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Movable Automatic Medicine Reminder and Indicator Using Arduino

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Abstract

The management of complex medication is required for avoiding it before it seriously affects the health of the aged people. Due to physical and mental decline, they need to take a number of drugs. In such a scenario, forgetting to take prescribed medicine is one of the problems. In hospitals there are many patients and it is difficult to remind every patient to take medicine on time. The traditional ways require human efforts to remind them to take medicines on time. The digital era does not follow that and we can use machines to do that. can introduce in a solution a movable automatic medicine reminder and indicator this system will remind medicine. It can set an alarm on their dosage timings. The alarm can be set for multiple medicines and timings including date. The system can be moved from one place to another place by using a mobile to control the entire unit. It is a combination of physical and digital reminders that will be helpful for people of any age, but is especially helpful to old people who forget to take their medications.

Keywords: *Arduino UNO, Real Time Clock (RTC) module, LCD, DC motor, L298N motor driver, buzzer*

1.0 Introduction

Since sicknesses are on the rise, many people are forced to take medications they have not had to take in the past several years because of this. Many people get infected much later as a result of this. Some illnesses are really just temporary, while others are life-threatening. Prescribing drugs has become a lifeline for many people. Patients must now take their drugs without interruption to maintain their health problems under control for a variety of diseases, included diabetes, high blood pressure, and heart failure. One or both medicines are often left unattended by the vast majority of people. A medication admonitor organisation feeds the user's regimen in this effort. If you want to keep an eye on your loved ones 24 hours a day, you'll have to spend a lot of money and time. We often do not realise how much harm we're doing to our bodies when we do not take medications at the right time, do not take them at all, or take the incorrect dosage. The medication storage system makes use of an Arduino module that has been custom-programmed in an efficient and exact manner. A gadget like this "movable automatic medicine reminder and predictor" may have been a lifeline for the careers, who are overburdened and understaffed. In practise, when the caretaker has set up the system to follow prescribed prescription schedules for a certain number of days and stocked up on dosage, they are done with their tasks. As a final step, the system sends the patient an alarm via buzzer and a drawer containing their

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prescribed medication. You may also turn off the alarm by depressing the push button or by using the blink applications on your smartphone or other mobile device. In certain cases, the model will migrate because both strategies are equally effective at completing the job at hand. Making sure someone has taken her prescription is easy with this method. Because several people are in the room, it may be difficult for the medical staff to remember all of their medicines and doses. As a consequence of climate change, colleges are now using this strategy. Patients may find it difficult to remember daily dosage and the name of the prescription amid a busy work schedule, making their lives more complex. Everybody's health is being harmed by non-adherence to medicine. Prescription medication notifications may be useful for everyone. Responsibility for patient monitoring and treatment has shifted. Physicians are designed to examine the patient's health every time an approved drug is supplied. Patients may remember to take their prescriptions on schedule, but they may forget which pill they are meant to be taking at the designated time of day. There is a need to construct a medication management reminder circuits system so that patients can give these things like a medicine at the proper moment. Patients may change the time and the names of their medications using the keypad. This system is very user-friendly and simple to administer. It may be utilised by anyone else, people with higher education or social status.

2.0 Motivation

As I worked on this project, I was motivated by the concern of my elderly parents about losing out on their medication because they were not being properly cared for. Government hospitals may become even more stressful if they lack enough control. As a consequence, we came up with a simple method to aid the elderly and the ill.

3.0 Literature Review

(1) D. Jeya Priya, Garlapati Hema, BIST, BIHER, Bharath University, Chennai [2017]: the proposed in this paper share the information into the Arduino at that point the unit alarm to remind the patient to take the medicine at proper time as client determined. At that predetermined time the alert will be in the dynamic state until the client opens the pack [1].

(2) Automated Medicine Reminder, ram Chorda, Janhavi Dhore, Himanga Choudhury, Dy Patil University, Pune [Oct.-2018]: The purpose of personal automated medicine reminder is to accurately dispense specific dosage of medication to the patient at the right time with an alarm and LED signal automatically as per the estimate given data by the user or the caretaker. And the system serves as a personal medication caretaker for the user [2].

