iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** VIII **Month of publication:** August 2018

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue VIII, August 2018- Available at www.ijraset.com

Compact Medicine Box for Supporting Elders: Arogya

Mainak Paul[1], Jayeeta Saha[2], Pritam Chandra [3]
[1, 2, 3]*Electrical Engineering Department, Meghnad Saha Institute of Technology*

Abstract: With increasing number of nuclear families in today's world, situations arise where one has to leave their unwell elderly parents/parent or sick patients at home and has to face the world for earning their bread and butter. These elderly people and other patients suffering from various diseases need a constant medication and various such cases occur where one has to depend on a caregiver who shall have to remind them or provide them with the medicines at the proper time. This paper designed an intelligent pillbox and its back-end monitoring system. The implemented pillbox could remind the elders to take medicine in time and could inform the families remotely when the elders took the medicine. The design of this medicine box could prevent the medicine dependence. The custodian could easily make schedule time for the elders to take medicine. Hence, we proposed an alarm based medicine dispenser to help people to take the right medication at the appropriate time. Combination of sensors and Arduino microcontroller controlled the medication dose. An alarm system was implemented via popup notification on the user's smart phone.

Keywords: Healthcare, Pill reminder box, IoT, Arduino, LCD screen, Sensor.

I. INTRODUCTION

The medication non observance problem had caused a serious problem to health of living being as well as huge financial misuse worldwide. The rising predominant social insurance related with the Internet-of-Things (IoT) offered empowering arrangements. Moreover, a station for in-home healthcare services winds up basic to meet the quickly developing requests for day by day observing, nearby analysis and expectation.

The wider availability of powerful, low-cost smart devices (e.g., smart phones or tablets) are profoundly changing healthcare so that the mHealth term can be devised. The announcement of healthcare projects by market big players as Apple and Samsung confirmed this trend. In particular, the opportunity to collect patient data automatically and reliably allowes to improve patient/user self-management and helps to deliver better therapies. The real challenge for information technologies was not content or curriculum development, but the development of interactive mechanisms by which to make information individually relevant, timely, and, tailored to promote information sharing.

Leaving unattended a medical treatment might have had consequences; from prolonged recovery waiting time resulted in mortal circumstances. Different technological solutions had been proposed for this problem, including pillboxes and automated pill dispensers. In that sense, this paper aimed to present the development of an automatic pill dispenser to improve attention to medical treatment when a patient did not take medicine on time. The implementation considered two components: a fixed device that worked as the main automated pill dispenser, and a portable device that can be communicated with the fixed device in order to synchronize medical treatment information in both devices. Experimental results proved that this functional prototype improves the number of times a patient forgot to follow a medical treatment and it reduces the delays in taking pills. Many of the people around us forgot to take medication on time.

II. LITERATURE SURVEY

Medication exploit among the people had become a big issue in the healthcare industry. Especially for those who had been prescribed several different medications at once, and for a prolonged duration of time, they tended to forget to take their medicine on time, or they easily took wrong medicine on same time. This project was an Arduino-controlled, consumer device which dispensed the correct amount of medication of the correct type. A textured cone was found to be the ideal method of trapping precisely one pill at a time to prevent overdose. After the medication would be dispensed, the user would be notified via SMS that his/her medication was ready to be taken. This device was also configurable via an Android application; a caretaker could select dates and times the medication will be dispensed for up to three types of medication. The device counted on a Bluetooth based module for a serial activation signal. The first set of results obtained measured how often the correct pill was dispensed and how often a single pill was trapped and dispensed. [1] Some research described in a study in somewhere in the Europe where electronic

