International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

COPY RIGHT

IJIEMR Transactions, online available on 16th Aug 2017. Link :http://www.ijiemr.org/downloads.php?vol=Volume-6&issue=ISSUE-7

Title: **DIFFERENTIAL PHASE SHIFT KEYING- ORTHOGONAL FREQUENCY-DIVISION MULTIPLEXING BASED QR CODE TRANSMISSION IN ELECTRONIC DEVICE**

Volume 06, Issue 07, Pages: 100 –112 .
Paper Authors

***SK.FARMANULLA**

*Eswar College Of Engg, Narasaraopet, Guntur Dt.

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

DIFFERENTIAL PHASE SHIFT KEYING- ORTHOGONAL FREQUENCY-DIVISION MULTIPLEXING BASED QR CODE TRANSMISSION IN ELECTRONIC DEVICE

SK.FARMANULLA
Asst Professor, Dept Of E.C.E, Eswar College Of Engg, Narasaraopet, Guntur Dt.

ABSTRACT—There are several wireless data transmission techniques in which barcodes are of great relevance. The concept of 2-D barcodes is of great relevance for use in wireless data transmission between handheld electronic devices. In a typical setup, any file on a cell phone, for example, can be transferred to a second cell phone through a series of images on the LCD which are then captured and decoded through the camera of the second cell phone. In this project, a new approach for data modulation in 2-D barcodes is introduced, and its performance is evaluated in comparison to other standard methods of barcode modulation. In this approach, orthogonal frequency-division multiplexing (OFDM) modulation is used together with differential phase shift keying such as DPSK over adjacent frequency domain elements. A specific aim of this study is to establish a system that is proven tolerant to camera movements, picture blur, and light leakage within neighboring pixels of an LCD.

I.INTRODUCTION

Communication industry has grown enormously in past six decades and supports various applications belong to different research fields. Wireless communication is major constituent of communication industry which has 75% of total market share. Wireless communication takes the communication domain to next level in terms of reliability and performance. Mobile data transmission is considered as 21st century system which offers higher data rate but suffers from complexity. The stability of communication systems depends on modulation technique, if a system is deployed with equipped modulation mechanism it helps to achieve high efficiency and as well as better performance. Traditional modulation systems have limitations in its architectural design which restrict them to operate in proper way and the abnormal restriction results in complexity which eventually decline the total system performance. The research on modulation system reveals an interesting fact that the modulation scheme alone cannot perform entire task with accuracy and it needs additional barcode system to perform the modulation scheme with security. Barcode system based modulation framework achieves high performance along with nearly low complexity BARCODES have played a great role in facilitating numerous identification processes since their invention in 1952. In fact barcode is a simple and cost-effective method of storing machine readable digital data on paper or

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

product packages. As pressing needs to transfer even more data faster and with high reliability have emerged, there have been many improvements that were made on the original barcode design. Invention of two dimensional (2D) or matrix barcodes opened a new front for these cost-effective codes and their application in more complex data transfer scenarios like storing contact information, URLs among other things, in which QR codes have become increasingly popular .A comparison of 2-D barcode performance in camera phone applications. Much of the efforts in matrix barcode development have been dedicated to barcodes displayed on a piece of paper as that is the way they are normally used.

A. Barcode A barcode is a code consisting of a group of printed and variously patterned bars and spaces and sometimes numerals that is designed to be scanned and read into computer memory and that contains information (as identification) about the object it labels. Most barcodes used today are under the UPC or Universal Product Code. These codes are designed to have both the thin thick bars as well as a 12 digit UPC code. An example of a barcode is shown below:

Fig.1. Bar Code Example B. Types of Bar Code 1. 1-D One-Dimensional Barcodes

One-dimensional barcode appearance looks in a peculiar form consists of white and black lines in parallel form with essential spacing between them. Generally scanner reads the white lines excluding the black lines which decoding the barcode and it's the interesting fact about the one-dimensional barcode spacing consists of white and black line.