(3) K. Gomathi, P. Elamathi, V. Saravanan, P. Shanmuga Sundaram, [May 2015]: The objective of this undertaking is to help the patients for the confirmation of prescriptions at the ideal time. In this paper the time and drug names are changed by the patients through the keypad associated. The rundown of medications must be taken by the patient at the endorsed time is shown on Character Liquid Crystal Display (LCD) and the time is shown on seven fragment show. So, in this manner the status of the patients can be effortlessly observed by the doctors. This is actualized utilizing Unified Technology Learning Platform. In this framework, Advance Risk Machine (ARM) cortex processor is utilized which depends on ARM form 7 engineering the fundamental purpose for utilizing this processor is because of elite and power proficiency [3].

(4) Nitesh P. Sona wane, Vijay Chaudhari, Dr. K. P. Rane, [August 2016.]: In this paper system which reminds medicine through automatic process. The system consists of Raspberry Pi Module, GSM Module, Secure Digital (SD) Card, RTC, power supply, Ethernet interface for Internet access, and smart phone. The proposed system is implemented around Raspberry Pi processor. In this system, the user has to set the timer by means of a processor. The proposed system is very useful for older persons who suffered with chronic diseases like Diabetic and also different types of cancer and for pregnant women as well. This project can implement using the Raspberry Pi and GSM module. By system sending text message [4].

(5) Priyadarshini, Ramya. S, Kalaiyarasi. S, Mithuna. S, Manivannan.L, [june-2015]: The proposed system is used to give information to patients automatically for taking proper dosage at proper time which is mentioned in the prescription schedule. All the above details are done with the help of Master IC, keypad, LCD display. After that the controller is interfaced with RTC module to track the current time. All the three commands including Number of Tablets, set time, Current time are displayed with the help of LCD display. LED indications and sound will be happened at corresponding medicine (tablet) boxes. Similarly, it can give the information for all time. This novel device is economical, smaller in size, better accuracy and less complexity in operation [5].

(6) AkshayPande, Rahul kumar, Vinay Yadav, Prof. V Dhawan, [May 2016]. In this paper mobiles are used for communication using greatest common multiple.

the messages are sent as notifications. This alarm action sends an emergency message to the user's emergency contact which is registered and family and doctor. To locate the location information of user. The smart phones nowadays provide internet service. This allows doctor to send the prescriptions on the patient's smart phone. This in turn updates the user's reminder schedules automatically [6].

(7) Deepti Ameta, Kalpana Mudaliar and Palak Patel, [June 2015]. An Android-based application in which an automatic alarm system is implemented the alarm can be set for multiple medicines and time including date, time and medicine description. A notification will be sent through email or message the system preferably selected by the patients. They can search doctor disease wise. The patients will get the contact details of doctors as their availability. Also, the users can see different articles related to medical fields and health care tips. The system focuses on easy navigation and good user interface.

(8) Namrata Kataki, Abhishek Nath, Manasweta Das, [June 2018]: The system medicine reminder and monitoring system. The reminder part is capable of reminding the patients about the prescribed medicine as well as time to be taken. Once the patient takes the medicine within specified time the alarm stops. The monitoring part checks if the medicine has been taken in prescribed time or not. In case the patient does not take the medicine within the prescribed time the system will automatically send a report in the form of SMS to the concerned person [8].

(9) A. Jabeena, Animesh Kumar Sahu, [November 2017]: This paper the conventional pill bottles could be reconfigured into an automatic multi-pill reminder and dispenser for ease of operation and usability. With the help of simple microcontroller, we have attempted to create a model of a pillbox – an automated pill reminder and dispenser containing several compartments for keeping different types of pills such as tablets, it uses a micro-controller to keep track of when a patient should take his/her medication. It displays the time for the next medicine in a LCD screen and when the set time reached, it generates messages repeatedly, along with LED blinking indicating which box to open. When the patient opens a box, a sensor detects this and resets the light, alarm gets snoozed [9].

