

Development and Evaluation of a Novel Medicine Expiry Detection Application: An Innovative Approach to Ensuring Medication Safety

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Abstract. Ensuring the safe use of pharmaceutical products is of utmost importance for patient health and welfare. Expired medications pose a significant risk to individuals, as their efficacy may be compromised or entirely lost, potentially leading to adverse effects. This research paper presents the design, development, and evaluation of a novel Medicine Expiry Detection Application (MEDA), an innovative solution to address the challenge of identifying expired medications and promoting medication safety. The evaluation of MEDA's performance involved rigorous testing and validation, assessing the accuracy, efficiency, and usability of the application. Results demonstrated a high degree of effectiveness in identifying expiration dates, with minimal errors and user-friendly design. Our findings suggest that MEDA has the potential to significantly improve medication safety and promote better health outcomes for users. Further research is encouraged to explore the application's broader implications in various healthcare settings and populations.

Keywords: Scanner, Mobile application, QR code.

1 Introduction

The proliferation of medication usage worldwide has raised concerns regarding the safe and effective utilization of pharmaceutical products. Ensuring that medications are within their expiration date is crucial for maintaining their efficacy and preventing potential health risks associated with expired drugs [1]. Expired medications may lose their potency, develop harmful byproducts, or lead to antibiotic resistance when used inappropriately [2]. Despite this, monitoring and managing medication expiry dates remain a challenging task for patients, particularly those with multiple medications or chronic illnesses [3].

Therefore, it is very much important to know the expiry date of the medicine. There is a QR code framework these days in pretty much every item whether it is medication, food, or beverages. It addresses heaps of data about an item when the code is scanned. You simply need your mobile to examine it and get all data soon. Yet, consider the possibility that just in a few cases there will not be any QR code or any expiry

date an exceptionally restricted measure of data will be there behind the covering if you just buy two or their capsules. Recent advancements in technology have paved the way for innovative solutions to tackle the problem of medication expiry management. Smartphone applications, in particular, have demonstrated significant potential in improving healthcare outcomes and patient self-management [4].

In light of these developments, this research paper introduces a novel Medicine Expiry Detection Application (MEDA) that leverages optical character recognition (OCR) technology to accurately detect and interpret expiration dates on medicine packaging. By providing information to users via text messages or emails with an easy-to-use mobile platform that offers timely notifications regarding upcoming expiry dates, MEDA aims to empower individuals to take control of their medication management and mitigate the risks associated with expired medicines.

2 Literature Survey

A literature survey of recent research papers on medicine expiry detection applications reveals a growing interest in employing technological solutions to tackle the challenges associated with medication management and expiry date monitoring. This survey presents some research papers published within the last five years that focus on various aspects of medicine expiry detection applications.

Authors of paper [5], presented a review of mobile applications for medication management, including features related to medicine expiry date detection. The authors analyzed various applications based on their functionalities and highlight the potential benefits and limitations. In paper [6], researchers introduce a smart medicine box with integrated expiry date monitoring and reminders. The system employs RFID technology to track medication usage and ensure patient adherence to their prescribed regimens. The study [7] discussed the development of a mobile application designed to manage medicine expiry dates. Authors described the application's features, including barcode scanning, OCR technology, and user-friendly interfaces to facilitate medication management.

In research [8], authors proposed an IoT-based smart medication storage system capable of detecting expired medicines. This system utilized RFID tags and sensor technology to monitor medication expiration dates and send alerts to users via a smartphone application. Study in [9] presented a smart medicine inventory management system using IoT technology. Their system tracks medication expiration dates, sends alerts to users, and updates a centralized inventory database to maintain accurate and up-to-date information. In paper [10], authors introduced an IoT-based medication management system, which includes a module for medicine expiry detection. Researchers described the system's architecture and evaluate its performance, emphasizing its potential for healthcare applications. In paper [11], authors investigated the potential of app-based tracking in monitoring blood pressure among patients undergoing chemotherapy, highlighting the potential of mobile health applications in improving patient health management and monitoring. The authors [12] systematically re-

viewed the effectiveness of IT-supported shared care in managing chronic diseases, emphasizing the potential of technology-based interventions to improve healthcare management and patient-provider collaboration.

3 Research Gap

However, the primary distinction between proposed work and existing applications lies in the fact that all the aforementioned applications require users to add medications themselves, either by scanning barcodes or entering serial numbers. This can lead to issues if they forget to do so and end up consuming expired medications. We address this problem by recording the medication details at the time of purchase, eliminating the possibility of overlooking crucial information.

