Medicine Traceability System

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Abstract:

This paper aims to help the medical industry. The medical industry strives to improve the delivery of key device information through the package to patients,Distributor and end users. To achieve this goal Indications For Use and user manuals have been major tools and are necessary components required in Medical Package according to Food and Drug Administration (FDA) standards.Historically there have been challenges caused by packaging information materials aspects such as manufacturing, transportation and translation. The need for extensive packaging and labelling has ultimately contributed to increased cost of manufacturing for devices. It is also important to know what information a customer needs and recognize that the safety of the consumer is of the utmost importance. The development and implementation of new technologies and procedures in a medical industry may be complicated and slow but it is a necessity to improve safety and provide maximum comfort to the end user.The existing supply chain for the pharmaceutical industry is obsolete and lacks clear visibility over the entire system. Moreover, the circulation of counterfeit medicine in the market has increased over the years. According to the WHO report, around 10.5% of the medicinal medicine in lower / middle income countries are fake and such medicine may pose serious threats to public health, sometimes leading to death.In this paper, we propose a QR Code -based model to track the movement of medicine from the industry to the users and to minimize the chances of a medicine being counterfeit.Barcodes and Two Dimensional code have been used in the medical device industry for tracking purposes; however, the focus of this thesis was using QR codes in medical device package without IFU, user guides and manuals to enhance patient safety, reduce cost and enhance the breadth of information available to the ultimate users. Access to the information was achieved by just taking a picture or scanning the QR code which was printed on a medical device package. This thesis also assesses the feasibility of implementing the QR code technology on medical device package and a case study is conducted that elaborates on the cost analysis.This paper helps to track the manufacturing process of the medicines, right from the raw materials to the Company,Dealer,Distributor,retailers and consumers ,using QR Code technology.In this paper, This proposed model, the manufacturer would be able to upload the details corresponding to a medicine, after which it will be sent after company scan the QR Code. we propose a QR Code model to track the movement of Medicine from the company to the Distributor,Dealer,Users and to minimize the chances of a medicine being counterfeit.we can

also track the movement of the medicine beginning from the manufacturer right up to the users consuming that medicine.

Keywords:QRCode,AndroidApp,Medicine,Android,Company,Dealer,Distributor,retailers,Consumers, counterfeit.

Introduction:

In this era, the world of piracy and counterfeiting has touched nearly every product including medicines.The challenge of counterfeit medicine in the pharmaceutical industry has been increasing across the globe over the past many years. According to a WHO report , around 10.5% of the pharmaceutical medicine in the markets of low or middle-income countries are fake. Hence, there is a need to develop a strong model to overcome the issue of counterfeiting medicine. Moreover, the current industry lacks clear visibility over the delivery of the drugs from the pharmaceutical company to the patients. Keeping these challenges in mind, we aim to develop a QR Code based model that can prevent medicine counterfeiting and keep track of medicine movement from the industry to the Users.Such a problem of counterfeiting medicines and their tracking can be solved by applying QR codes on them during their manufacturing process. Thereafter, we can track their journey by scanning their QR codes. However, because one can make a copy of the QR code and this copied code can be applied to the counterfeit medicine, this solution will not completely solve the problem of medicines tracking and counterfeiting. Hence, we came up with a model based on a decentralized system such as QR Code in which the manufacturer will create a medicine and will Create QR Code. After that, the Company Scan these medicine using QR Code. Thereafter, Distributor Scan Medicine using QR Code,then Deliver to Dealer.After Reciving medicine dealer also scan Medicine using QR Code n give to end users, hospitals.Today is the world of android phones and their applications have now become an integral part of almost all sectors such as health, entertainment, office, college, banking etc. With the increase of android devices, many problems like privacy leakages have also increased. The user's private information can be accessed easily. In many applications, the user accepts the terms and conditions but they are unaware about that their private information can be leaked by certain applications without permission. There is an android permission system which controls the admittance of resources of the mobile device. Hence permissions can be misused deliberately so imposing permissions is not enough to prevent from permission violations. Android's enforcement of the permissions is at the level of individual apps, allowing multiple malevolent apps to collude and combine their permissions or to trick vulnerable apps to execute actions on their behalf that are beyond their individual rights.QR or Quick Response Codes are a type of two dimensional barcode that can be read using Smartphone's and dedicated QR reading devices, that link directly to text, emails, websites, phone numbers and more.Medical devices are the most important part of the package. Device determines the other components like labelling, type of the package to be used. There are many kinds of medical devices categorized in different ways depending on their functionality and criticality. This problem can be overcome by implementing the QR code technology.The focus of this Paper will be on investigation of QR code technology and feasibility of this technology being implanted in Medical industry.