(10) Abhishek Dimri, Dr Bindu Thakral [June 2020]: Within this project, a medicine admonitor organization is designed to feed the user's medicines schedule and the organization warns them by sending SMS to their cell phone if they miss a dosage. The customer has to grain the type of medicine, its dosage, after or before food admonisher, doctors name and time of the dosage in the organization [10].

(11) Sanjay Bhati, Harshid Soni, Vijayrajsinh Zala, [April 2017]. In this paper smart medicine box which solve these problems by setting up time table of prescribed medicines through push buttons as given in prescription. Present time will be saved in RTC module and notification time will be saved in EEPROM. Therefore, at the time of taking medicine system generate notification sound and display the light in specified pill boxes. So, patient can know the specific number of boxes from which he has to take out medicines. All pill boxes are pre-loaded in the system which patient needs to take at given time. Another advantage of system includes of sensing capability if the patient tries to postpone the time of taking medicine by suddenly opening and closing the medicine boxes to stop the sound [11].

(12) Ni Ni San Hlaing, San San Naing, [August 2019]: Microcontroller based medicine reminder alarm system. This system includes the DS1307 Real Time Clock (RTC) module, L298N motor driver, DC motor, I2C Liquid Crystal Display (LCD) module, four pushbuttons and buzzer. Arduino UNO is used to activate the whole system. push button enters the time for the person to take medicine. The clock module is used to set up time and LCD is used to display time for taking the medicine. The buzzer is used to alarm the time for taking medicine. The motor driver is used to drive the DC motor which controls the opening and closing function of the medical box [12].

(13) Waleed Humaid, Mohammad Mohtarma, [Nov 2019]: The proposed system prolonged period prescription update is a framework which helps in medicine organization and checking. This model comprises an ATMEGA328P microcontroller with an inbuilt EEPROM and a continuous circuit. This unit driven by a programme that information sources predefined parameters which are prepared information for example, the keypad. Every one of the passages made on the keypad are simultaneously and at the same time showed on the LCD display of the mechanical device. The rationale for the preparing is incorporated with the inserted programme to start the caution through a sound alert. In addition to the fact that it has an alert framework, yet additionally an LCD which shows the drug to be taken at the update time [13].

(14) P. Raga Lavima, G. Subramanya Sarma, [October 2015]: The using of the embedded system is capable of taking care of the patients from all aspects. This system is designed using Zigbee and wireless sensor network to monitor and valuation of patient's health

condition. The Wireless Sensor Network (WSN) set up used for monitoring smart home consists of fabricated electrical sensing units. These are installed at an elderly home to monitor patients' daily activity in terms of object usage and execute effectively process. The electrical sensing units connected to various household appliances in this proposed system implemented a health monitoring platform such as temperature heartbeat fall occurrence and in addition to these gives an alert message to caring person or hospitals by using GSM technology [14].

(15) Huai-KueiWu [2015]. The Smart pill box is equipped with a camera and based on the medicine bag concept. The matrix bar codes printed on the medicine bags are used to interact with the pill box in order to perform pill remind and confirm functions. The camera is placed on the inside of the cover to detect the matrix barcode and the medicine bag. After visiting a doctor and returning home, a patient need only scan the matrix barcode using the camera of the pillbox, and all medicine related information will be loaded into the pill box. After the matrix barcode is scanned, the patient places the medicine bags in the pill box without dispensing the medicine in to the cell. This method is suitable for the elderly who do not have access to the internet as well. The proposed pill box can reduce family member's responsibility towards ensuring the correct and timely consumption of medicines [15].

(16) Shivani Sharma, Katyani Tyagi, Pooja shishodia, [2018]: The system development of a mobile application to help to provide an effective healthcare system. This is an android-based application in which alarm is used which may be closed by tapping the close alarm button under the image of the medicine which is to be taken at that particular time. Through the image appear suddenly with the alarm, they may remember which medicine is to be taken. Its system allows users to set an alarm and date, time which allow them to set alarm for multiple medicines at different times. The input to the system as an information entered by the patient which includes date, time and medicine's image. Medication adherence usually refers to whether the patients take their medications properly. After saving the name of medicine, alarm rings on its respective time. The application also provides the health-related quotes and the list of doctors along with their names, their specializations and their contact details [16].