medication dispensers were tested by a many elderly users. Also persons with narrow vision or manual skill reported great personal benefits. [2] The point of this work was to make a gadget for the administration of solution as indicated by the client's treatment, with the IoT gadgets and by enabling clients to deal with this smart medicine box independent from anyone else. The work fell into two main areas of current research: the End-user development (EUD) and the Internet of things (IoT). [3] [6] In order to assist such patients, the objective was to design a Smart device that made their life easier. In some of the articles, medical engineers created a smart device which worked on three operations in order to find a cure for a disorder called Dementia. At first, a schedule that consisted of a sequence of activities were fed into this Smart device based on which it prompted with dos and don'ts and also suggested good diet and physical activities increase brain power. Then it specified the medicine and dosage that must be consumed and the medicine box was attached with IR sensor that monitored if the patient had consumed medicine. At last, if the response was not received from the patient to any of the above activities the device sent an alert to a caregiver. Therefore, by implementing this Smart device the burden on the caregiver became less. [4] Some people reported on the first phase of a program that was aimed at developing low-cost, portable and easy-to-use pill dispenser that addressed the infrastructural and economic challenges of low-income families, especially in developing countries. [5] This study from Turkey proposed a new approach called Medi- Deep (Deep Control in a Medication Usage). Medi-Deep was based on a remote management technology that aimed to be in a reliable and a solid position while information amongst a patient and a doctor were being exchanged. In other words, Medi-Deep was a solution that provided precise information to physicians about a medication usage trend in patients without needing a manual intervention. Among other important and critical features, this solution also established a secure and private connection channel between physicians and patients. Last but not least Medi-Deep was the inevitable solution to prevent waste in fields of economy, resources and etc. [6] The use of Internet of Things (IoT) concepts and health sensing technologies made diagnosis easier and convenient for the doctors as well as the patients [3]. Some researchers presented an overview of an dependable device for monitoring refusal of medication by providing one platform and a closed loop inter-connection between patients, doctors, and pharmacies. Their work gave recognition into system's mechanical design, architecture and development of android platform, information security and cloud integration of the physical system [3] [4]. This device helped in maintaining single step medication for the patients and helped with improving the longevity. [8] This study used the Webduino module installed in SPB to achieve two-way messaging with remote relatives via the internet of thing (IoT). The module first reads the sensing signal in the kit and used WiFi to transmit the signal to WiFi Router, and then sends the medication information to a remote webpage or cell phone for monitoring (on LCD). Remote relatives could take input care messages on the webpage or mobile phone to send a signal back to the WiFi Router and then to Webduino module. After receiving the signal, Webduino would send it to Arduino for text displayed and voice playback in the SPB. [9] One of the examinations depicted a mechanized solution, an automatic pill dispenser, that has improved capacities given by the coming of the IoT worldview. The model gadget illustrated here was fit for conveying two unique medications at around a similar time. [10]

At first, this article reviewed common technological approaches accessible to elderly that were intended to increase adherence to medication. At that point, in a developmental procedure, the investigation proposed a novel system to plan and assess an intelligent mechanized pill update for more seasoned grown-ups. For elderly patients, dosing was pivotal for their solid life. A large number of them were asked for to take medication standard with no error. Consistency in the pharmaceutical agreement had demonstrated basic for measurement control, determination, and treatment. Doctors were regularly considered as the last pathway for almost all expert choices about the utilization of wellbeing assets. However, as for drugs, drug specialists were, as a rule, the last connection between the pharmaceutical and the patient. This approach of medicine admission could be dangerous to the patient. iMAT was an arrangement of programmed solution container and programming instruments. It was for individuals who took pharmaceuticals on long-haul premise at home to remain well and free. The framework helped its clients to enhance thoroughness inconsistency by anticipating misconception of solution bearings and making medicine plans more tolerant of lateness and carelessness. Drug plan chief in iMAT could be conveyed either on independent programmed, savvy prescription distributors or on PCs and advanced cells went with customary pillboxes. Then again PROMUS scheduler considered both client inclinations and medicine bearings in an age of adaptable prescription calendars and consistence authorization. PROMUS booked drug occasions to be more adaptable and neighbourly by gathering the solution dosages to lessen the occasions prescriptions were to be taken and permitted the client longer reaction time. Population aging was a global issue that affected many developing countries such as Taiwan. The natural declination in physical function with aging lead to an increase in incidences of various chronic diseases in elderly individuals; most patients with chronic diseases needed to take medications over a prolonged period of time in order to stabilize their conditions. Over 125,000 Americans died annually from not taking medication properly. It was reported that wrong medicine box was delivered to patient accidentally at hospital's Inpatient Department, so the patient might have taken the wrong medicine and the medical incident

occurred consequently. In order to resolve this problem, it was necessary to design intelligent medicine box Monitoring and management system. The system effectively resolved the problem of negligence and disoperation with medicine distribution, and as well avoided the accidental medicine taking for patient.

