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STUDY THE MECHANISM OF BARCODE MODULATION WITHIN THE HANDHELD MOBILE DEVICES FOR COMMUNICATION

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ABSTRACT- For transmitting the data of information in between the wireless devices as like handheld electronic devices such mobile phones that time two-dimensional barcode i.e. 2-D barcodes used in with great importance. When the user want to transfer a series of images from one cell phone to other cell phone that time it can be transferred from one cell phone to other cell phone through the LCD which are then captured and decoded by using the other cell phone camera. The data modulation in two-dimensional barcode is launched in this paper, and also we checked its performance to assessed in differentiate to other typical methods of barcode modulation. The Orthogonal Frequency-Division Multiplexing i.e. OFDM and Differential Phase Shift keying i.e. DPSK is used together for a contiguous frequency domain elements. To implementing such type of system the movements of camera when the user capturing the image, image blur and leakage of light within neighboring pixel of an LCD, so we worked on this issue and trying how to overcome on it.

Keywords— Study of Barcode, Data Transmission in between the devices, OFDM, DPSK Modulation techniques.

I. INTRODUCTION

A Barcode is a simple representation of data which is machine readable. The data which is in barcode carries from one place to another when the product moves. The representation of data is by varying the spacing of parallel lines and width. There are two variants of barcode developed as

- One Dimensional (1D)
- Two Dimensional (2D)

The other name of one dimensional barcode is linear barcode; it is in the form of vertical lines with different width as well as different space and pattern. The other name of two-dimensional barcode is

matrix code, which is two-dimensional way to design the barcode as well as represent the information. It is quite similar to linear barcode but it can represent more and more data per unit area as compare to linear barcode.

In the history of barcode, Bernard Silver, a graduate student at Drexel Institute of Technology in Philadelphia, US, was asking one of the deans to research system to automatically read the product information at the time of checkout the system. And then they started working on a variety of systems. Their first system is known as Ultraviolet Ink. In 20 October 1949 Bernard Silver and his friend Norman Joseph Woodland filed a patent application for "Classifying Apparatus & Method". And then their application of patent was approved in 1952 [10]. That means the actual idea to develop barcode began from 1952. In the invention of two dimensional or matrix barcodes there are large number of cost-effective codes and their application that transfer complex data like storing contact information, URL's among other things in which QR(Quick Response) codes become increasingly popular. Normally some of the efforts to developed matrix barcode have been dedicated to barcode displayed on a simple paper, that means usually it can used the barcode which is present on the paper. And when we replace that paper or book with tablet and e-book reader one could gaze upon the paper with LCD may open another promising front for broader applications of two-dimensional barcodes as a mean of data transfer. Besides unlike the static paper, the LCD may display barcodes to the time alter manner for the eventual transfer of streams of data to the receiving electronic device(s) to paint. In this research we studied the implementation of transferring data between two handheld cell phones through a series of two dimensional QR code, to achieving maximum or under 10 kbps for the mobile devices. After that in some advanced developed systems in [3] which transmission and reception of bit rates more than 14 kbps in between digital camera and a computer monitor over the distance of up to 4 meters. When the distance is increased to 14 kbps the rate drops to over 2 Mbps. The best performance is achieved using more effective scheme of coding as well as modulation for image blur and pixel to pixel light leakage. The performance of QR decoders greatly reduces by the image blur and light leakage but it can limited effect on OFDM modulation. Furthermore their performance degradation limited to known portions of the decoded data.

Orthogonal frequency subcarriers transfer data & limited blur in image, a low pass filter to high frequency constituents such that low frequency data bits are transmitted entire by the OFDM modulation. This OFDM modulation method requires natural connection to discover the data bits correctly. In this current study extends the detail notion through improve on modulation scheme to lessen LCD-CAMERA relative movements when capturing single image or frame which results blur in the captured images . This kind of failure which is affected on the performance of QPSK modulated