QR Code Format:

The structure of a QR code consists of a 2D matrix where each cell is of 1pixel area. In general, QR code consists of square black modules on a white background where the black square defines 0 in binary and the white square defines 1 in binary. In practice, the whole part of a QR code isn't used for only storing information, rather it consists of different sections. In this section we will review the sections in a QR Code

Fig -1: Schematic Diagram of QR Code

1. Finder Pattern: In QR Code finder pattern is a 3X3 matrix in 3 corners of the square except the bottom right corner. The QR finder pattern helps the decoder software to identify the correct orientation of the QR code.
2. Separators: Separators are used to separate the finder's pattern from actual information. The width of separators is 1pixel and it is of complete white.
3. Format Information: The Format Information, a 15 bits section next to the separators, stores information about the error correction level of the QR Code and the chosen masking pattern.
4. Alignment Pattern: Alignment Patterns support the decoder software in compensating for moderate image distortions.
5. Timing Pattern: Timing pattern consists of the alternate black and white boxes, which allows the decoding software to recognize the width of each module.
6. Data: In data section, information, converted in bit stream is stored in 8-bit parts named code words.
7. Error Correction Section: In this section information is stored in similar manner as the data section. It, as the name suggests, is used for error corrections.
8. Remainder Section: This section consists of empty bits, if data and error correction bits cannot be divided properly into 8 bit code words.

Why use QR code technology?

QR code-based anti-counterfeit services are ruling the digital market. The legendary tech performer in the market is Genefied. Its QR Code solution can ensure to end your brand's counterfeits in the market.QR codes act as the identification tools for authenticating the originality of any medicine . They store the data concerning:

1. Name of the manufacturer
2. Name of the product
3. Pharmaceutical form, strength, size

4. Location of the firm
5. Manufacturing date
6. Expiry date

Also, a Parma firm benefits in terms of reduced operational costs and increased brand. This is only possible if it starts using Anti-Counterfeit solutions based on QR codes.QR-code is the identity mark for each pharma product. They store original details regarding each medicine. Thus, fake medicines entering your supply chain can easily be traced.An instant scan via your smartphone will display each detail regarding the medicine on the phone. Customers will automatically start trusting your brand.

Literature Review:

Many researchers have contributed to this field. Various combinations of existing technologies have been used. Braille systems, screen magnifiers, etc. went through some developments but later faced technical issues.

1. HsinyiPeng etal has given an Instructional Decision Making and Learning Assistant, They have conducted various studies on applying wireless communication and ubiquitous computing technologies to education, so that the technologies can provide learners and educators with more active and adaptive support. This study proposes a Ubiquitous Performance-support System (UPSS) that can facilitate the seamless use of powerful new technologies in the school setting. In order to help the readers visualize these novel technologies in practice, we present one case study of a butterfly-ecology training course facilitated by the UPSS. The aim behind the case study is to inform the design and the development of context-aware ubiquitous computing system and its learning materials. The research inquiry centers around three themes: (1) the critical features to the data-driven decision making of teachers, (2) the perceptions of teachers and students to the UPSS, and (3) implementation issues. The results of the two rounds of formative evaluation indicate positive effects of the UPSS regarding motivation, interactivity, and effectiveness. In addition, teachers' attitudes and teachers' pedagogical approaches toward UPSS use are two key factors in the successful implementation of teaching with such innovative technology. This study can be a useful reference for those who are interested in conducting studies applying context-aware ubiquitous computing to educational contexts. Finally, this study presents suggestions and implications for future research and system development. [1]

2. The method proposed in this study is based on image sharing technology and uses visual cryptography to ensure that the images used cannot be viewed by patients until all the correct medicines are scanned. Visual cryptography is an image sharing technique that was first introduced by Naor and Shamir in 1994 .A secret image can be encoded into n transparencies and can be revealed if at least r transparencies are stacked together. This process is called (r, n)-threshold visual cryptography. The proposed method does not

require a computer or another computing equivalent for image evaluation. The secret image can be revealed by only stacking the qualified transparencies together. [2]