4.0 Methodology

4.1 Detailed information on the proposed system of medicine reminder block diagram

ARDUNIO UNO-based movable medicine reminder and indicator is constructed using real time clock. Figure 1 Employing the real time clock, we've built a portable medication remember and indication for the Arduino Microcontroller. Refer to Figure 2 for further background. The fundamental purpose of the framework is to automatically remind and suggest medicines to the person at the opportune moment and also relocate the model when the folks call at the spot from a single machine. As a starting point for the development of a real-time clock (RTC), the suggested prototype system includes an Arduino UNO board as well as other components such as an LCD, OLED display, motion sensor, motor drive, Wireless communication module, and other wirelessly modules.

All of the modules controlled by the microprocessor in the Arduino UNO. There is no need for any additional peripherals or storage devices. Initially, the Arduino communicates through a push button and an LCD screen. Using the keypad, input the dose time as indicated in the prescription; the box should reflect

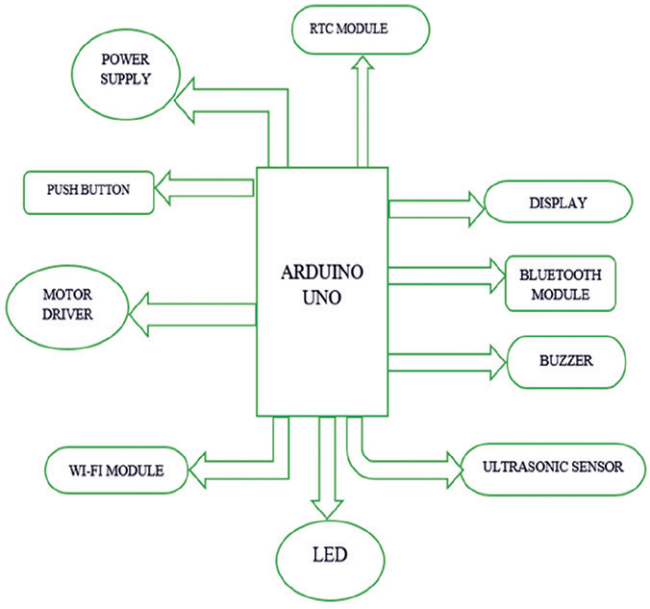

Figure 1: Block diagram of medicine reminder

the dosage. RTC system functioning is shown on the LCD. 'The ultrasonic sensor will detect any impediments during movement and give the input to the driver unit, which will halt the model; the motor driver drives the DC motor to move as close to the person as possible. Block diagram of low-cost moveable automated medication reminder and indication with mobile control system shown in the fiture.

5.0 Major Components Used

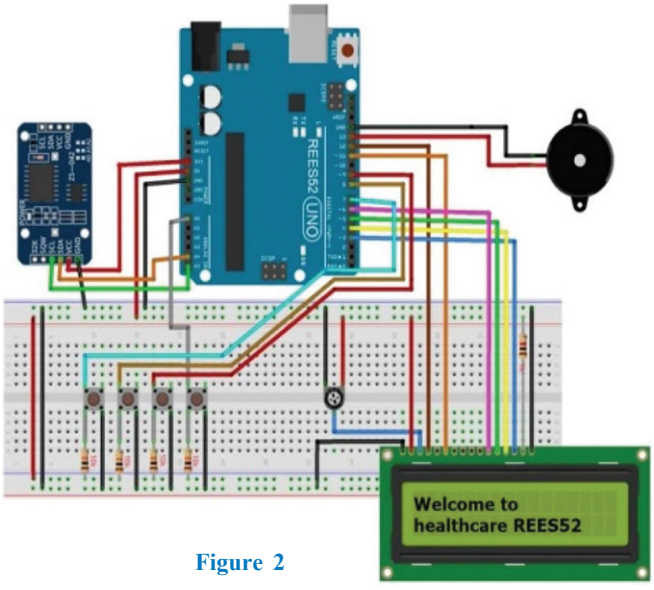

Figure 2

(A) Arduino

At the center of Arduino Uno is just the ATmega328P microcomputer, which would be used to build an online projects (datasheet). Additionally, the board has modified version for power amplifiers, as well as an ICSP header, a 16-MHz quartz crystal, an Usb type-C port, and a USB power port. In order to implement the Arduino board, you'll need to employ a desktop application referred as an IDE. You may use your PC to develop and upload computer code here to Arduino board [20].

