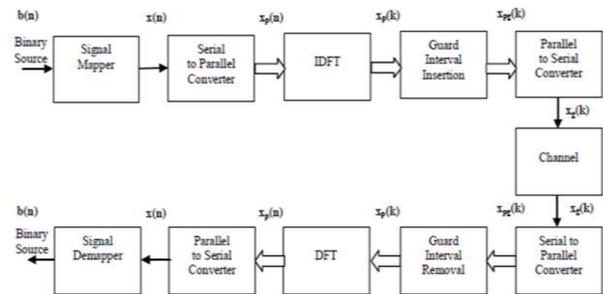


Figure 1. Block diagram of OFDM system model.

Applied binary data signal $b(n)$ is initially assembled and the signals are mapped as per modulation by utilizing signal mapper expressed as $x(n)$. The mapped signs are after that changed over under parallel obstructs $p \times (n)$ for effective high rate information correspondence. Those information in the frequency-domain is converted into time domain utilizing an inverse discrete fourier transform (IDFT) and indicated likewise $x_p(k)$. The receiver performs the opposite operation of the transmitter by utilizing an FFT to examine that signal in the frequency domain.

After IDFT, Cyclic Prefix (CP) extension of guard intervals are introduced among two successive blocks, the OFDM symbol includes the binary input information along with the cyclic prefix signal $p_g x(k)$. The signals can be converted from parallel form to serial form with the help of Parallel to Serial (P/S) converter and it is represented as $g \times (k)$. The communicated signal $x(n)$ permits to pass through the frequency discriminating time changeable channel with the influence of additive noise. At the receiver end once again serial transmission of signal is converted in parallel form and guard time is removed.

The received signal is sent to DFT block for converting time domain signals in to frequency domain. The received signals are extracted using damper and the binary information is recovered in the receiver. Figure 1.4 shows the time domain representation of an OFDM system. The CPT represents the cyclic prefix duration and T_s is the OFDM symbol duration. 1-D and 2-D barcodes bring turned into extremely well known alongside from long time of years and generally used to distinguish goods and services. In recent times, 2D barcodes, similar to QR codes, likewise utilized to optically exchange a committed hyperlink. The greater

part 2D barcodes offer person major limitation: the storing limit. With succeed that, the long haul could be presented a 3-D system. As an alternative one, an arrangement of barcodes may be used to exchange a bigger amount from data information. The principle objective of the proposed work to design, implement and more particularly assess those whole workflow for such QR code-based, three-dimensional (3D) transmission framework over the smartphone, having the ability to from a sender and characterized by a screen. Those steps contain gathering and capturing of the 3D barcode, the distinguishment and perusing of the arrangement of 2D barcodes, and the last recovery of the unique substance. Moreover, adversarial circumstances must be recognized, verified and documented precisely for point of interest.

The model accomplishes a hypothetical throughput from 12,288 Bytes to 30 seconds transmission intervals, which brings about pretty nearly 3,280 bit/s. Upcoming extension of effort might concentrate on expanding the throughput of the framework and in addition those transmission steady quality by applying interval identification and reconsideration systems.

Demand for high data rate communication system leads to design of OFDM architecture which offers high data rate up to 100mbps. Introduction of blur in digital images has become a major concern area in the data transfer and usage of orthogonal subcarriers from OFDM has successfully handled the problem of image contamination. Orthogonal frequency division multiplexing scheme utilizes the low pass filter in efficient way to ensure the transfer of low frequency bits in uncontaminated way and only requirement needed is high phase coherency which helps in detect data bits in accurate and reliable way. A detailed explanation with well-defined modification is presented in this paper based on above study and the proposed idea mainly relies on equipped modulation scheme along with LCD camera [9] movements which is used in capturing the single frame and the acquired images are perceived in better way.