Moreover, some enhanced features in proposed application have been incorporated such as stock management, detailed information, notes, calendar, expiry tracking, alerts, and consultation options. These added functionalities aim to assist users in various ways and improve their overall experience.

4 Proposed Model

The proposed application known as 'Medication Expiry Detection Application' (MEDA) will give the subtleties of the drugs i.e. when the medication will lapse, what all drugs are accessible to you and so on. Essentially, there will be two ends of the application: one at the charging counter (pharmacist end) and other for the client (User end).

So, basically it will work as follow and depicted in figure 1 and 2:

STEP 1: As soon as user buys any medicine from any pharmacy,at time of billing he needs to provide a phone number, pharmacist scan all the medicines using QR code. After scanning, allthe details of the medicine will automatically feed on an application (Pharmacist End).

STEP 2: If user have an application, he will receive all the information on his app otherwise, he will receive text messages regarding medication on his registered mobile number (User End).

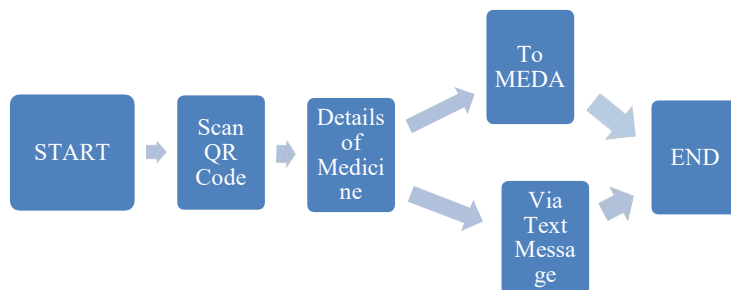


Figure 1: Flowchart of MEDA (Pharmacist End)

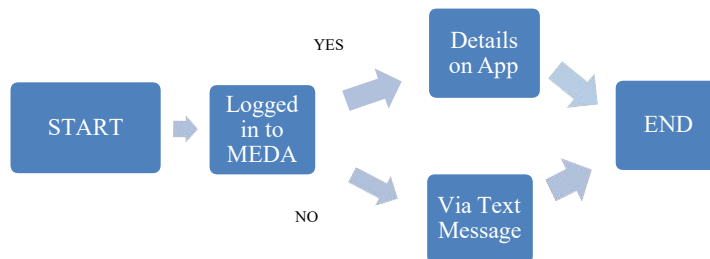


Fig 2: Flowchart of MEDA (User End)

3.1 Methodology

The main feature of MEDA is it prompt a message about the medicine whenever it will be expiring or 6-7 days before expiring to change your medicine or avoid consuming it.

When a user buys a medicine, pharmacist scans a QR code at the time of billing and automatically sends the details to user registered mobile number, such as name of medicine, for what cause it is used, Manufacturing date, Expiry date, company in which that medicine is produced, drug contains in the medicine, price of the medicine etc. These detail will be feed in the database of application for the future use of the user.

On other hand, user will be using this application in various aspects, user will receive alert message few days before the medicine get expired and to change that medicine i.e. Buy the new one and remove that from your stock.

Other than this we will enhance much more feature for the user end to facilitate them in various aspects as follows:-

- 1- Stock: - By using this feature user will be able to check all the medicines that are in stock with them.
- 2- Details: -This feature will facilitate the user by providing all the details of the particular medicine.
- 3- Note: -User can use an interface to create a note for remembering in future.
- 4- Calendar: -This feature will remind every day which medicine you have to take.
- 5- Expiry Region: -This interface will show you the name of the medicines sorted by expiry dates from closer to later.
- 6- Alert: -This feature will provide you a facility to set alarms for remembering the various things.
- 7- Consult: -This feature will provide you the list of medicines you have to take at time of illness. Example-at the time of fever what all medicines are available in your stock.

Below are the screenshots of MEDA application in figure 3 and 4.



Fig 3: QR Code scanner at Pharmacist End



Fig 4: Notification of Expired Medicine at User End

4 Conclusion and Future Work

Medication expiry recognition application helps in really taking a look at every one of the subtleties of medication in an extremely simple way. It will caution individuals about their expiry medication, by simply taking a look at the versatile application subsequent to checking the QR code of medication at the hour of purchasing medication to get every one of the connected information in our application. It helps to diminish the pace of individuals consuming lapsed medication and getting different medical problems.

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