However, this being a human dependent procedure, it is uncertain as it might also include the possibilities where the caregiver, as well as the patient, might forget about the medicine taking time. In those cases, light to severe mistakes might engulf the lives of many. To get rid of such situations, we have come up with the idea of the smart pill reminder box. We have designed this box which not only reminds the patient to consume the pill at the proper time but also transfers his response to the alarm remotely to one of his selected family members or a physician via an SMS. This pill reminder box also includes another feature which is highly recommended for temperature sensitive medicines as it might be necessary for proper action in the patient's body. Thus we have a display unit which displays the sensor measured room temperature and helps one to keep temperature-sensitive medicines in the required environmental surrounding. Alongside it is also an easy set-up with visual and hearing effects that enhance the ease of work for the users.

III. WORKING PRINCIPLE

With the development of medical science and medical technology, there has been an alarming rate of success for curing a huge number of diseases. However, this requires proper and smart medication. Only technology can improve the human habits and can omit human mistakes. Technological advancement is at its peak and medical field has also experienced the inventory and innovative vibes of the technical minds. Again, human lives have fallen prey to the increasing amount of pollution in this world. For some unavoidable reasons, the human body is vulnerable to diseases and such threatening diseases need a proper cure and proper medication. Our project is microcontroller based which focuses on the human grievances and aims for serving the human society. It has pill storing boxes, where the pills might be stored for consumption. It displays the alarm setting format (set with easy working switches) and room temperature (using room temperature sensor). After the patient consumes the medicine following the display unit and light and sound indicators, a notification is received remotely by another specified person. This assures his medicine consumption at the proper time and relieves one's anxiety.

In this article, the hardware, control, and correspondence conventions were depicted and actualized. In this article, a general construction of the arrangement was introduced, and a concise portrayal of the main equipment and programming models were additionally included. The arrangement incorporated the improvement of a programmed medicine dispenser and the relating software applications.

A. Basic Block Diagram

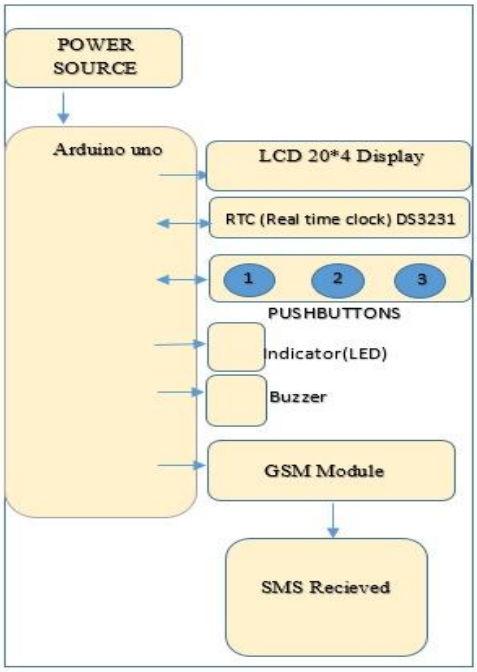


Fig. 1 Block representation with different components of medicine box

B. Components in the block diagram:

The most important components, as specified in the block diagram, are:

1) *Power source:* This is of prime importance and required to deliver power to the microcontroller (Arduino-Uno).
2) *Arduino Uno REV3:* This is a microcontroller board in light of the ATMEGA328P having 14 computerized input/yield sticks out of which 6 may be utilized as PWM yields. It furthermore has 6 straightforward information sticks, a quartz crystal of 16MHz, a USB affiliation, a power jack an ICSP header and a reset catch. It can be made to work by associating it to a PC with a USB link or power it with an AC-to-DC connector or battery. This is the fundamental part utilized for the task of the pill reminder box.
3) *LCD 20*4 Display:* This is the show unit which demonstrates the time, date, day as per the continuous clock, the room temperature, the set pill reminding timings and their on-off status. After the patient switches off the update, the LCD likewise shows the case number which contains the predefined prescription. The interface pin functions of a 20*4 LCD display are