Fig.2. 1-D Bar Code 2. 2-D Two-Dimensional Barcodes

Two-dimensional barcode is a purely a graphical image which has ability to preserve the necessary information both in horizontal as well as vertical way. There are many 2D barcode are available from that some uses for camera phone applications these are QR code, visual code, data matrix, VS code. But along these codes QR code is more widely used in camera phone application since QR code is a unique code and it has a larger data storage capacity

Fig.3. 2-D Bar Code 3. QR Code Input

Created in Japan where they are most commonly found, Quick Response codes or QR codes for short were produced to be a quicker and easier read code by cell phones, tablets and smart devices. QR codes were created mostly for advertising and business to describe a product, link the scanner to a website to purchase the product, or even give a coupon to the devise that just scanned the code. Moreover, a QR code is two

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

dimensional code, which is considerably more useful than a standard barcode, because they can store and digitally present much more data than, just a company number, and an item number. Above all, other than barcode, a QR code is the most scanned code in modern technology today. Consequently Alfred has been provided with a QR scanning device, just in case the business tends to move towards the QR scanning industry, due to the more information the codes can hold.

4. Design of a QR Code

Unlike one-dimensional barcodes that were designed to be mechanically scanned by a narrow beam of light, a QR code is detected by a 2-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 square near the fourth corner to normalize the image for size, orientation, and angle of viewing. The small dots throughout the QR code are then converted to binary numbers and validated with an error-correcting code. A QR code can have a max of 7,089 characters if numeric only, to up to 1,817 characters if Kanji/kana the most common QR codes used today. QR codes can be easily created, by using Kaywa.com or the new Google QR generator that turns URLS into QR codes for you. As a consequence, with a wealth of information with such an easy setup to create, QR codes will be used by many companies for Alfred to scan for the companies.

5. QR Code Scanning A QR code scans the exact same way as a barcode except, In the case of QR code scanner; the decoder sends the information to your mobile phone instead of a computer. The app you download for your phone that is a QR code scanner contains the illuminator, which is the red light that runs across the screen when you open the app. The sensor and decoder then work to decode the QR code. Then the decoder sends the information to your phone, and you will be able to see where the QR code was supposed to take you. There are so many QR code apps that can be chose from to work with due to the popularity in Japan that the product can pick from any of the following below.

II. LITURE SURVEY

A.Topic— Prototype Implementation of a Visual Communication System Employing Video Imagery Information transmission through the use of video imagining systems has the potential to build upon the success of imaging communication systems, such as QR Codes and 2D Barcodes. Video communication systems add a temporal dimension to image-based information transmission systems, greatly expanding the amount of data that can be transferred. Such a system allows for secure transfer of data through the use of a line-of-sight (LOS) visual channel, making it attractive for several applications, including in-store purchases, banking, and stealth military missions. The nature of the LOS visual channel also reduces interference from other applications, making it a very attractive option for implementing short range communications systems from a cell phone, computer, tablet, or other device. This project investigates how a video

imaging system can be used for information transmission. A prototype system has been designed and implemented as a proof of concept, and the performance of the prototype is evaluated. Digital images are widely used at present in digital broadcasting, digital still cameras (DSC's), and the image delivery through the broadband network, and are being applied to the extended fields such as telemedicine, electronic commerce, and electronic museum. The natural color reproduction is one of the key issues in these applications, as well as the high resolution or large-screen display technologies. However, many of conventional color imaging systems are designed for user preference, and it is difficult to reproduce the original color of the object. The color management technology is greatly progressed, but there still remains a limitation in color reproducibility in RGB 3-primary color systems. As a breakthrough to this limitation, multispectral imaging technology is promising, and the research and development of multispectral imaging are gaining remarkable attention recently. In the printing and the display of color images, there have also been the attempts to improve the color reproducibility by increasing the number of primary colors. This project introduces the activities of natural vision project over the seven years, including the development and system integration of multispectral and multi primary imaging for video and still-image communication, as well as the demonstration of the effectiveness of spectrum-based color reproduction. NV project proposed the renovation of color imaging techniques from the observation purpose to the measurement-oriented system. It thus enables not only the high-fidelity color reproduction but also the application of image analysis based on the quantitative spectral information. Moreover, multispectral information will be also of great utility in the image editing for preferable color, and other various image processing such as object extraction or image synthesis, though those were not the main topic of this project that basically aims to natural color reproduction. Wide gamut display becomes one of the recent topics in display industry, and the presentations of multiprimary displays can be also found from other groups. It is expected to establish the basis of multispectral or wide-gamut video contents creation, management, distribution, and utilization in near future. For the widespread use of the technology, compact and easy-handling devices, and refined system integration are the next important subject to be addressed.

