



Intelligent Scheduling Drug Dispenser using Patient Management System

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Abstract: Medicine dispensing at hospitals is one of the challenging issue at healthcare management. It has led to the need of smart and automatic medicine dispenser without human intervention to speed up the drug delivery process and avoid the delay at counters. The hospitals already automated the process of patient appointment booking before hospital visit but after doctor consultation, patients still have to wait for medicine delivery at counters as the drug delivery process is not automatic. This paper works on Automatic Drug dispensing with IoT and IPFS. This approach reduces waiting time counters and provides simple and effective way of dispensing medicines. The IoT based vending device is designed and developed to read the post doctor consultation Prescriptions digitally through QR codes, process and identify the accurate medicines and dispense the accurate medicines. IPFS Is used to store patient and Prescription data for more security

Keywords: Dispenser, Inter Planetary File System(IPFS), NodeMcu Patient, Hospital, Medical Units, Pharmaceuticals.

1. Introduction

India is the largest country and managing Health care system is essentially required with more accuracy and security. It calls for the need of reliable , sophisticated and accurate approach which may help the patients at hospitals in providing quick healthcare services. One of the health care service which needs quick response is at pharmacy, there is a demand for reducing the long waiting time. In the conventional system , the pharmacists have to manually the verify the prescription stock and dispense the medicines.

The Smart Automatic Drug Dispenser avoids the problems by introducing digitalizing into the drug delivery process.(2) This system provides an modernized solution that can easily accommodate with the present hospital's digital infrastructure. Pharmacists can now easily make use of this cutting edge technology to turn prescriptions into digital prescriptions. Manual intervention in pharmacies can be avoided by employing this system in pharmacies. Patients can easily get their required medications easily by scanning the QR codes at the dispenser. This system provides an effective change in healthcare systems by reducing human errors in dispensing. In addition, it also provides patient convenience, cutting lengthy queues near pharmacies. It

ensures transparent and reliable operations carried out at pharmacies by providing security through QR codes. The Smart Automatic Drug Dispenser provides a revolutionary step in creating digital health ecosystems, building smart hospitals by integrating automation, IoT devices, thus providing reliability and security. This system provides a remarkable solution in promoting patient-focused system. This system overcomes the problems in traditional pharmacies thereby automating operations in pharmacy sector. This system operates effectively and can be used easily [1]. Traditionally pharmacies takes a lot of time in dispensing medicines which leads to long queues, delay in distribution, manual collection and delivery of medicines make chemist overloaded which sometimes may lead to errors. During emergencies or peak hours patients has to face this long queues which may raise the risk of distributing dosage, incorrect medication issuance [2]. In addition if the patient adherence and inventory tracking are not automated it may result in shortage of medicines. Security and accuracy are further limited because the complete procedure depends on traditionally verifying documents.

2. Related Work

H.C Yeh proposed a method of dispensing and scheduling using authoring tool [8] .pharmacists relies on human



labour to dispense the medicines by manually verifying the prescription and issuing of drugs , besides this process pharmacists have to manually observe the stock verification . Wan D Proposed a method of face recognition scheduling day wise scheduling of pills[3].

Debiao proposed the concept of PPAD machines those are commonly used to fill pharmaceutical units for improving drug delivery process and accuracy. These Days several approaches were introduced in the market and can prepare schedule for dispensing the medicines based on doctor's prescription and one can be observed through Internet. These types of devices are well suitable for patients who needs close monitoring of patients supervision and guidance. The limitations urge for a revolutionary system that intelligently digitalize the system and provide automated solution.

Smart Drug Dispensing machines will provide a hassle free environment at the pharmacy thereby reducing labour requirement and reducing patient time for getting medicines [4]. The aim of our proposed work is to completely automate the drug dispensing with IoT services and IPFS . Our work is Simple, reliable and accurate tool for dispensing the pills according to the doctors prescriptions without waiting for manual dispensing by clinician. This system approaches and ensures the security by authentication.

3. Proposed System

The system proposed effectively decreases the human error thereby increasing the efficiency of healthcare systems. The proposed system incorporates various goals:

To create an automatic dispenser: Automatic Drug Dispenser that effectively handles digital prescriptions by scanning the QR codes.

To Get Down Lengthy Waiting Queues: Automating the dispenser will get down the long waiting lengths and crowd at the pharmacy.

To Provide Error Free Medication: By making use of machine controlled medication dispensing human errors can be eliminated.

To provide ease of use: This smart dispenser provides an user-friendly interface that provides medications Fastly without talking to the pharmacy employees.

To Manage Pharmacy Inventory: This mechanism keep track of the pharmacy inventory, restocking medications, checking expiry dates.

Modernized Healthcare Systems: In addition to the modern equipment's, hospitals should automate pharmacy. Introducing automation into pharmacy will reduce manual intervention and increases use of smart devices.

To Provide Reliability and Security: This system make use of digital prescriptions which contains unique QR codes helps to provide reliable and secure services. Unified and modernized health care systems can be developed by making use of various IoT devices, automating human intervention and error free pharmacies.

Prototype

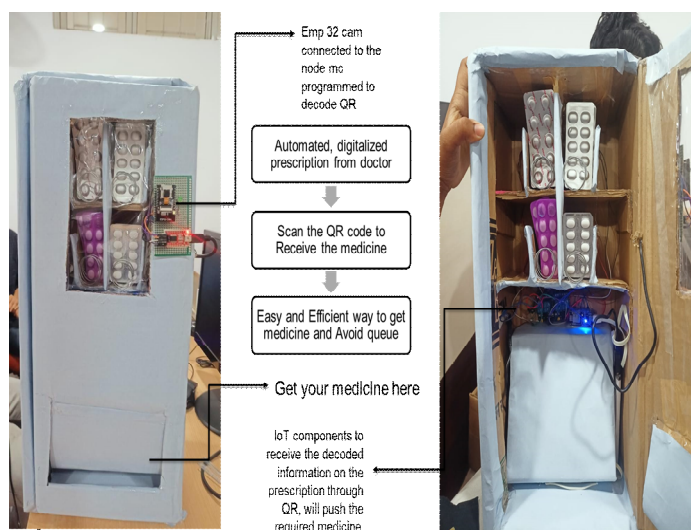


Figure.1 Showing the prototype of the Dispenser

Using IoT components, the devices scans the QR and EMP 32 camera which is connected to NodeMC will decode the QR and generates the digitalized or list medicines prescribed by the doctors . Again the IoT will dispense the medicines based on the decoded prescription

3.1. Storage

The IPFS-based storage is introduced to decentralized, tamper-proof, meaningfully improving data safety and avoiding replication. Unlike a Cloud , IPFS stores the data at distributed nodes , its also maintains multiple chunks of data for more accuracy and auditable purpose

In today's world healthcare systems focus on various factors like accuracy, patient convenience, efficiency, error free and security. Although hospitals deploy modernized equipment's it cannot eliminate the challenges faced in traditional methods like dispensing the medicines, long queues, out of stock that are time consuming procedures.

To handle this we introduce a project Smart Automatic

Drug Dispenser that effectively replaces the manual intervention with smart devices like Internet of Things, Cloud Computing and automation. This project mainly focus on modernizing the traditional way of providing prescriptions with QR based E-prescriptions. This system mainly works in 2 key stages: Prescription Generation and Automatic Medical Dispensing. In the initial stage a digital prescription is generated by the doctor which is safely stored decentralized IPFS (Inter Planetary File System) .A QR code that is uniquely generated for the prescription is sent to the patient's mobile or a printed copy of the e-prescription will be provided. In the later stage patients us this QR code to scan at the

Automatic Drug Dispenser, this system uses ESP32-CAM module to decode it. The ESP32-CAM module authenticates the patient, if the authentication is successful; the dispenser automatically dispenses the required medicines on the prescription. This system ultimately removes the overhead of pharmacists, reduces waiting time, human error and offers hassle free experience for the patients. This system also provides manual selection of medicines by using a user interface when e-prescriptions

are not available. It also includes payment gateway. The project integrates the use of embedded systems, IoT and block chain-inspired storage which establishes the foundation for future ready digital health care systems.[3].

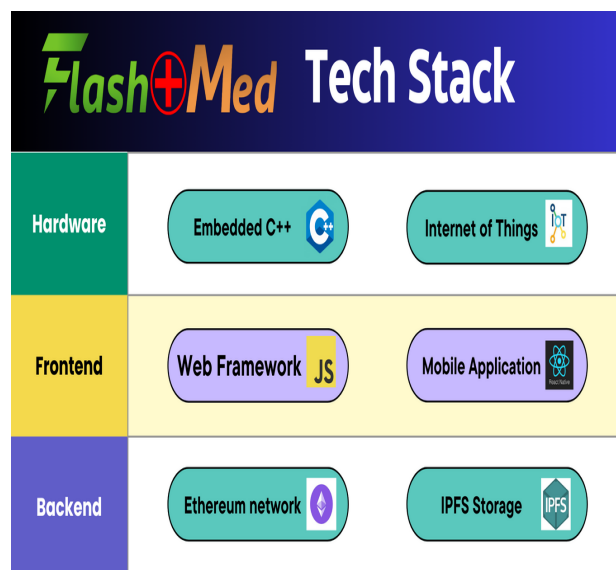


Figure.3 Technologies used in proposed system

3.2. Workflow

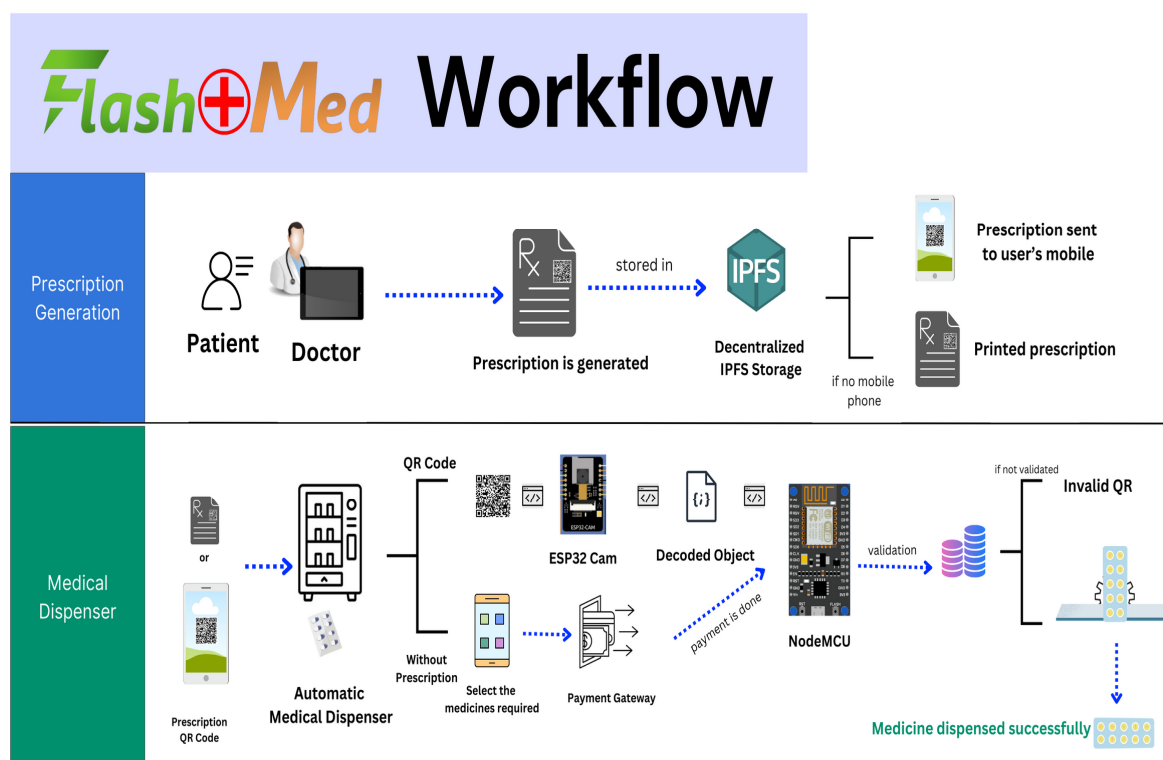


Figure.2 Workflow of the Proposed System

4. Results and Analysis

Patients information and their prescription will be encoded to QR code and correct medicines will be selected from the storage place , then will be dispensed

AYUSH HOSPITAL

Patient Details

Enter patient name

Varun Shah

Age

19

Order Summary

Dr. JRK Pesin 500 mg Tablet (1)

Sand beast Coenzyme Q-10 (1)

Order

Medicines

enter the medicine

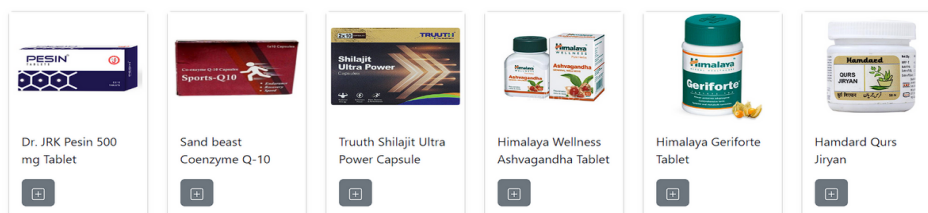


Figure.4 Reports analysis and ordering of medicines

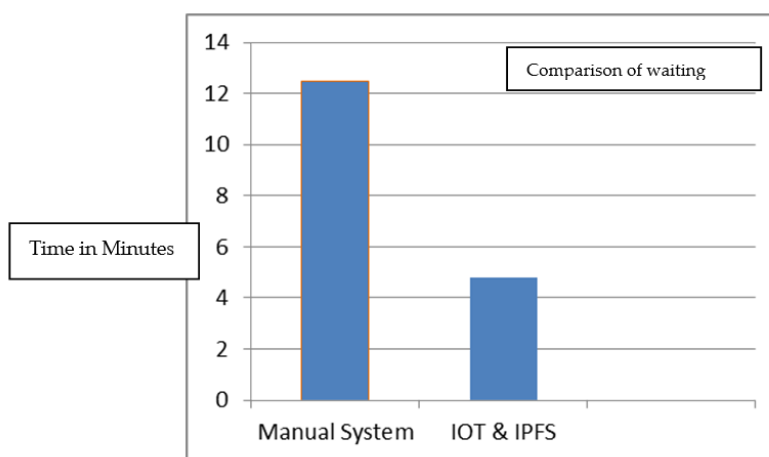


Figure.5 Comparison of Manual system and Proposed system

It is observed that, our proposed system reduces delays at drug delivery process to the patients

5. Conclusion

To overcome the difficulties in dispensing the medications manually, we use a revolutionary method “Automatic drug dispenser” that can dispense medicines automatically by scanning the prescription suggested by the advisor removing the challenges faced in traditional methods. Automatic Drug dispenser overcomes the long queues, human errors and also medication mismanagement by making use of various advanced technologies like Internet of Things, automation and also a digital prescription that contains a QR code, which helps to scan it. Automatic drug dispenser helps hospital management to maintain the track of inventory by which supply and demand chains can be properly managed which improves the workflow of the hospital. By using Automatic dispenser hospitals can improve the effectiveness of the workflow by

providing securable e—prescriptions that prove the rapid advancements in hospital industry by making use of advanced technologies.

Therefore we conclude that this system contributes to help elderly people or chronically disorder people to get the medicines easily without waiting in long queue, in addition it proves to aid hospital by tracking inventory, providing securable prescriptions, reduces human errors, handling multiple types of pills. To Further this system can be integrated with AI/ML and also can include voice assistants, network dependency so that it can be useful for remotely located patients. This Automatic dispenser is a scalable and effective innovation that removes the barriers of safe drug distribution, prescribed drugs by using a fully digitalized setup.

References

- [1]. B. N. Hiremath, K. Chavhan, N. J. Johnson, P. Monika, P. S and T. J. Reddy, "Automatic Medication Dispensing System using Machine Learning, Internet of Things and Cloud Research and Applications (CENTCON), Bengaluru, India, 2022, pp. 125-129, doi: 10.1109/CENTCON56610.2022.10051452 .
- [2]. M. Penna, D. V. Gowda, J. J. Jijesh and Shivashankar, " 2017 2nd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT), Bangalore, India, 2017, pp. 1962-1966, doi: 10.1109/RTEICT.2017.8256941
- [3]. C. P, K. Venusamy, D. G, M. A. Wazil A.K and N. Raj Um "Automated Medicine Dispenser with Personal Healthcare Monitoring Using IoT," 2023 Eighth International Conference on Science Technology Engineering and Mathematics (ICONSTEM), Chennai, India, 2023, pp. i-vii, doi: 10.1109/ICONSTEM56934.2023.10142832
- [4]. S. R. Bhagya Shree, P. Chandra Shekar, A. Arjun, G. R. Manoj, A. Nithin and R. S. Raj, "Automated medication dispensing system," 2014 Eleventh International Conference on Wireless and Optical Communications Networks (WOCN), Vijayawada, India, 2014, pp. 1-6, doi: 10.1109/WOCN.2014.6923079.
- [5]. K. Chavhan, N. J. Johnson, P. Monika, P. S and T. J. Reddy, "Analysis of Technologies used in Automatic Medicine Dispensing Systems," 2022 IEEE International Conference on Distributed Computing and Electrical Circuits and Electronics (ICDCECE), Ballari, India, 2022, pp. 1-6, doi: 10.1109/ICDCECE53908.2022.9792921
- [6]. V. K. Sharma, A. K. Gupta," International Journal of Biomedical Engineering and Technology," vol. 32, no. 4, pp. 287-304, Dec 2022.
- [7]. Electronic prescriptions & QR-code authentication in pharmaceutical dispensing S. M. Lee, J. H. Kim, "QR Code-Enabled e-Prescription Authentication for Hospital Pharmacies," Journal of Medical Systems, vol. 45, article 58, May 2021.
- [8]. Han-Chun Yeh, Pi-Cheng, Chi and Janes " APAMAT: A prescription algebra for medication authoring tool" IEEE International Conference on Systems, Man and Cybernetics, 2006. SMC '06.
- [9]. Wan D. (1999) "Magic Medicine Cabinet: A Situated Portal for Consumer Healthcare". In: Gellersen HW. (eds) Handheld and Ubiquitous Computing. HUC 1999. Lecture Notes in Computer Science, vol 1707. Springer, Berlin, Heidelberg.