(B) LCD

A flat panel display is made possible by the light-altering properties of piezoelectric crystals in something like a liquid crystal display (LCD). Liquid crystals don't emit any different wavelengths of light. A 16x4 LCD was also used to show the rucksack information, along with the amount of medication eaten in each sub-box when the explosion went off [19].

(C) Real Time Clock:

In terms of maintaining component is used. The RTC is fuelled by a lithium battery charger that may be queried through the I2C protocol. With the use of a modules, the user should choose a certain time for taking medication, such as 8.00 a.m., as their morning medicine-taking time. As such, RTCs must preserve specific moment even while the device is turned off or when occurrences like alarm clocks are activated, also including turning over (Fig.3) [18].

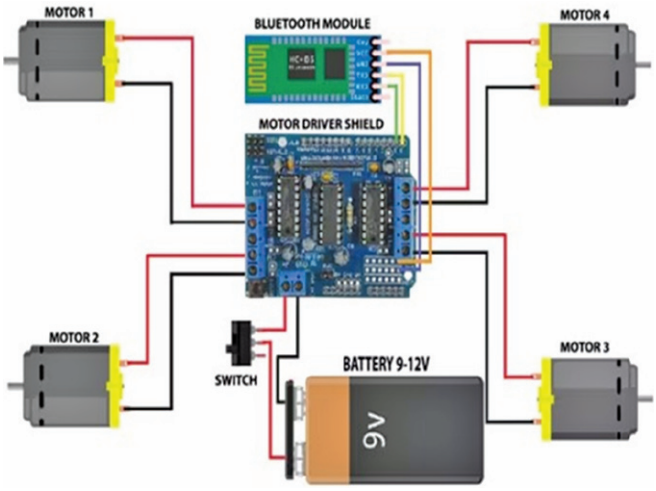

Figure 3: Movable automatic medicine remainder and indicator

(D) L293D Motor Driver IC

In autonomous robotic systems, micro controller ICs are integrated circuit chips that are used to regulate the velocity and distance of the robot's wheels. Motor driver ICs serve as a link amongst robot microprocessors and their corresponding motors. In general, the L293 family of motor driver ICs is most often and utilised. Two DC motors may be regulated by these ICs.. (Refer Fig 5.2).

(E) ESP8266 Wi-Fi module

The HC-05, as an introduction, has two connections. Full duplexity is what I mean by that. A large variety of microcontrollers may be used. In an attempts to help use of the Serial Communication Protocol (SSP). A baud rate of 9600 is supported by the module's communications, courtesy to the USART (Universal Synchronous/Asynchronous Receiver/Transmitter) interface. Therefore, we may connect to this gadget through a USART connection on any computer. The HC-05 can also be used in one of two ways [17].

(F) Ultrasonic Distance Sensor HC-SR04

As the name suggests, it's an electronic device (also known as an ultrasonic transducer), which is used to measure the length. This sensor's location first from item will be defined by the time it takes to emit and receive vibrations. For the most portion, it relies on sound waves using "non-contact" technology to do the task. Accurate and exact information about the target object's distance may be collected without any harm.

(G) Tower Pro SG90 Servo Motor

The most often used servo motor in RC miniatures is the Tower Pro SG90 9g. When precise control is required, the positioning of cutting tools in machinery. Servo motors typically have such a 180-degree range of motion. You may adjust the motor's exact displacement through duty cycle by using PWM technology, which uses pulse-width modulation (PWM). The SG90 Servo Motor is a rotary actuator that really can move from 0 to 180 degrees. The potentiometer is linked to the output shaft, thus it can only spin in a clockwise direction. Using a 1cm distance from the rotor, this servo motor may raise 1.6 kg in the air. Additionally, it may be utilised in robotic arms, CNC machines, steering systems for RC vehicles, and many other robotic and automating technologies (Fig 4).