B. Topic: Clipping Noise in OFDM-Based Optical Wireless Communication Systems

In this project, the impact of clipping noise on optical wireless communication (OWC) systems employing orthogonal frequency division multiplexing (OFDM) is investigated. The two existing optical OFDM (O-OFDM) transmission schemes, asymmetrically clipped optical OFDM (ACO-OFDM) and direct-current-biased optical OFDM (DCO-OFDM), are studied. Time domain signal clipping generally results from direct current (DC) biasing and/or from physical limitations of the transmitter front-end. These include

insufficient forward biasing and the maximum power driving limit of the emitter. The clipping noise can be modeled according to the Bussgang theorem and the central limit theorem (CLT) as attenuation of the data-carrying subcarriers at the receiver and addition of zero-mean complex-valued Gaussian noise. Analytical expressions for the attenuation factor and the clipping noise variance are determined in closed-form and employed in the derivation of the electrical signal-to-noise ratio (SNR). The validity of the model is verified through a Monte Carlo bit-error ratio (BER) simulation. Finally, the BER performance of ACO-OFDM with DCO-OFDM is compared for different clipping levels and multi-level quadrature amplitude modulation (M-QAM) schemes. The impact of clipping noise on Optical Wireless Communication (OWC) systems employing Orthogonal Frequency Division Multiplexing (OFDM) is investigated. The two existing Optical OFDM (O-OFDM) transmission schemes, Asymmetrically Clipped Optical OFDM (ACO-OFDM) and Direct Current-biased Optical OFDM (DCO-OFDM), are studied. Time domain signal clipping generally results from Direct Current (DC) biasing and/or from physical limitations of the transmitter front-end. These include insufficient forward biasing and the maximum power driving limit of the emitter. The clipping noise can be modeled according to the Bussgang theorem and the Central Limit Theorem (CLT) as attenuation of the data-carrying subcarriers at the receiver and addition of zero-mean complex valued Gaussian noise.

C. Topic: "Recognition of QR Code with Mobile Phones," in Proc. Chinese Control Decision:

Quick Response Code has been widely used in the automatic identification fields. In order to adapting various sizes, a little dirty or damaged, and various lighting conditions of bar code image, this project proposes a novel implementation of real-time Quick Response Code recognition using mobile, which is an efficient technology used for data transferring. An image processing system based on mobile is described to be able to binarize, locate, segment, and decode the QR Code. Our experimental results indicate that these algorithms are robust to real world scene image. Based on analysis of factors of concrete quality of cold-rolled products, a comprehensive evaluation index system of cold-rolled products quality is established in this project. With this evaluation method, ABP (Analytic Hierarchy Process) is used to determine the weights of evaluation indices for all vendors, while the method of nonlinear dimensionless is introduced to process the information relevant to vendor evaluation. At last it comprehensively assesses concrete quality by the way of linear addition method. A case study is conducted to explain applying the method in a cold-roller manufacturing enterprise, through which enterprises can realize and evaluate their products quality correctly. This method can provide theoretic basis to improve the competitive quality for their products

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

III.PROPOSEDSYSTEM

A. DPSK_OFDM

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 movements which is used in capturing the single frame and the acquired images are perceived in better way. 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 distortion 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. A related figure composed of LCD camera movements along with communication standards is shown in figure 1(a) and figure 1(b) and the mechanism presented above successfully eliminates the unnecessary channel estimation requirements which results in low processing power

