Original Article

Framework to find expiry of Medicinal Drugs in Pharmacy

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Abstract

Medication is the important part in day to day life for the past recent years. All the pills have a manufacturing date and also most importantly an expiry date along with it for safer use by the consumers. Pills which are over the duration time of expiry will create problem to the consumer in all means of their health. Expired medicines may also have growth of bacteria and it will not be helpful in treating the infections. In the pharmaceutical market the specialty medical need is increased in an highly rate of 1200%. The drugs which are of expensive must have special attention in the pharmaceutical. Also some medicines which are rare for the patients are also to be monitored in a proper way. All pharmaceuticals have their customers in a regular pattern for their monthly medicines so their importance is considered in terms of having availability of their respective medicines. The medication errors across the global level costs so high. Our proposed work will help in finding out the duration of the medicine for its expiry in the pharmaceuticals. It reduces the work of the pharmacists and they can easily replace the older stock in the shops with this approach. An easier approach which offers a drug information resource will be a highly recommendable tool in all pharmaceutical centres. This approach is highly efficient and will not let the customers out of the pharmaceutical shop. The approach is simple in execution with few hardware components and easy for the shopkeepers to utilize.

Keywords: RFID, ATMEGA, Coupling, Relay, LCD .

INTRODUCTION

In recent situations the whole world depends on the medications because of lack in nutrition. Elder the people get more their medication list. The medications are more expensive in the Asian countries when compared with that of other nations in the world [1]. Usually the pharmaceuticals will have stockpile of the medicinal drugs for common flu, cold, cough or some minor problems of health. The expiry date is nothing but the date provided by the manufacturer that indicates that the drug will be to its full potency. After the period of expiry the drug will not have any effect for the purpose it was made and may also create other problems for the human. Hence it is to be monitored in a proper way [2-3]. The expired medical products will be having higher risk because of its change in its chemical composition due to over period of time. Sometimes the expired drugs for antibiotics will be leading to serious illness. The expired drugs may cause fatigue, unconsciousness, nausea [4]. The expired drugs have to be disposed in a proper way also to be safe and sound. These expiry drugs can be found manually but it's difficult over a period of time. The date printed at the back of the pill slip may be damaged due to its poor print quality, sometimes the part of the expiry date available in the pill slip might have been cut off and given to some customer [5]. Considering these situations it is difficult for the pharmacists to deliver the correct product with expiry. At even sometimes due to the cutting part in the pill slip it is harder to predict the pill name itself [6-7]. Our proposed system will overcome these problems and helps the customer in getting the correct pills with the expiry date. The problems in pharmaceuticals are to find the pills in its spot which also takes more time for the customer to spend their time in the shop. This could also be overcome in this proposed design. The pharmacist could easily find the drugs inside the shop using the proposed architecture. The usage of the design is also simple and automatic in finding the pills. The pharmacist could easily find out the total number of pills inside the shop thereby the customer will be delighted always [8-9]. The customers will not be said no for the pills that they ask because the count of the remaining tablets is updated in the data. Once it goes to the minimum level the shop owner can put a quote to get back the drugs for the customer [10-11]. The design will give more customer satisfaction and thereby the shop keepers can retain their customers using the proposed design. The RFID has several purposes in today's modern world in the fields of control system, attendance management system, product authentication, employee monitoring, vehicle positioning, room automation, library management [12]. These part and part applications are utilized for the proposed system of drug identification. It is the

responsibility of the pharmacy department to check the validity and the expiration date of drug products throughout the hospital. Every product dispensed by the pharmacy shall carry an expiration date [13-14]. Drug label generated by the pharmacy department should carry the medication's expiry date. The inpatient pharmacy has to keep the medications that will expire in the next 30 days in a designated shelf for nearly expired medications to be labelled properly during dispensary. Medications that are going to be expired within 3 months shall be marked in all medication storage areas (inpatient, outpatient pharmacy and nursing units). These medications, which will be expired within three (3) months, are to be arranged in separate shelves in the pharmacy store [15-16]. Monthly inspections are regularly conducted in all pharmacy facilities and a monthly inventory carried out for each nursing unit. Medications stocked on patient care areas (floor stocks) are checked by nursing personnel, and verified by a pharmacist on a monthly basis. Verification procedure found in the Nursing Unit Inspection Guide, the original copy is kept at the pharmacy and duplicates are sent to nursing unit [17-27].If there are medications found to be near the expiry date (within one month), the Head Nurse/Charge Nurse must check with the inpatient pharmacy if there is new expiry date before returning the drugs to the pharmacist in-charge, so they can be moved to other units, where these medications could have a better chance to be used before they expire, but if the item is urgently needed and there is no replacement stock in the pharmacy and warehouse, then the nursing unit can use it until the last day of expiry.