3. A QR code is a two-dimensional bar code that can be easily obtained ,for example, on leaflets or posters, often to record website addresses, and has been the focus of an increasing number of recent researches. The data embedded in a QR code can be extracted by scanning the QR code using a QR code scanner on a smartphone. A QR code can be regarded as a visible watermark that causes the degradation of image quality. [3],
4. Huang et al. introduced a reversible data hiding method for the lossless recovery of an original image without a QR code from an image with a QR code as a visible watermark. [4]
5. Yen et al. proposed two RFID technologies to prevent human errors in inpatient medicine management that can be used in online and offline environments and can prevent proof attacks. These technologies can provide auditable evidence of medication records, which can be used for medication disputes or routine medication safety audits [5].
6. The authors in highlighted the issue regarding drug safety and tried to solve the same issue using Blockchain technology which was integrated with QR code. They highlighted the irregularities present in the current supply chain of pharma industries and proposed a methodology that consisted of blockchain-based architecture for the supply chain. Their proposed methodology ensured the reliability aspect of the drug as well as well as the genuineness of the involved manufacturer. [8]
7. Haq et al. specified the problems that are present in the current pharma supply chain and explained how blockchain can be used instead of the current supply chain to ensure traceability and transparency while transferring a particular entity from one level to another. They suggested a permissioned blockchain for storing all the data involved within the network and since it is a permissioned blockchain so it ensured that only trusted parties are becoming a part of the network. [9]
8. The authors in highlighted the use cases of a decentralized model such as blockchain in the medical sector. They discussed the use of blockchain in various fields such as EHR (Electronic Health Records), Medical Insurance, Bio-medical Field and Medical Supply Chain.In conclusion they stated that this technology has still not been adopted by healthcare systems where this is capable of solving various problems.People who are in-charge of making these decisions should become aware of the technology's potential and the revolutionary power that it carries with itself and should introduce it in the current healthcare system. [10]

Problem Statement:

To make an efficient use of Android Tehcnology. To develop a paper E-Medicine for Android Smartphone for developing a positive attitude towards technology as an integral part of Enhancing Medical Industries.The size of the booklet may be excessive and not compatible with the package and track the movement of the medicine beginning from the

manufacturer right up to the users consuming that medicine..The focus of the study is to do an investigation on QR Code compared to other similar technology existing in the market and to determine the applicability of QR code in medical device packaging.

Motivation:

The main motivation of the research is saving cost by implementing new emerging technology by contributing to the field of sustainability. Cost reduction can be achieved by reducing paper and printing costs; global warming can be reduced by eliminating paper use and it also supports sustainability. Enhancing the functionality of any technology by cutting cost and implementing lean manufacturing was also another motivation to this research.Serious health issues, including deaths, may occur if the users consume counterfeit medicine. Several counterfeit medicine have been detected in the market of lower / middle income countries. Hence, detecting such fake medicine in the market is a big challenge. Keeping their threats in mind,in this paper, we have proposed a QR Code based model to detect such fake medicine.The proposed model also aims to track the movement of medicine from the industry to the users.

Objectives:

The objectives are as follows:

1) To support requesting for required data within less time.
2) Detect Fake Medicine.
3) To determine if the QR code technology is feasible to be used for medical package.
4) To introduce the QR code technology to the medical industry.
5) All users will have easy and fast access to the information.

System Architecture:

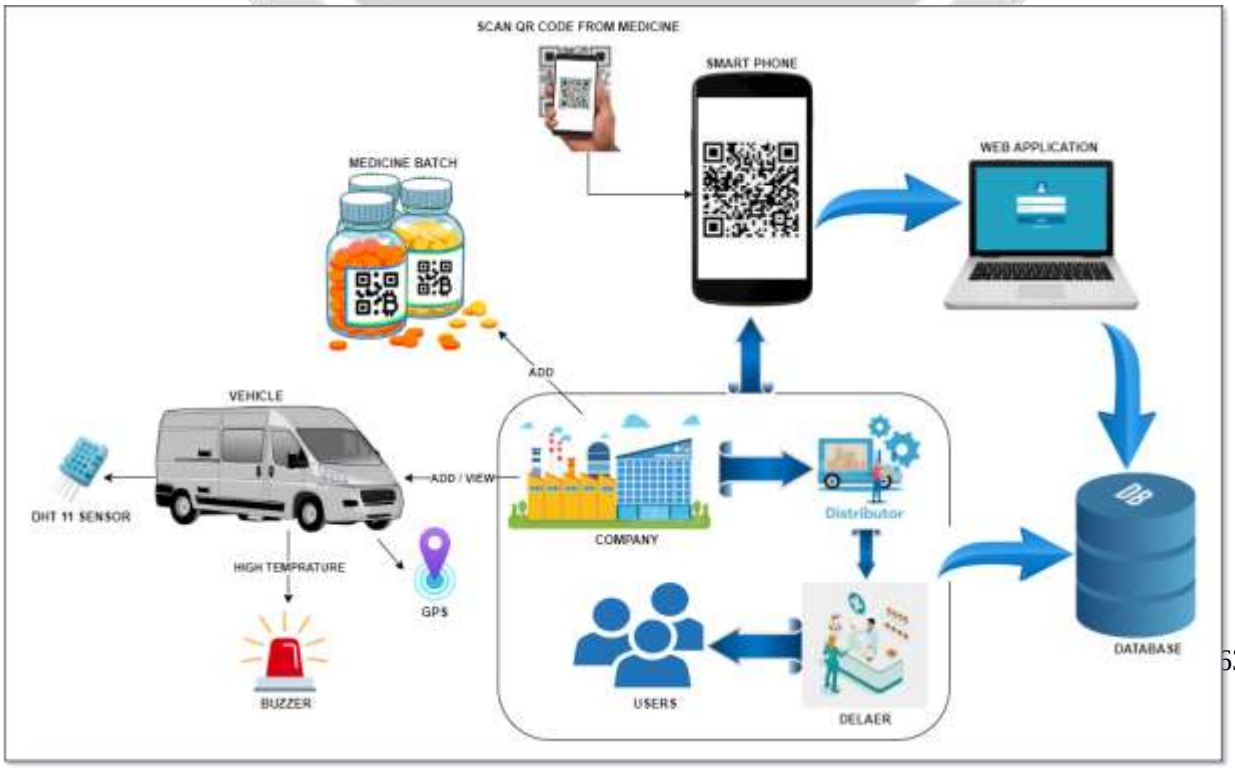

Fig:System Architecture

Company ,Distributor,Dealer,Medical Shop can login to App for QR code scanning.After scanning QR code scanning medicine will validate in system.Each medicine validation is depend on previous level validation.Levels are Company→ Distributor→Dealer →Medical.End user is a guest User he/she scan QR code to check medicine is original or not.

System Necessity

Hardware:

1. Processor – i3
2. Hard Disk – 5 GB
3. Memory – 1GB RAM
4. Smart Phone.
5. DHT11 Sensor
6. Ardunio Uno
7. Buzzer
8. GPS
9. Temperature Sensor

Software:

1.Operating System:Windows XP and later versions
2.Front End:XML
3.Programming Language: Java
4.DataBase:MySql
5.Domain:Android

Advantages:

I. User Friendly.
II. Access to authorized personnel only.
III. No additional devices need to be carried Scan QR code.
IV. Portability
V. Time-Saving
VI. Preventing Paper Wastage

Disadvantages:.

I. Slow Internet Connection.

Applications:

1. It is an open source android application.

2. Very affordable as only require the android device.
3. An instant scan via your smartphone will display each detail regarding the medicine on the phone. Customers will automatically start trusting your brand.

Conclusion:

In this paper, we had proposed a much helpful Application for Medical Industry.The QR code can be implemented successfully on a medicine package. The QR codes are unique in nature. Scan the code and you get the detail for the medicines packed inside the carton.The code on the package successfully links to the intended information by providing easy access to the users. The thesis was successfully completed in assessing the QR code technology for particular devices. Thus, leaving no scope for entry of a fake product via a widely spread supply chain.The thesis also demonstrated the cost to produce and the cost savings that can be benefited by the technology.This system will be very easy to use. This application will run on Android operating System.Let us help your brand regain its market share by ensuring authenticated supplies.

Referance

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