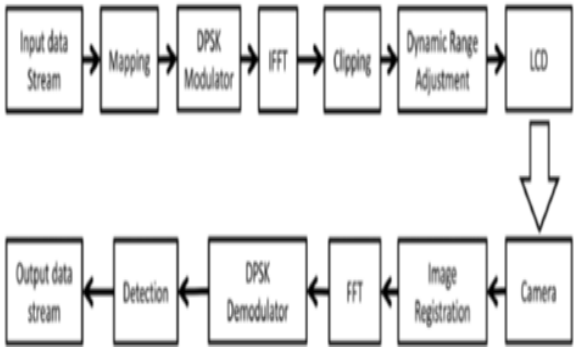

Fig.4. Transmission of Information B. Using DPSK Algorithm

Transmission information from the transmission end at maximum level is a concerned area especially from a single image and in order to meet the criteria, maximum data must be extracted from the single which is followed by increasing the data rate of the consecutive frames for decoding purpose. Extraction of the information depends on the LCD display design while in some cases it depends on the receiver end camera respectively. Transmission of information through wireless scenario is possible because of reliable modulation schemes. In traditional approaches vast amount of modulation schemes along OFDM has implemented but none can achieve low complexity. In this work, DPSK-OFDM modulation scheme has implemented for better transmission of

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

information from transmitter end to the receiver end. The transmission of information through DPSK OFDM approach is shown in following figure .Here the respective input taken is _TEXT‘. The encoding process helps in achieving secured QR code for reliable transmission. Encoding and decoding of QR code is achieved by Zxing open link source. Cyclic extension is used to prevent the inter carrier interference (ICI) in a OFDM system

C. Clipping The clipping is the easiest technique to reduce the power by setting a maximum level for the transmitted signal. Though, this technique has several disadvantages:

- The performance of BER could be affected negatively due to the in-band distortion caused by the clipping.
- Also out-of-band radiation usually appears with clipping technique that could disturb the adjacent channels

However, we can use filtering operation to decrease the appearance of the out-of-band radiation but the signal may exceed the maximum level of the clipping operation. The block diagram of clipping and filtering technique for PAPR reduction is exposed in Fig4. In this figure, N denotes the number of subcarrier and L represents the oversampling factor. In the diagram, The IFFT generate $x'[m]$ which is the L-times oversampled signal. As shown in fig 3, the FFT-IFFT filter is applied to allow the signal passing through a band-pass filter (BPF) then through a low-pass filter (LPF). The outcome of the filtering stage is a less degraded BER performance and a reduced out-of-band radiation. Though, the PAPR reductions improvements are gained at the cost of regret the peak where the signal could go beyond the clipping level after applying the filtering operation

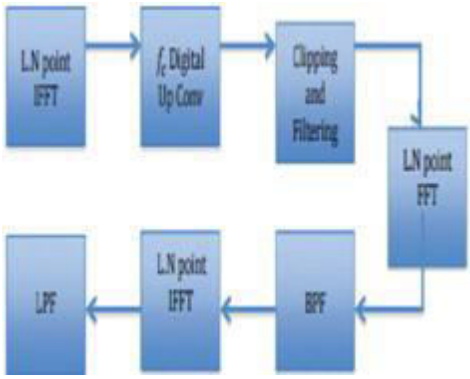

Fig.5. The Scheme of Clipping and Filtering Technique for PAPR

The signal $x\ p\ [m]$ is the pass band modulated one with carrier frequency. We symbolize the clipped form of the pass band-modulated signal as $xc\ p\ [m]$. The expression of this signal is shown in following equation

$$x_c^p[m] = \begin{cases} -A & x^p[m] \le -A \\ x^p[m] & |x^p[m]| < A \\ A & x^p[m] \ge A \end{cases}$$

Where the clipping level is denoted by A and (CR) is the clipping ratio that can be represented as follow Where the RMS value of OFDM signal is denoted by σ and it is well known that $\sigma = N$ for the baseband and $\sigma = N/2$ for the pass band OFDM signal

D. DPSK Modulator DPSK takes the converted data as a input source. Each symbol is converted to a complex phase by following rules $11 \rightarrow ej1\pi4$, $10 \rightarrow ej7\pi4$, $01 \rightarrow ej3\pi4$, $00 \rightarrow ej5\pi4$, (2) First bit modulates the Real component & second bit modulates the imaginary component of the phase of each symbol. S matrix converted

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

into Differential matrix D using following method: D(0,0)=S(0,0)
(3) D(0,n)=D(0, n-1) × s (0,n)1≤n<N-2
(4) D(m,n)=D(m-1,n)×s(m,n)1≤m<M/2-1, 0≤n< N-2
(5) D matrix is converted into two matrices: D1(m,n)=D(m,n)
(6) D2(m,n)=D(m,n+N-2/2 (7) Where 0≤m<M/2-1, 0≤n<N/2-1, these two matrices are used to fill regions 1 and 2 of the transmission matrix.