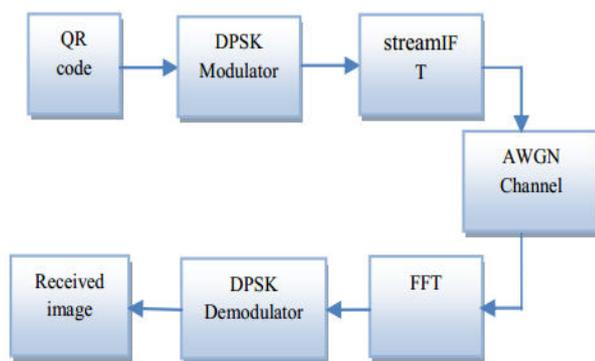


Figure 2. Block diagram of DPSK Modulation Demodulation.

DPSK modulation scheme is literally called as heart of the proposed work and adjacent frequencies phase differences leads to DPSK modulation. DPSK

modulation usage comes into implementation when data is inscribed in phase differences based on the required movement tolerance. Finally, DPSK-OFDM termed as DPSK method in entire project till end. Generally, phase differences in data transfer results in phase distortions may affect the relative neighboring components in negligible way and usage of DPSK modulation handle the distortion situation in better way which paves way for transmission even in high LCD vicinity and in camera relative motion.

II. DESIGN AND IMPLEMENTATION

A. Finding the relevant patterns

Modulation and demodulation is deliberated as core of the current communication system which is contributes great data rates to numerous indoor and outside solicitations by global communication principles. Abstraction of etched information from individual barcode modulation is highly affected by power distortions. Average finder pattern used for QR code is 1:1:3: 1:1.

B. Correspondences of Barcode and Wireless RF Channel

To make simpler, every 2D picture is transformed made about a 1-D row trajectory which comprises all the pixels of 2-D picture. Every row is being deliberated a time domain signal with Pulse Amplitude Modulation.

The result will only affect the extraordinary frequency components, escaping the moderate frequency components contaminations for data broadcast. This idea may be stretched for applying to 2-D signals, to achieve the condition for transmitting whole image at a same time. In its place of a 1-D, inverse Fourier transform, the 2-D form is being utilized in such a way as to restrain the effect of objects substitute on two axes individually to extraordinary frequency components. The study will discuss the exact modulation scheme.

Transmission of data through wireless condition will be possible due to dependable modulation schemes. To conventional approaches, different modulation schemes along OFDM were actualized among them as none camwood attain low density of simplicity. In this proposed work DPSK-OFDM modulation plan is executed for finer transmission of data starting with transmitter end of the recipient end. That transmission about data through DPSK OFDM approach is indicated to Emulating figure 4. Here that particular input made may be "TEXT". The encoding transform aides help to accomplishing secured QR code for consistent transmission. Encoding and deciphering for QR code may be attained by Zxing open join hotspot. Cyclic addition is used to prevent those inter-carrier-interference (ICI) over OFDM framework [7] utilizing its actual and fanciful parts of the components. The sign of the actual part determines those to start of first bit and sign of the nonexistent segments determines those second bit.

C. DPSK Against OFDM

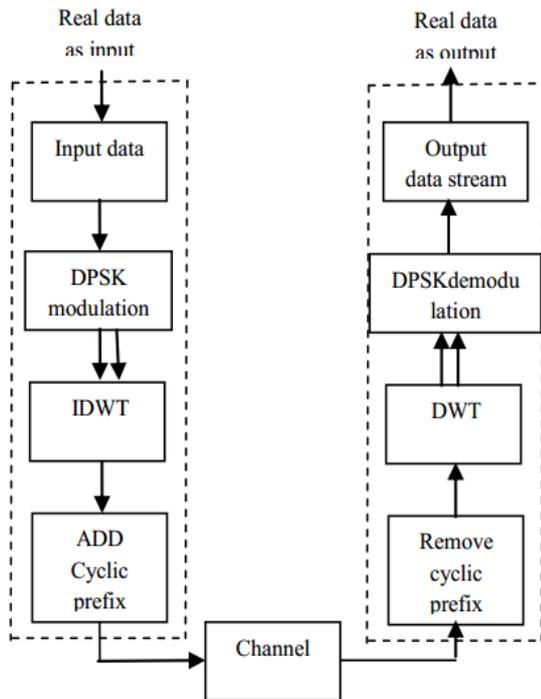


Figure 3. Block Diagram of DPSK-OFDM approach.

