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Medicine Traceability using QR Code

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Abstract: This project 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to improve safety and provide maximum comfort to the end user.The existing supply chain for the pharmaceutical industry is obsolete and lacks clear visibility over the entire system.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

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

I.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

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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 Project will be on investigation of QR code technology and feasibility of this technology being implanted in Medical Industry.

II.LITERATURE SURVEY

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 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. [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. 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].

6. 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]

7.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

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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 current healthcare system. [10]

III MOTIVATION

This is a challenging era due to the growth in the field of computer science and demand weare facing today. Hence examinations play a vital role in testing student's performance.And that is why it is important to have a smart development question model for growth of students as well as to test their learning skillsthereby keeping a check on student performance. Now the traditional method of generating question paper has been manual. In this method certain officials chalk out the question paper. But this method can be ineffective at times owing to bias, repetition and security concerns. We have proposed an Question Paper Generation which is fast, streamlined, randomized and secure.

IV.OBJECTIVE

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.

V. SYSTEM ARCHITECHTURE

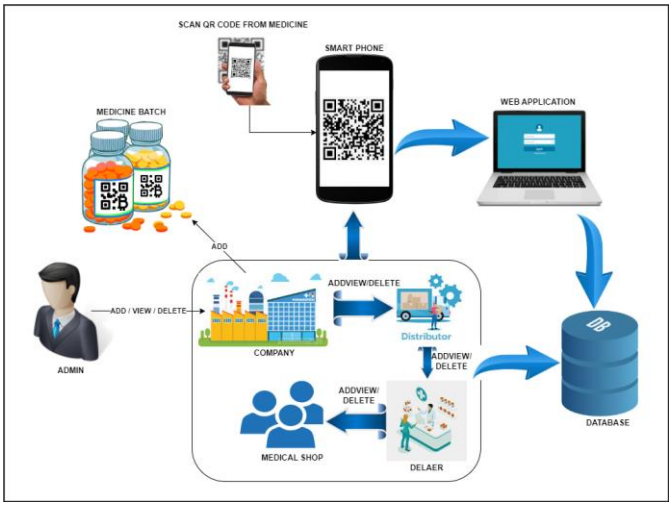

fig 1: System Architecture

VI. METHODOLOGY AND SCOPE

Methodology:

Unique QR Code Generation: Each medicine package or unit should have a unique QR code containing information like batch number, manufacturing date, expiry date, serial number, etc.Database Integration: Develop a database system to store comprehensive information related to each QR code. This database could include details about the manufacturer, distributor, batch details, expiration date, destination, and any other relevant information.QR Code Application: Affix QR codes on medicine packaging or attach them directly to units.Scanning Infrastructure: Develop or use a scanning infrastructure accessible to stakeholders like manufacturers, distributors, pharmacies, and consumers. This could involve smartphone apps, specialized scanners, or even integration with existing healthcare systems.Verification and Tracking: Stakeholders scan the QR codes to verify the authenticity and access information about the medicine, ensuring it matches

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the data stored in the database. This step helps in tracking the medicine's journey from manufacturing to the end-user.

Scope:

Authentication: QR codes help in verifying the authenticity of medicines, reducing the risk of counterfeit products entering the market.

Supply Chain Monitoring: Allows tracking of the medicine through the supply chain, enabling identification of any potential issues or points of compromise.

Consumer Information: Enables consumers to access information about the medicine, including dosage, usage instructions, and safety information by scanning the QR code. Regulatory

Compliance: Helps in meeting regulatory requirements for traceability and ensures adherence to quality and safety standards in the pharmaceutical industry.

Recall Management: Facilitates efficient recall of medicines in case of defects or safety concerns by identifying affected batches or units swiftly. Implementing QR code traceability in the pharmaceutical industry enhances safety, transparency, and accountability while ensuring consumers receive genuine, safe medicines.

VII.CONCLUSIION

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

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.