1. IFFT

$$X[n]=\sum_{k=0}^{N-1} X(k).e^{\frac{j2\pi n}{N}} n=0,1,2\ldots,N-1$$

IFFT is used to convert the frequency domain data into time domain. Output of DPSK modulator is in frequency domain, so IFFT is used to convert it in Time domain representation using following equation:

2. AWGN Channel AWGN channel is widely used in OFDM. In OFDM multipath signals are transmitted then these signals are received as a train of pulses at the receiver .In this white Gaussian Noise are considered with constant spectral density.

3. FFT FFT is used to convert time domain representation of data into frequency domain using following equation:

4. DPSK Demodulator Data can be extracted using phase differences between respective elements. Data corresponding to region 1 & 2 should be concatenated to form matrix R corresponding to transmitted matrix T. Rd(0,0) =R(0,0) (10) Rd(0,n)=R(0,n)×R*(0,n-1)0<n<N-2 (11) Rd(m,n)=R(m,n)×R*(m-1,n)0<n<N-2, 0<m <M/2-1 (12) Finally, the received signal is to be detected as the phase differences have been extracted. Each input bit may be calculated using constellation map of the transmitter. Each element is evaluated using its real and imaginary components. The sign of the real component determines the first bit and sign of the imaginary components determines the second bit. In wireless medium to increase the data rate with high performance orthogonal frequency division multiplexing (OFDM) is used which uses inverse fast fourier transform at the transmitter to modulate a high bit rate signal onto a number of carriers. The problem to this technique is that it requires more complex IFFT core. Over this, we can use discrete wavelet transform to generate the output with lower computational complexity.

IV. SIMULATION RESULTS

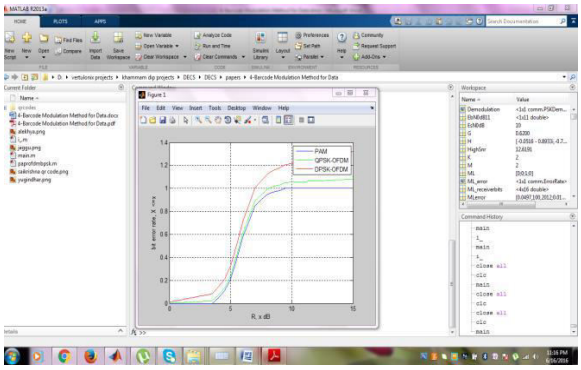

Fig.6. BER Performance Of PAM and QPSK,DPSK

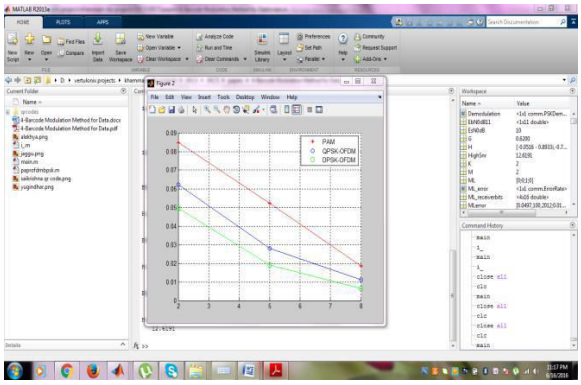

Fig.7. BER Performance Of PAM and QPSK DPSK A. Advantage

□□ To reduce ISI problem

□□ To reduce clipping problem (PAPR)