In wireless communication system, to expand information data rate orthogonal recurrence division multiplexing (OFDM) may be utilized which employments inverse fast Fourier transform at those transmitter will modulate a high bit rate indicator onto a number of carriers. The issue with this strategy may be that it obliges a greater amount complex IFFT core. Again this, we could utilization discrete wavelet transform that will produce low level computational multifaceted nature. Wavelet transform will be the a large portion suiting for utilize on AWGN channel and also measures the execution as far as bit error rate (BER) and signal to noise ratio (SNR). It increments the spectral effectiveness. Also abatements the bit error rate as contrast with Fourier transform and we get the better execution.

III. SYSTEM ANALYSIS

The suggested technique has been assessed and done by using MATLAB R2015b simulation tool. Those adjusted encrypted QR code obtained and transformed form phone by catching the picture. This caught picture might have been effectively decoded and decrypted will get those genuine information. Fig indicates the encrypted adjusted QR code. This QR code is shown on the phone Furthermore is transmitted to an alternate telephone catching those picture. Fig. 4. Indicates the information exchange eventually catching those QR code. Indicates the caught QR code. On decoding and decrypting this captured QR code, the unique data is retrieved.

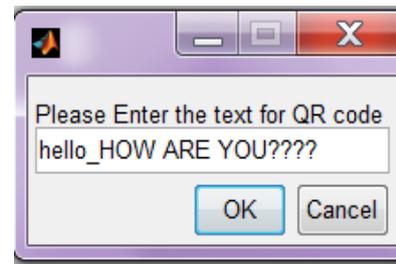


Figure 4. Transmitting data towards mobile phone

TABLE I. SYSTEM COMPARIION

Systems	Previous System	New System
Elapsed Time Required	1.641066 Seconds	0.235176 Seconds

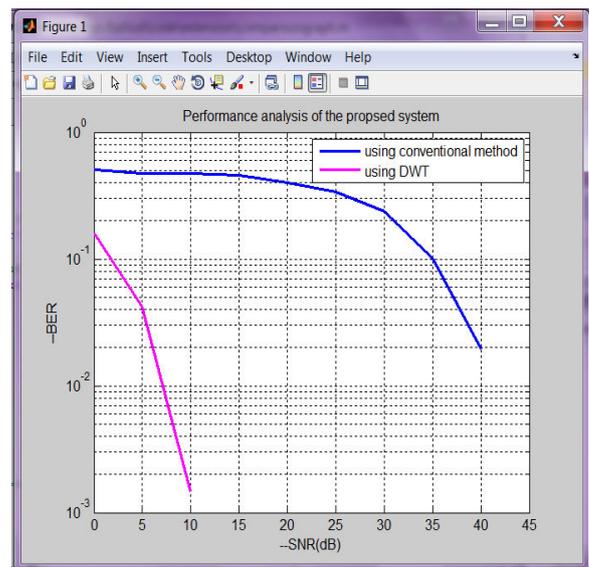


Figure 5. Compare Elapsed time.

IV. RESULTS AND DISCUSSIONS

Present two dimensional barcodes utilize PAM similarly to favored regulation strategy [2]. Should think about them for the recommended modulator Furthermore demodulator, both frameworks need aid actualized clinched alongside MATLAB.

A basic PAM modulating system which interprets bits in to optical light and dim pixels about a picture may be contrasted with the recommended DPSK-OFDM strategy which employments describes the modulation and demodulations. Also, the enactment of QPSK base OFDM is basically same as 4 point QAM utilized in PixNet [5], is likened to the planned DPSK based OFDM system. The core constraints are reflected consisting: the ratio of noise and clip; low pass filtering; and movements of camera.

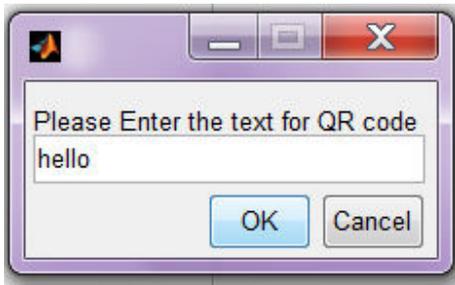


Figure 6. Transmitting data of the system.



Fig 5: Received data

For investigation of impact for each from these parameters, initially irregular information stream is adjusted and modulated to shown picture utilizing the algorithm to be analyzed. Also modulation distortion may be added to the picture earlier applying it to receiver. That data stream in the interpreter is compared and likened with the information of random stream. This procedure will be repeater a few times utilizing different random processes.

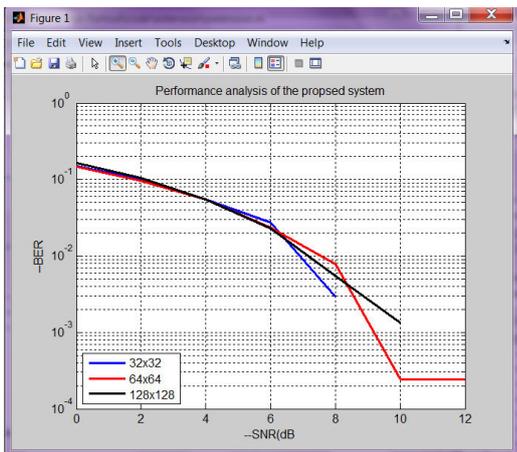


Figure 7. Low pass filtering output of BER performance.



Figure 8. Encrypted Modulated QR code.



Figure 9. Captured QR code.

V. CONCLUSIONS

A data can be securely transferred from one mobile device to another by first encrypting it and then converting the data into barcodes. This is then transferred to another device by capturing the image of the barcode. This data transfer uses visual light communication, thus reducing the possibilities of NFC attacks. In order to avoid motion blur distortions, the data is stored in phase difference of adjacent elements. The data transfer rate can be increased by increasing the bits per symbol from current 2 bits per symbol constellation. Also elapsed time required for this system is less as compare to another system and bit error rates is reduced.

REFERENCES

- [1] N. J. Woodland and B. Silver, "Classifying apparatus and method", U.S. Patent 2 612 994, Oct. 7, 1952.
- [2] Information Technology Automatic Identification and Data Capture Techniques QR Code 2005 Bar Code Symbology Specification, ISO/IEC 18004:2006, 2006.
- [3] H.Kato and K. Tan, Pervasive 2d barcodes for camera phone applications, Pervasive Comput., vol. 6, no. 4, pp. 76-85, Oct. 2007.
- [4] X. Liu, D. Doermann, and H. Li, Vcode-pervasive data transfer using video barcode, IEEE Trans. Multimedia, vol. 10, no. 3, pp. 361-371, Apr. 2008.
- [5] S. D. Perli, N. Ahmed, and D. Katabi, "Pixnet: Interference-free wireless links using LCD-camera pairs", in Proc. MobiCom, 2010, pp. 1371-148.
- [6] J. Memeti, F. Santos, M. Waldburger, and B. Stiller, "Data transfer using a camera and a three-dimensional code", Praxis der Informationsverarbeitung und Kommunikation, vol. 36, no. 1, pp. 31-37, 2013.
- [7] C. Pei, Z. Zhang, and S. Zhang, Softoc: Real-time projector-wallcamera communication system, in Proc. ICCE, Jan. 2013, pp. 100-101.
- [8] S. Kuzdeba, A. M. Wyglinski, and B. Hombs, "Prototype implementation of a visual communication system employing video imagery" Proc. CCNC, 2013, pp. 184-189.