METHODOLOGY

Much number of health care or pharmacies is available all over the world. Mostly their medicine information's are checked manually (like expiry dates) before it reaches the customers hands. The expiry medicine due to manmade error may lead to lot of troubles. The pharmacist is responsible to check the validity and the expiration date of drugs through the course of patient treatment. It is the responsibility of the pharmacist and nurse to maintain the allowed stock in each nursing unit as per approved sheet posted in each unit. Most of the medications are coming with boxes as shown in Figure 1 which are difficult if the pills are taken outside the box.

Figure 1. Pill box having dates

The figure 2 shows the overall simple structure of the proposed design. The heart of the system is the microcontroller to process the input data from the RFID system block.

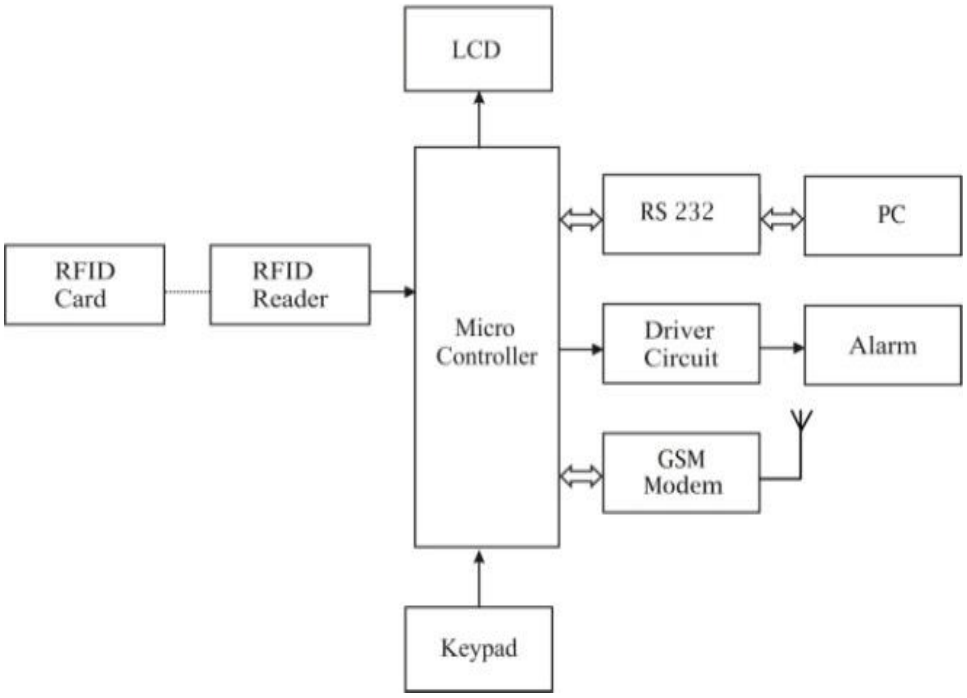

Figure 2. Block Diagram

The RFID card and its Reader play a major role and its responsible for identification purpose. The Radio Frequency Identification system will be having two components for the procession of information which are nothing but a RFID Tag and a RFID reader. The RFID reader detects for the predefined RFID tags which is programmed with the data to be redeemed. The RFID frequency bands can work in low frequency range of 125-135 Hz, High frequency range of 13.56 MHz, Ultra frequency range fo 868-930 MHz and Microwave range of 2.45 GHz. Different range of RFID tag has various advantages along with some disadvantages. Each RFID range has different power standards which is also one of the main consideration for any kind of application based on a RFID system. The idea is to implement a RFID card into each pallets of the medicinal strip and each will have its own identity of all its values like manufacturing company name, its address, manufacturing date, expiry date, its level of dosage, its ingredients. If it is scanned with the help of the RFID reader then it will show its originality values in the display screen. The display will have all the details which were fed into the RFID tag in the medicinal strip. The calculative part in determining the number of tablets are calculated using the adder blocks of fast adders [12], [13], [15]. The complete process is done with the help of ATmega microcontroller based on Arduino. The Input voltage limit for the ATmega microcontroller is 6-20 volts. The Arduino is an electronic platform which is an open source. Since it has many digital input/output pins it is easier for any connections. The external programmer avoidance with easier programming is an added advantage of using the arduinoIn this design we use the arduino for processing of data. This can be powered with the help of USB itself using a PC henceforth the product developed is of less power consumption. The processor is coded in order to process the RFID tag values to be displayed in the LCD available in the product design and the same could also be viewed in a window developed for the product in the PC using communication cable RS232.

The module is also connected with a GSM in order to deliver the data personally to a communicative device.

RESULT

The product of the design is shown in the below figure 3. The design starts with the RFID block connected to the arduino. The relays in the design act a switch in changing the levels and values. All of them powered with the help of a step down transformer which is connected directly to the AC power supply. Henceforth a separate rectification block is also available in the design to convert the AC into a DC for usage by the electronic components in the design.