TABLE I

Pin No.	Symbol
1	Vss
2	V_{DD}
3	V_O
4	RS
5	R/W
6	E
7-14	DB0-DB7
15	A
16	K

4) *RTC:* It is a low power devouring gadget that monitors the present time. Having its own power source, this device can operate even when the whole system is switched off temporarily. We have used this device in our project for enabling the access of time, date and day.
5) *Push Buttons/ Switches:* Use of a few push buttons/ switches have been done that are required for setting the alarms, altering them and also to sense the patient's response towards the reminder.
6) *Indicators:* Indicators used are LEDs and a buzzer. Three LEDs have been used primarily for indication purpose. One led and one buzzer act as the reminder for the patient. After he switches off the reminder, the particular medicine box from which medicine is to be taken is indicated with LEDs.
7) *GSM 900A Module:* Working on frequencies 900/1800 MHz, this is a module with input voltage 12V DC. This can be operated using a SIM and is used in this project for sending an SMS to a pre-defined person according to the patient's response to the pill reminder.

C. Working phenomenon

The basic internal working phenomenon of this reminder kit can be explained as: a real-time clock is linked to the microcontroller via a wiring network. The microcontroller is programmed with all its input-output pins defined and the logics have been set using a favourable programming language, such that the outputs get printed in the 20*4 LCD display. Using the push-buttons, the real date and time have to be set. The reminder time for various medicines has to be set accordingly. For example, if medicine 1 has to be taken at 10:00 a.m., matching with the RTC, the reminder time for medicine 1 has to be set at 10:00:00. Again if medicine 2 has to be consumed at 1:30 p.m., the reminder time has to be set at 13:30:00. When the real-time and the medicine reminder time coincides, a buzzer and an LED are used as an indication and comes across as a reminder. As soon as the patient is aware of the reminder and responses to it using a push-button, the indicators are turned off. With a delay of 5 seconds, a light indicates the correct medicine box and the box number is also displayed on the LCD screen. Just after the patient successfully consumes the medicine from the indicated box, a confirmation is sent to an assigned person via SMS using the GSM module set-up.