OFDM signals. The DPSK-OFDM scheme which is simply nothing but the DPSK method throughout this study, which is achieved by adding or inputting data in phase differences of adjacent frequency leading components. Deformation of blur in image motion influence neighboring frequency components negligibly; data may be transmitted trustworthy even in the nearness of high LCD, camera relative motion. To make the most of data transmission rate, it should extracting large data from a single image shown on an LCD & then increases the rate at which following order frames will be decoded. This type of issue with any method that is introduced should efficiently consume the available bandwidth considering motion deformation. Earlier studies confirmed the likelihoods of such systems and have addressed the effect of single contortion like linear misalignment, defocus blur on the modulation methods under consideration, but they have not provided a relative opinion of these systems in a restricted environment. Moreover no comparisons were made in case of LCD motions which greatly affect the performance of the system in applications that absorb handheld camera phone receivers. As an importance, this study introduces DPSK-OFDM as a means of justifying LCD camera motion contortion and sets a series of simulations based on mathematical modeling for vague impression and movement on the received images in a way that the deformation would be the same for Pulse Amplitude Modulation, Quadrature Phase-Shift Keying-Orthogonal Frequency Divisional Multiplexing and Differential Phase Shift Keying- Orthogonal Frequency Divisional Multiplexing modulations. As a result, consistent evaluation can be made between these major modulation methods anyway of other parameters disturbing the piece of such sensible systems.

- Barcode :-

Barcode is a mechanism to check the data which is in the form of vertical lines with different spaces as well as width. The data is representing in the form of barcode which is read by barcode scanner or we can also say that barcode reader. The barcode reader is a machine-readable device to read barcode and identify the data within it. After the advance development in the field of barcode there are number of dots, hexagons, rectangles and also other pattern of geometry in the two-dimensional barcode. In the two-

Dimensional barcode there are various symbols are encountered and it will be read by the special barcode scanner. The diverse regions of barcode are as given below:

Fig1: Barcode structure

A. Structure of Barcode :-

Quiet Zone: The quiet zone is also called as Clear Area. The quiet zone is nothing but the minimum space which is present before the start character of the barcode, and its ability to scan the free space. It should be free from any printing as well as the same color of the background reflectance of the barcode symbol. The minimum width space of quiet zone is 0.25 inch and it is approximately 10 times narrow element in barcode symbol.

Start Code: The starting point of character in the barcode symbol. By using the start code, it will indication to the barcode scanner i.e. the starting phase of barcode symbol. Start code or start character is no exposed and not delivered to the host.

Check Digit: It is a mathematical addition used to check the accuracy of the data which is in the barcode symbol. The barcode scanner confirms that, the digit which is added at the end of barcode symbol to confirmation of the barcode scanner i.e. whether the barcode read correctly. Sometimes the check digit not present in the barcode symbol. It is usually not exposed from the data and not transmitted to the user side.

Stop Code: The stop code indicates that the end of barcode symbol. And they also give intimation to the barcode scanner that means the end of barcode. Usually stop code also not exposed and not transmitted towards the client side.

B. Working of Barcode:-

The working of Barcode is shown in the following figure, in that one laser beam is present and one of the printed one-dimensional barcode is there. Simply the laser beam is event on a mirror or prism on the barcode directed from left to right. In this barcode the dark bars absorb the light which is taken from the laser beam and the bright bars reflected the light. Then the reflected light is measured by the photodiodes and give the electric signal and after that the signal which is came from the photodiode is in the form of analog electric single then it is converted into digital signal, after that the computer system read this digital signal and identify the data which is present in the barcode.