□□ To avoid power limitations

□□ To avoid distortion and noise and camera problems

B. Applications

□□ Military Purpose

□□ Biomedical Purpose

□□ Stock Market

□□ Electronic Device

V. CONCLUSION

In this project, Differential Phase Shift Keying was combined with Orthogonal Frequency Division Multiplexing in order to modulate data stream into visual two dimensional barcodes. It was shown that QPSK-OFDM modulation has serious short coming sign the mitigation of camera LCD movements where the phase of each element changes continuously. On the other hand, addition of a differential phase modulator before OFDM to modulate the data stream into phase differences of adjacent elements (DPSK-OFDM) causes the motion effect to increasingly weaken because of its gradual change from element to element, contributing to a small deviation from the ideal phase in the received signal. It was observed that under relative LCD-camera motions that generate error rates in excess of 30% in PAM and QPSK-OFDM, the proposed system of DPSK-OFDM will maintain an error rate less than 8% which is practically correctable using error correction coding. Future inquiries in a resolution to this problem have to address the best choice of differential pattern to optimize performance for various motion scenarios. Moreover, extension of the current two-bit per symbol constellations increases data transfer capacity, and its BER performance evaluation would be required. Nevertheless, a study on the effect of perspective correction errors on the BER performance of this algorithm compared to the other ones could augment our understanding of its applicability to real world scenarios

VI. 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,
[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. 137–148.
[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,‖ in Proc. CCNC, 2013, pp. 184–189. [9]M.Mondal and J. Armstrong, ―Impact of linear misalignment on a spatial OFDM based pixelated system,‖ in Proc. 18th Asia-Pacific Conf. Commun., Oct. 2012, pp. 617–622. [10]M. Mondal and J. Armstrong, ―The effect of defocus blur on a spatial OFDM optical wireless communication system,‖ in Proc. 14th Int. Conf. Transparent Opt. Netw., Jul. 2012, pp. 1–4.

[11]M. R.H.Mondal and J.Armstrong, ―Analysis of the effect of vignetting on mimo optical wireless systems using spatial OFDM,‖ J. Lightw. Technol., vol. 32, no. 5, pp. 922–929, Mar. 1, 2014.

[12]R. Gonzalez and R.Woods, Digital Image Processing, 3rd ed. Upper Saddle River, NJ, USA: Pearson Education, 2007.

[13]A. Sripad and D. Snyder, ―A necessary and sufficient condition for quantization errors to be uniform and white,‖ IEEE Trans. Acoust., Speech, Signal Process., vol. ASSP-25, no. 5, pp. 442–448, Oct. 1977.

[14]J. Proakis and M. Salehi, Digital Communications, 5th ed. New York, NY, USA: McGraw-Hill Education, 2007.

[15]T. Cover and J. Thomas, Elements of Information Theory, 2nd Ed.ed. Hoboken, NJ, USA: Wiley, 2006.

[16]H. Ochiai and H. Imai, ―Performance analysis of deliberately clipped OFDM signals,‖ IEEE Trans. Commun., vol. 50, no. 1, pp. 89–101, Jan. 2002.

[17]S. Dimitrov, S. Sinanovic, and H. Haas, ―Clipping noise in OFDM-based optical wireless communication systems,‖ IEEE Trans. Commun., vol. 60, no. 4, pp. 1072–1081, Apr. 2012.

[18]Y. Liu, J. Yang, and M. Liu, ―Recognition of QR code with mobile phones,‖ in Proc. Chinese Control Decision Conf., Jul. 2008, pp. 203–206.

[19]H. Kato and K. T. Tan, ―First read rate analysis of 2D-barcodes for camera phone applications as a ubiquitous computing tool,‖ in Proc.2007 IEEE Reg. 10 Conf., 2007, pp. 1–4. [20]A. Ashok, S. Jain, M. Gruteser, N. Mandayam, W. Yuan, and K. Dana, ―Capacity of pervasive camera based communication under perspective distortions,‖ in Proc. IEEE Int. Conf. Pervasive Comput. Commun., Mar. 2014, pp. 112–120.

[21]D. Tsonev, S. Sinanovic, and H. Haas, ―Complete modeling of nonlinear distortion in OFDM-based optical wireless communication,‖ J.Lightw. Technol., vol. 31, no. 18, pp. 3064–3076, Sep. 2013.

[22]R. v. Nee and R. Prasad, OFDM for Wireless Multimedia Communications. Norwood, MA, USA: Artech House, 2000. ISO/IEC 18004:2006, 2006.