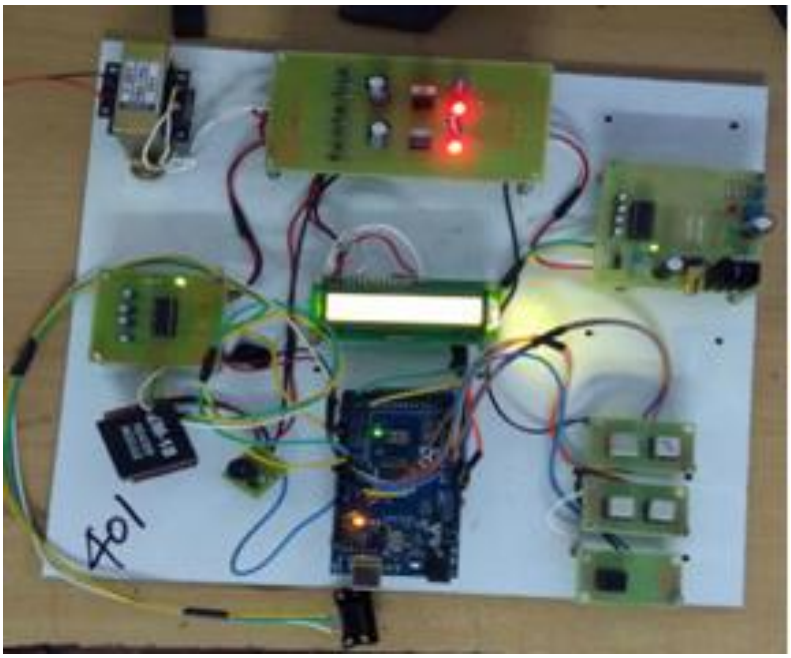

Figure 3. Real Time Snap of the Product

To use the module with the PC or a laptop, a separate GUI has been designed which will be asked to enter the username and password of the shopkeeper to utilize it as shown in Figure 4.

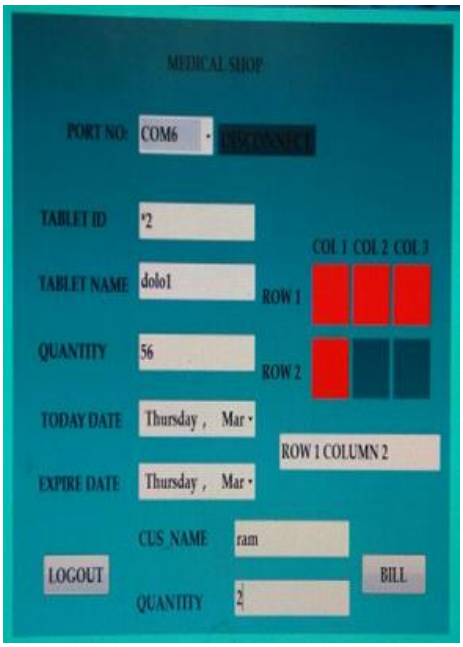

Figure 4. Input view of the product

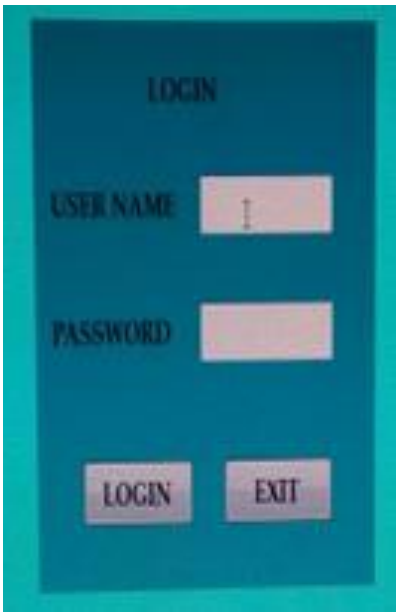

Figure 5. Output View of the product

The GUI made is user friendly for anyone going to make use of this product. Once the Log in credentials are entered by the shopkeeper, the tablet strip enhanced by the RFID tag is to be placed near the reader to perform the data retrieval functionality. The arduino process the reader values and puts it at the output GUI to know the details about the tablet. The Figure 5 shows the output GUI where it shows all the details about the tablet strip. The details includes the ID of the tablet, its name, quantity available in the shop, today's date and most importantly the expiry date of the product under the RFID reader. Additional information about its locality in the shop is also indicated in the GUI.

CONCLUSION

Thus the product to determine the expiry date of the tablets has been designed and its functionality has been explained in the previous paragraphs. The design proposed is user friendly and can be used by all the shop keepers with minimum human strength. The proposed work also reduces the man made errors in determining the wrong expiry and delivering it to the customer. The design also helps in saving the time of the customer inside the shop to purchase the tablets. The proposed design is based on the collective data only in the PC maintained by the shopkeeper alone and this could be enabled to a cloud platform with a server to access it from any part of the world which is considered as the future work of this product design. In future this could be done with the help of the automatic robotic arm [8] in getting the tablets from the rack. The product is also made possible to be converted into a M2M once the development of 5G with UFMC filters designing [9] – [11]. The additional information through an alarming can also be added using the CNN [14]. The automatic dispensary system is also possible in the near future if the design in accompanied with the help of smart Shoppe trolley [16],[17].

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