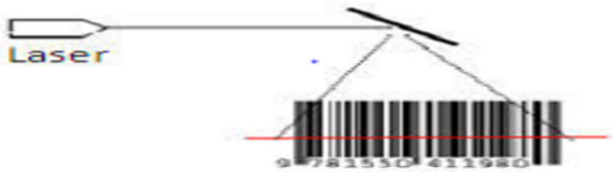

Fig2: Working of Barcode

- QR CODE:-

Accurateness, reading speed, superior high-quality functionality characteristics of the barcode symbol, the barcode becomes popular. The market is used the barcode due to its functionality and universal approval, the barcode which is capable to store large number of data in it with secure manner and it uses the smaller space to print. So that number of attempt were grow to increase the amount of information which is used to store in the barcode, such that increasing the number of characters as well as numbers and symbols etc. But in the type of improvement some of the problems would be occurred such as reading problem and enlarging barcode area and printing cost. Due to such type of problems which are occurred in the barcode i.e. in the one-dimensional barcode, the new type of barcode is introduced that is nothing but the two-dimensional barcode is used to overcome the type of problems. The contents which are present in the barcode decoded at the high speed, allowed by the creator. The one-dimensional barcode scanned the narrow beam of light mechanically and obtain the data, but the two-dimensional code i.e. QR code is used a semiconductor mechanism to scan a barcode image and digitally analyze by using the programmed processor. The three distinctive squares are present at the corner of the image, a smaller square near the last corner to normalize the image for size, orientation and viewing angle these things located by the processor. The smallest dot among the other is converted into binary number and checked its validity for error-correcting code. The two-dimensional matrix code is nothing but the QR i.e. Quick Response code and that QR code design apart from whether they are made up of squares, bars or there shaped elements. When we compare the one-dimensional barcode with two-dimensional barcode that time we can say that the two-dimensional barcodes i.e. QR code still store the large amount of data in it as compare to one-dimensional barcode [3].

Fig 3: QR code and Barcode

A. Versions of QR-Code:-

QR codes are divided in various categories according to information capacity they hold.

Version 1(21*21) content 'version1'

Version 2(25*25) content 'version2'

Version 3(29*29) content: 'version3 QR-code'

Version 4(33*33) content: 'version4' QR-code'

. Fig4. Versions of QR Code

QR Code	Barcode
	
UPTO 7089 numeric digits	10-20 digits
40 digit Numeric (approx 5 mm 5mm)	10 digit Numeric (approx 50 mm 20 mm)
Supports 360d reading	Horizontal reading

Table 1: Comparison of QR code and Barcode

QR code is used for Advertising, Business cards, Social networking, Branding, registration.

II. PROPOSED METHODOLOGY

1. Transferring Data:-

When we are take out the data from some device or simply as LCD that time some of the factors which are affected to the data because of the design of LCD, camera working or etc. The power consumption issue and the systems processing capability there can be limitations occurred. Even if in practice, it might be tough to achieve a reasonable measurement of the system's performance, it is essential to know what affects the move rate and what can be done on the subject of each restrictive factor in this data transmission medium.

2. Camera Limitations:-

The two-dimensional signals, which are of digital samples, are considered by the digital camera. The display refresh rate R_D should be two times the camera capture rate, if not there is a synchronization system in place to activate the camera close when the image is exactly between frame changes on the display. For example $R_c = 10$ is the camera capture rate then the refresh rate could not go beyond 5 Hz. The image resolution criteria i.e. Nyquist to satisfy the each and every pixel of the image which is displayed on the LCD should be sampled by two or more pixels in the camera. The conversion of each color pixel, the image sensor uses the minimum number of bits per channel so that ensuring into quantization noise. To edge the outcome of the noise on the overall detection performance, it need to maintain 5-10 db below the level of noise, on the other side it maintained the signal power level to below depending on the method of modulation used in order to have acceptable bit error rates.

3. Inter-Symbol Interference (ISI):-

While we printed one-dimensional or two-dimensional barcode on a paper that time there is some black pixels and some of the white pixels in it, there is not affection in between the two different neighboring white or black pixels when the printing quality is good and its resolution is high enough. Whenever the data is shown on a LCD, in that white pixel may leak with the neighboring black pixel so that the black pixel looks like as gray because of the light is traveling from it. To solve this problem we simply increase the size of the pixels so that it has minimum effect on each other, so it is called as barcode granularity in Quick Response coding. On a lower level this is accurately the procedure to printing barcode is generated, wherever every printed dot is not equivalent to a data symbol but somewhat many printer dots supply to a single black symbol. To generating just one symbol in the LCD there is each pixel $k \times k$ set is assigned, to separating the center pixel from bordering pixels that may be

exaggerated by neighbors. Unluckily this method greatly decreases the transfer rate because the $M \times N$ self-governing data symbols cut to which leads to a K^2 to 1 rate decrease. The pixel density of the barcode is increased then this is a major obstacle for the receiver camera when the inter-symbol interference could happen. Besides, when the image is capture for barcode processing during the any movements between camera and LCD the results in motion blur which is translated into ISI as neighboring pixels affected by camera and LCD in the captured image. Originally this type of result may not be apparent based on regular experiments with two-dimensional barcodes like quick response codes. So that these type of barcodes are decoded effectively without any main hard work in condition of steadiness of camera or code. First read the rate performance of some two-dimensional barcodes and some quick response code detection algorithm are studied, the user is able to decode the barcode in a first attempt as well as user experience on the important factor which are mainly occurred in the research. Actually the two-dimensional barcode decoders are checked by the frames processed per second, hence a barcode scanner try to decode a fixed two-dimensional barcode, multiple frames are processed within a second and a successful decode will be reported if only one frame is captured in good condition.

- DPSK-OFDM :-

The LCD technology is improving on pixel to pixel isolation that time the capture images deformation still remain and affecting the neighboring pixels of the barcode mixed the image and then result is nothing but the Inter Symbol Interference. To solving such type of inter symbol interference problem, the barcode image as a wireless radio signal for the ISI reduction technique have been verified successfully. So the best modulation method which is known as Orthogonal Frequency Division Modulation i.e. OFDM, is used to capable of coping rigorous condition when the limited communication channel band is available. When the restriction on power, multiple channel paths, limited band that time it is more capable to transfer a lot of narrow-band signals in parallel in its place of a single high bandwidth signal.

A. Similarities of Barcode and Wireless RF Channel :-

The two-dimensional image is reformulated into a one-dimensional row vector, it contains all pixels into the two-dimensional image, and this is done for only simplicity. The Pulse Amplitude Modulation i.e. PAM which has considered every row as a time domain signal that means the ones are white pixels and zeros are black pixels. Suppose we are taking an image of the single row that time limited band channel or as combination of camera focus problem also resolution limitations, leakage in light from white to black pixels and some of the other issue related with that. When the camera moves during the capturing

of image that time mixing of neighboring pixels in the image due to the multipath channel so the resulting picture endure from high ISI. To overcome such type of problem which are occurred in a time domain radio signal, the Orthogonal Frequency Divisional Modulation (OFDM) method is used to divide the channels intro multiple orthogonal low bandwidth and data rate is low while sending from one channel to another in parallel. The Inverse Fourier transform is used for showing the data in its place of PAM modulation process is using when in the case of one-dimensional data. Seeing that result the majority of artifacts have an effect on the high frequency mechanism and departure low frequency mechanism together for data transmission. The entire image is transferring at once when the idea may be generalized to two-dimensional signal meets the requirements. As replacement with one-dimensional inverse Fourier transform, the two-dimensional version is used to acting the two axes would be limited to high frequency components. After this study we discussed the precise modulation scheme. In the OFDM , the signal is which is traveled by the each sub-carrier is modulated using M-QAM (M-Quadrature Amplitude Modulation). Consequently suitable phase shift of every element should be projected and rewarded for before demodulation. The fast fading when the pilot tones are used for channel estimation or slow fading where most methods would require multiple symbols in seeking similar transfer functions, these are the conditions on the channel characteristics. The transmission of data as images there are every channel standardizes computations should be based on a single OFDM frame appropriate to the autonomous channel response between subsequent frames; otherwise the rate of frame is very high. In fact each frame is twist by LCD-Camera comparative motion through its personal capture time. To diminish this trouble the phase variation between adjacent elements is used to express data. To applying the inverse Fourier transform in OFDM modulating by using DPSK modulation, the data not stored in the fixed phase of received elements but rather in its segment difference to the neighboring elements, which abolish the requirements for channel evaluation and equalization if the channel reaction does not vary rapidly between adjacent subcarriers.

III. EXPERIMENTAL RESULTS

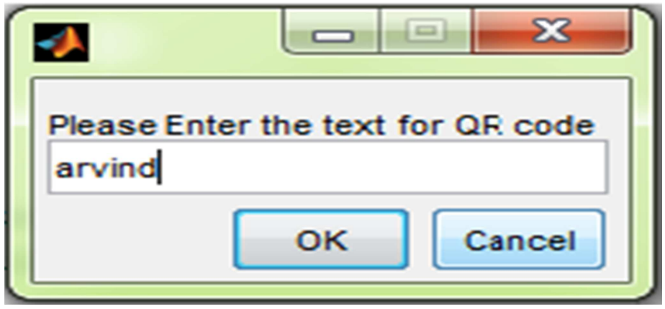

Fig 1:- Text enter for generating QR code

Fig 2:- QR code is generated for text "arvind"

Fig 3: Received Image

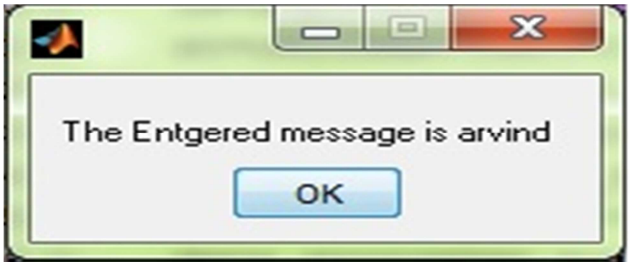

Fig 4: Message window for retrieving entered message successfully

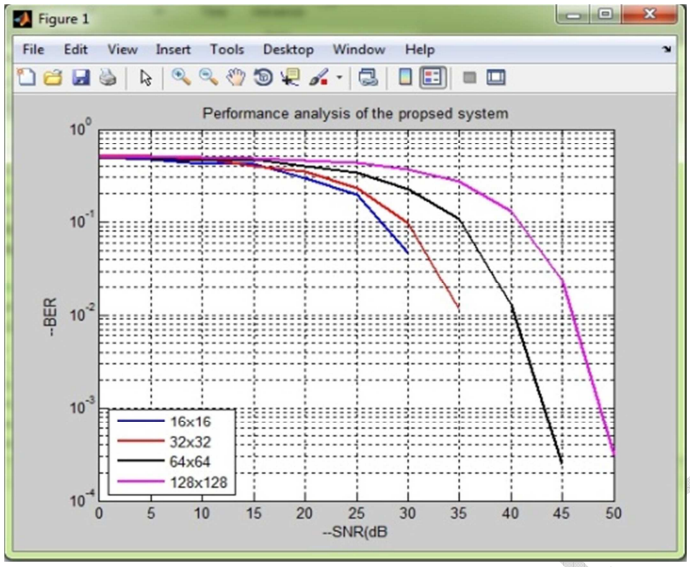

Fig 5:- In this we are using IFFT and FFT in OFDM system for transmitting the bar code Instead of IFFT and FFT we are using DWT and IDWT for the better results.

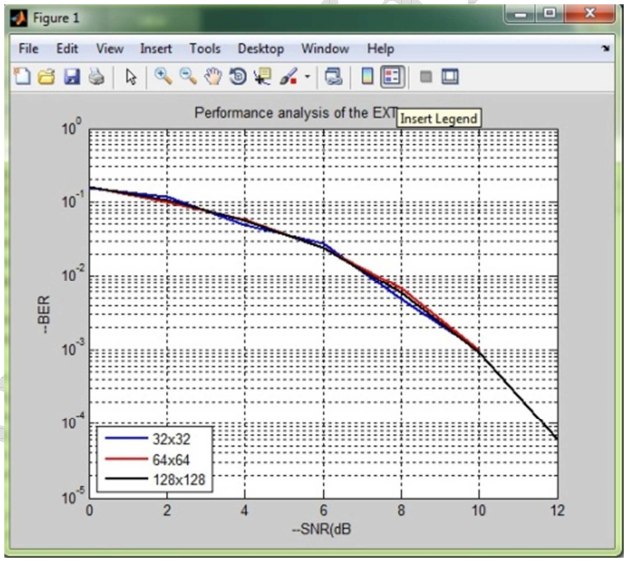

Fig 6: Analysis the performance of System.

IV. CONCLUSION

In this research paper the Radio Frequency Identification several settlements given that the barcode scanned without the user's line of sight. Whenever user used to check the product in the warehouse and elsewhere that time the quick response is required from the scanner and usually the QR code is more prominently satisfy his credibility as compare to traditional barcode. In the latest developments with the two-dimensional barcodes as well as laser scanner barcode reader equipments, still there should be improvements in the barcode scanning for further empirical analysis of this technology is required.

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