VIII.IMPLEMENTATION

Randomization Algorithm Steps:

1. **Generate Unique QR Codes**: Generate unique QR codes for each medicine package. This code should contain a unique identifier for the medicine package.
2. **Assign QR Codes to Medicine Packages**: Assign each QR code to a specific medicine package during the packaging process. Ensure that the QR code is securely affixed to the package.
3. **Encryption**: Encrypt the QR code data to prevent unauthorized access and tampering.
4. **Randomization Algorithm**:

- Define the parameters for the randomization algorithm, such as the number of batches, the number of medicine packages per batch, and the criteria for randomization (e.g., distribution across batches).
- Use a secure randomization algorithm to assign each medicine package to a batch. This algorithm should ensure that the assignment is truly random and cannot be easily predicted or manipulated.
- Verify that each batch contains the correct number of medicine packages and that the randomization process has been correctly implemented.

5. **QR Code Scanning**: When a medicine package needs to be traced, scan the QR code to retrieve the unique identifier and batch information.
6. **Traceability**: Use the information from the QR code to trace the medicine package back to its batch and production details. This helps ensure the authenticity and quality of the medicine.
7. **Verification**: Verify the authenticity of the medicine package by comparing the QR code information with the database of valid codes and batches.
8. **Auditing and Monitoring**: Regularly audit and monitor the randomization process to ensure its integrity and security.

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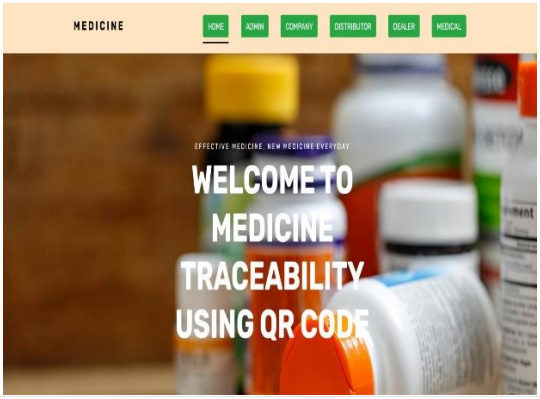
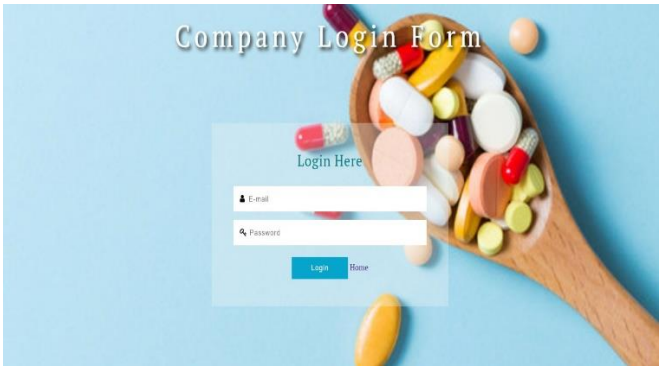
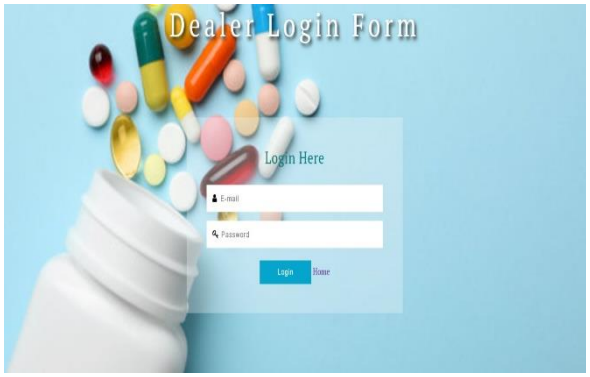
9. **Compliance**: Ensure that the randomization algorithm complies with relevant regulations and standards for medicine traceability.
10. **Record Keeping**: Maintain records of the randomization process, including the assignment of QR codes to batches and any changes or updates to the randomization algorithm.







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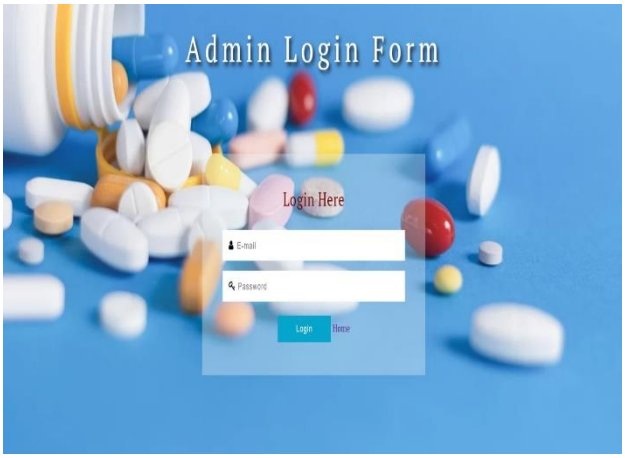

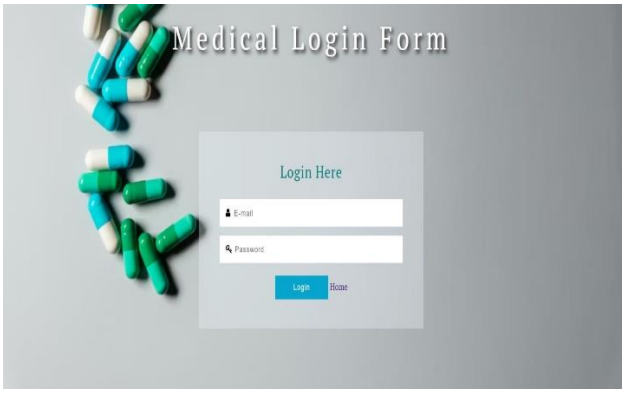

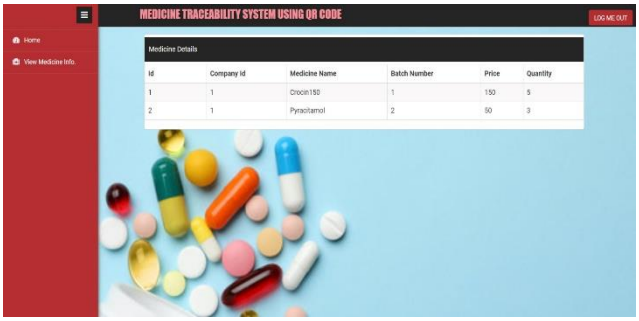

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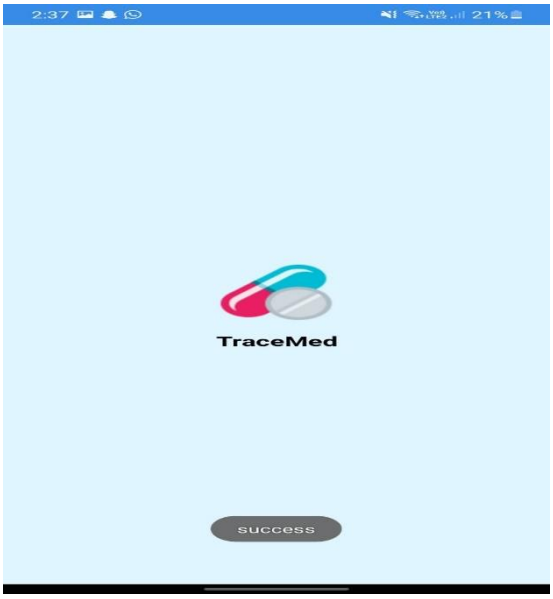
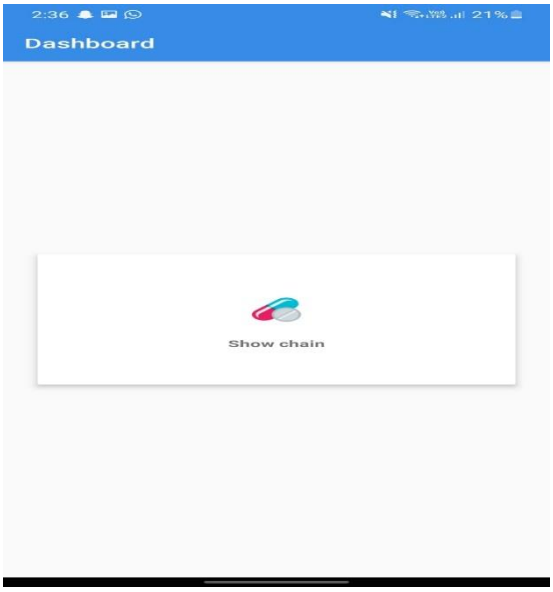
WEB APPICATION





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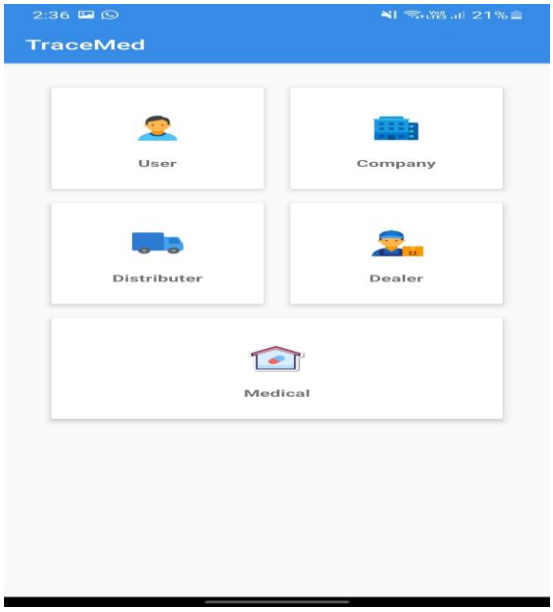

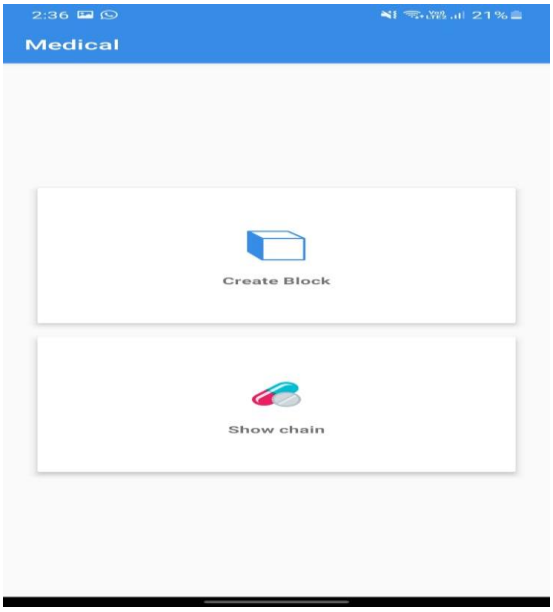

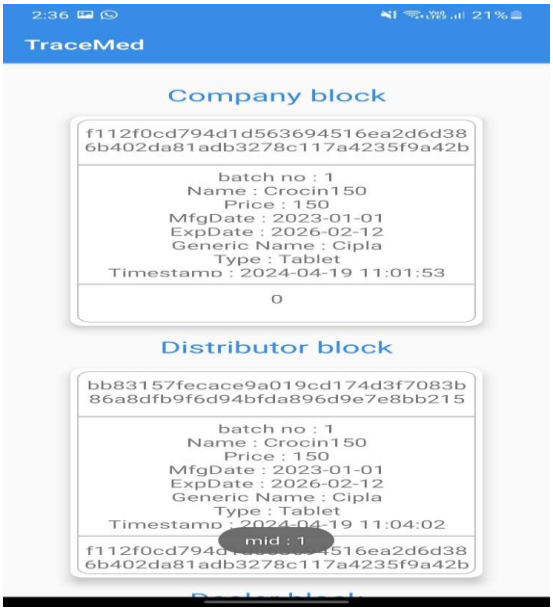

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