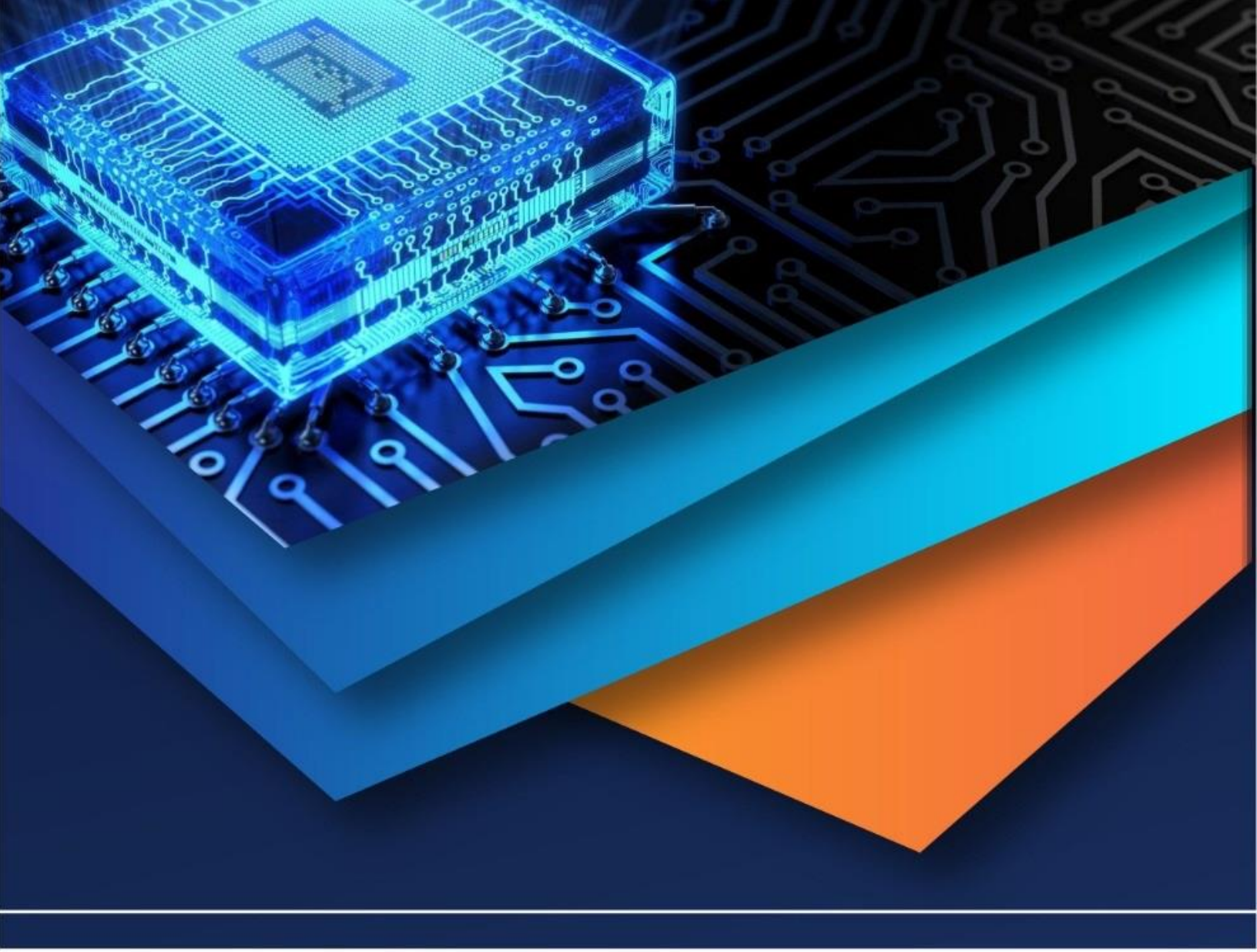
Fig. 2 Hardware model of medicine box

IV. CONCLUSIONS

The real challenge for information technologies was not content or curriculum development, but the development of interactive mechanisms by which to make information individually relevant, timely, and, tailored to promote information sharing. On-site diagnosis and prognosis of these vital parameters were supported by the high-performance architecture. Moreover, agreeable UI was accentuated to facilitate the activity for the elderly, impaired and patients.

REFERENCES

[1] S. Chawla, "The Autonomous Pill Dispenser: Mechanizing the Delivery of Tablet Medication", 2016 IEEE 978-1-5090-1496-5/16, 2016.
[2] I. S. Svagård, "Electronic Medication Dispensers Finding the Right Users – A Pilot Study in a Norwegian Municipality", Conference: International Conference on Computers Helping People with Special Needs, 2016.
[3] P. Buono, F. Cassano, A. Legretto, A. Piccinno, "A Homemade Pill Dispenser Prototype Supporting Elderly", Current Trends in Web Engineering, pp. 120-124, 2017.
[4] D.K. Aarthy, A. Pingle, D. Sudha, V.R.Sushmitha, "SMART DEVICE TO HELP PEOPLE WITH DEMENTIA", 2017 Third International Conference on Science Technology Engineering & Management (ICONSTEM), pp.202-206, 2017.
[5] G. A. MUGISHA, F-M. UZOKA, C. NWAFOR-OKOLI3, "A Framework for Low Cost Automatic Pill Dispensing Unit for Medication Management", IST-Africa 2017 Conference Proceedings, pp. 1-10, 2017.
[6] T. Cakaloglu, "Medi-Deep: Deep Control in a Medication Usage", 2017 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), pp. 900-904, 2017.
[7] A. Mondrag´on, A. D. Hoyos, A. Trejo, M. Gonz ´alez, & H. Ponce, "Medi-Kit: Developing a Solution to Improve Attention on Medical Treatment," pp. 28-33, 2017.
[8] A. Bharadwaj, D. Yarravarapu, S. C. K. Reddy, T. Prudhvi, K.S.P. Sandeep, O.S. D. Reddy, "Enhancing Healthcare using m-Care Box", International conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud), pp.352-356, 2017.
[9] H-L. Tsai, C-H. Tseng, L-C. Wang, & F-S. Juang, "Bidirectional Smart Pill Box Monitored Through Internet and Receiving Reminding Message from Remote Relatives," 2017 IEEE International Conference on Consumer Electronics - Taiwan (ICCE-TW), pp. 393-394, 2017.
[10] P. J. Vial, J. Sansom, D. Stirling, P. Premaratne, L. Tran and M. Ros, "A Dual Canister Medicine IoT Dispenser," in 15th International Conference on Information Technology: Information Technology - New Generations, pp. 167-173, 2018.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY