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Developing mobile application for medicine expiry date detection

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Abstract—**Nowadays, people use mobile phones widely and wisely everywhere. Mobile application is suitable for current daily activity. Therefore, mobile application is the best solution to what medium user need to use to detect expiry date of medicine. The consumption of an expired medicine may cause severe harm to the patients. The paper label of expiry date being pasted on medicines can be torn or crumpled. Hence, this paper presents the development of mobile application to detect the expiry date of medicines. This application is designed using Quick Response (QR) code. The user can utilize the camera at smartphone to scan a QR code to detect the details of the medicine including expiry date. This system is conducted in two phases: (1) Comparative study of existing mobile applications (2) Development of proposed mobile application. This paper discusses existing mobile applications for the detection of medicine expiry date and their comparative study.**

Keywords*— *Medicine expiry, mobile application, QR code

I. INTRODUCTION

The effect of consuming the expired products, particularly medicines include deterioration of patient health, side effects and death in some of the vulnerable targeted group of people [1, 2]. So it is vital to know the expiry date of a medicine. Nowadays, almost all products have its unique barcode numbers. The things have barcode to detect the price of the product at supermarkets. It represent loads of information about a product when the barcode is scanned. The use of an expired product may be harmful to its users. There are many types of barcode system available. A method of identifying system using Quick Response (QR) code is proposed in [3]. QR Code is a two dimensional (2D) encrypted barcode with a matrix structure which consists of black modules arranged in a square grid on a white background [4]. This barcode can serve as a mobile bridge between physical platforms and digital information. Hence, the proposed system, the medicine expiry date detection by using mobile application will be designed using QR-code. With innovative QR-code scanning technology, patient will be able to seamlessly identify medicine and know an expiry date of medicine using smartphone.

Nowadays, the mobile users are increasing as it assists in most of the daily activities [5]. There exists many wireless smart applications [6]. For example, a mobile application is suitable for the purchase of products using online method [7]. The barcode on the products when scanned, the scanner only knows about the price of product like, how the user pick up some

things and scan the barcode at machine to get detail about price in supermarket. Many individuals depend on their smart-phone to search for the things online. Applications that identify songs, pictures and video, or that scan barcode, make it simpler to users [8, 9]. At the prescription, users may attempt to distinguish some data about medication.

The problem using sticker price tag is, if a sticker price tag become scratched or crumpled the users may not be able to read it also [10]. Because a paper price tag like a sticker. The proposed system uses camera at smartphone to scan the QR-code. So, the user can detect the details such as expiry date of medicine and users can save the reminder a few days before the expiry date of medicine at their smart-phone.

The proposed system is developed using QR-code in mobile application. QR code can be easily generated using free on-line generators. They can be printed on plain paper using an ordinary printer and attached to any object [10]. It is a substantially cheaper and easier to get QR codes. By contrast, one has to do with a QR code is simply have it print out on any surface that they wish.

Nowadays, the expiry date on the medicine was just pasted using sticker price tag that easily lost if detached from the medicine beg. By using this system, users do not have to worry if the medicine beg become wet because the details of medicine can save in their smartphone and reduce the cost of hospital or health care to put sticker price tag and reduce ink to printed the details of medicine at plastic beg medicine. Only create the QR-code that include details of medicine such as price, expiry date and etc. Based on the problem statement, the objectives of the proposed system are:

i. To develop a prototype mobile application for medicine expiry date detection

ii. To develop a system that will be able to detect the expiry date of medicine using QR-code.

iii. To ensure users can save the expiry date of medicine as reminder.

II. Related Works

This section describes three existing mobile applications such as Pharma Secure by Nathan Sigworth and N. Taylor Thompson [11], Medicine List+ by NPS MedicieneWise [12] and Walgreens by Walgreen. Co [13]. The comparative study of the existing systems is also discussed in this section

A. *PharmaSecure*

The Pharma Secure gives innovation solution for protection against medication as well as patient understanding engagement and adherence. The system has three features that users can access such as check via SMS authentication on mobile phones used by patients, via web base when user login the pharma secure authentication portal and users can access via mobile application.

PharmaSecure interface via SMS

For this interface, Fig. 1 show the authentication of medicine, users can check the valid of the medicine by sending SMS to the mentioned number. The contact number of authentication will appear or printed on the medicine packaging.

Fig. 1 Authentication Contact Number

PharmaSecure Via Web Base

In this application, Fig.2 show PharmaSecure application use web base as a platform. Users can write the authentication code that the code could have at Tablet medicine to fill in the blank. As a next step, users must enter the CAPTCHA code [14]. The CAPTCHA code is already display at the portal page, so users can enter the code. This mechanism is widely utilized nowadays for ensuring web base, application and services from virus and spammers.

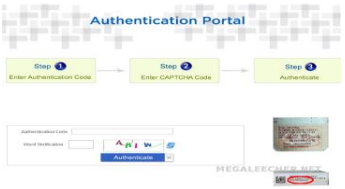

Fig. 2 Authentication Portal

PharmaSecure Via Mobile Application

In PharmaSecure Via Mobile Application, Fig.3 show the home interface where it includes features such as verify medicine, counterfeit, verification history and follow us. This application will give details about the medicine. PharmaSecure mobile application is a system that users can enable connection to internet to access authentication portal. This system can limit the danger of patients to get fake medicine every day all over India. Around 300 million packages medicine have as of now been secure by the PharmaSecure application [11].

Fig. 3 Home Interface of PharmaSecure Application

In this application, Fig.4 show a counterfeit [15, 16] of PharmaSecure where users can capture photo medicine or type in unique code that users can found on medicine pack using phone keyboard. The code must have 9 digit alphanumeric. This features will show the users about the details of medicine. Fig.5 show the interface for list of the medicine of PharmaSecure. When users scan or snap photo of medicine, users can record the details of medicine. Users can search for the detail of medicine when users type the name of medicine.

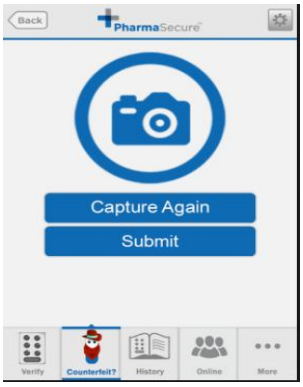

Fig. 4 Counterfeit of PharmaSecure

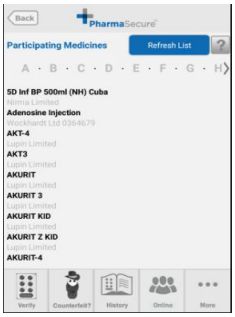

Fig. 5 List of medicine

B. Medicine List+

The Medicine List+ is a track list all the medicines yourself or family members. In addition, this application keep list of medicine up to date and users can get information about medicine when they scan the barcode. The notes is a part of the features in this system. The notes function record some health information or users can create emergency contact number if something happens to patients. In this application, the user can save information by using email address and PorTable Document Format (PDF).

Medicine List+ application provide individuals or family information, doctors and nurses with a comprehensive and easy to use the reminder application to users. Other than that, user can manage setting their medicine and this application help users stay on top in health as well in users care. The new Medicine List+ application can make users easier to see the list all of medicines. In addition, medicine list+ help the user to manage their medicine and record the medicine.

In this application, Fig.6 show a home interface of Medicine List+ application showing few features such as medicine, general health, reminders and notes. First the users must sign up this application for creating users account profiles. In create details information such as card of medical and medical insurance make it easier for doctors or nurses to keep in touch or track of patients. It also help parents to stay watch of the record level family medicine requirements. In reminder features, users can set timing or medicine reminder for prescription and non-prescription of medicine. Another feature such as notes, users can record or create own note in Medicine List+ application database and get answer question when doctor ask. In additional, users can add notes related to health professionals. The test result and list of medical can added at noted to record.

Fig. 6 Home interface Figure

C. Walgreens

The Walgreens provide a few functionality such as users can use their smartphone and scan barcode

medicine to get information about the medicine. The information will show the nearest store to buy or refill the medicine.

Walgreens application have many items that needed from pharmacy but only Rx product. Users can easily refill prescriptions, print photos, clip coupons and etc. Users not need wait in a line as nowadays instead they view and book for items in advance.

In this application, Fig.7 show that users can scan the barcode on the medicine to detect the information about nearest shop sell of medicine. Users also can refill the medicine but users must prescription and pick up in the store.

Fig. 7 Refill Rx product by Scan

Fig.8 show that users can capture photo to upload the moment at media social like facebook, instagram, blog and many more. The users can print favorite picture from mobile phone or other file and users can pick up the picture the same day at the store. Use media social are to associate with other people, stay in contact and make arrangements with friend, find old friends, find out about accasions, share photos, entertainment and information gathering.

Fig. 8 Quick Print Photo interface of Walgreens

Fig.9 show users can check their balance reward. The reward can get from how recently users use this application and buy the Rx product. Users can collect the reward to replace something medicine with collect point. Pharmacy chain Walgreens Co. Already has said that mobile technology is an integral part pf its strategy for diving more traffic into its 8,300 stores nationwide. The Walgreens application was on Apple's list of top 100 applications for 2012.

Fig. 9 Reward purchase interface of Walgreens

D. Comparison of existing system and proposed system

Based on the study of the existing system such as PharmaSecure, Medicine List+ and Walgreens, the advantages and disadvantages of those three system are listed in Table 1. The medicine system in mobile application provides a good platform nowadays, most of the people have smartphone but it does not have the facility on notification or reminder on expiry date of medicine. This will be one of the most important criteria consider for expiry date on medicine to maintain good health. So, the proposed system will be integrated with all the important features and functions that had been discussed from existing system. Table 1 shows a summary of comparison between existing system and proposed system.

TABLE I. COMPARISON OF EXISTING SYSTEM AND PROPOSED SYSTEM

System name	Pharma secure	Medicine list+	Walgreens	Proposed system
Application Type	Web, SMS and Mobile based application	Web and Mobile based application	Mobile based application	Mobile based application
Application for	Authentication portal Android	Android and IOS	Android and IOS	Android
Cost Install Application	Free installation	Free installation	Free installation	Free installation
Notification of expiry date	No	No	No	Yes

Type of barcode	No	1D-code UPC CODE	2D-code PDF417	2D-code QR-code
Show expiry date medicine	No	No	No	Yes
Calender event notification	No	No	No	Yes

III. MEHODOLOGY

Medicine expiry date detection by using mobile application is a system that help users to facilitate the users to know the details of the medicine by using a mobile application QR-code reader. With this application, users can know the details about medicine if they scan the QR-code which is available on medicine. It also keeps all the information about the details on the users to login this application on the database. The details of medicine such as name of medicine, function of medicine, expiry date of medicine, drug company that produces the medicine and pricing will be created using QR-code from hospital medical department or pharmacy.

In addition, user will receive alert notification as message a few days before the expiry date of medicine by using set up at expiry remind in features application, to remind the users about expiry date of medicine. The QR-code will be applied for this system and the QR-code which will be captured by camera to give the detailed medicine. For example, users can use a camera mobile to scan a QR-code to detect the details of medicine including expiry date. This application also make users to know the details and expiry date medicine easily and effectively.

In the proposed system, the application has six features such as list medicine, add medicine by scanning, view the details of medicine, create the note, calender and setting profile user as shown in Figure

List Medicine: By using this feature, the user can view the list of medicines in the database.

Add medicine: In this feature, the user can add the medicine and the details of medicine in the database by scanning the QR code on the medicine.

View Medicine: This feature allows the user to view the details of the chosen medicine

Create note: The user can use this interface to note down some information received from medical officers.

Calendar: This feature is used as a reminder of expiry date. Also, user can select this feature to create events or set date of appointment with medical officer.

Fig.10 illustrates the six features of the proposed system. In the figure, the user can login this application, view the list of medicine, scan the QR-code to add the medicine at account, view details medicine include know the expiry date, create or view the note, create event at the expiry remind as a features in this application and notification as reminder.

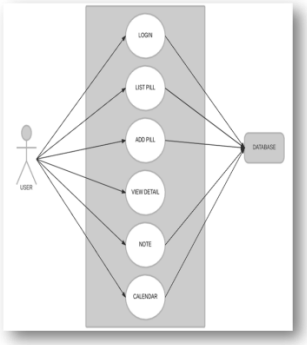

Fig. 10 Features of proposed application

Fig.11 show the feature, that user can check or add the medicine in this application to save at database. User can get status or details from database.

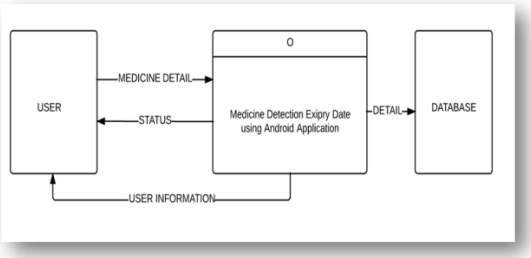

Fig. 11 Add medicine interface

Figure 12 show the interface design for viewing medicine details. This feature allow user to scan the QR-code for detect or view the detail of medicine only. User cannot add pill to this account or setting the notification expiry date. User only can view the details of pill.

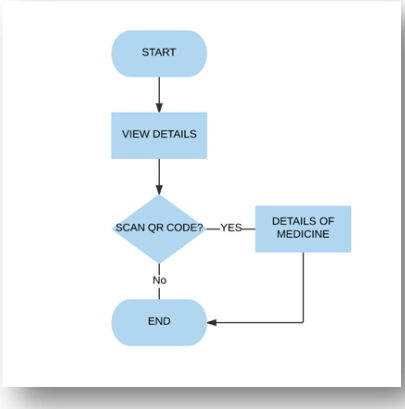

Fig. 12 Interface design to View the Details of medicine in Proposed System

IV. Conclusion

This paper discussed the comparative study of existing applications for the detection of medicine expiry date. The mobile application is designed by using QR code to be used in smart phones to ease the activity. The next part of the work is to implement the developed application for medicine expiry date detection. This application is used as an alerting system for the patients about the medicine expiry.

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