6.0 Working of Movable Automatic Medicine Reminder And Indicator Using Arduino

The movable automatic medicine remainder and indicator which consists of a pill box, led indicators and smart moving unit. Pill box consists of three chambers in which the medicines are placed. Arduino uno is the microcontroller which is used in pill box and smart moving unit. Arduino IDE software is used to write the code. A buzzer is placed in pillbox which alarms when prescribed medicine is to be taken. A LED's is also placed in the pill box which indicates which medicine have to take. A smart led display which displays the medicine name and time. When a medicine is to be taken from a particular-coloured compartment of pillbox, the blinking a led of that colour. A buzzer placed inside the unit beep sound gives until unless if the patient does not press the push button beep sound continue and also, we get a message alert with Blynk app and we can also control with the app and module connected to Wi-Fi. If we need to move the unit, we can use the app to move from one position to another place a module connected with Bluetooth unit. drive control is interfaced with the Arduino microcontroller in order to achieve this objective effectively. Date and time of the smart watch is set using a RTC module.

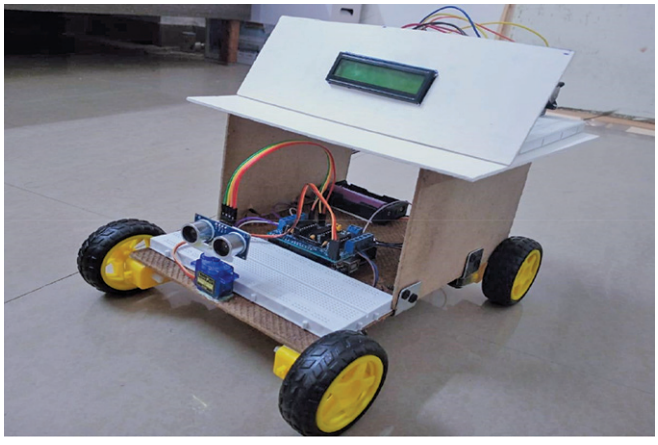

Figure 4: Movable automatic medicine reminder and indicator

7.0 Conclusions

1. Simple to use and inexpensive, the type under consideration is a portable automated medicine reminder and indication.
2. The elderly, those with Alzheimer's disease, and those suffering from paralysis may all benefit from this technology. A pillbox that can be carried by patients is part of the project. The patient is alerted by an alarm when it is time for their medication to be taken, thanks to the smart reminder.
3. Parallel to this, we get a notice on the Blynk app. The device may also be moved from one location to another if necessary.
4. This approach greatly lowers the negative effects of incorrect medication use.
5. The timing of medications was to be controlled by a task and the executives' programming.
6. Why a display and buzzer have really been added towards the gadget to help to ensure that the subject takes his medication on time without need for personal surveillance.
7. The system can be guaranteed to consistently remind the participants to take their medication at a specific time each day since the weekend's dose and time have indeed been placed into it.
8. If someone fills out their dosage for a month, even the most illiterate persons could utilise
9. It without fail. It is possible to modify the application of the controller circuit without having to replace any of the controller circuit equipment. As a result of its ease of use, compactness, and low cost, it is a significant asset.
10. An automated system to remind patients to take their prescribed medication will have a negative impact both on patient outcomes and on healthcare systems.

11. The patient will be reminded of the medication they should take at the time of the alert.

8.0 References

1. D. Jeya Priya, Garlapati Hema Sai Krishna, "An Automated Medical Reminder System Engineering Using Arduino Kit", International Journal of Pure and Applied Mathematics Volume 116 No. 9 2017, 209-212.
2. Ram Chokda, Janhavi Dhore, "Automated Medicine Reminder", *International Journal of Advances in Science Engineering and Technology*, ISSN(p): 2321 –8991, ISSN(e): 2321 –9009 Volume-6, Issue-4, Oct.-2018, http://iraj.in.
3. K. Gomathi, P. Elamathi, V. Saravanan, P. Shanmuga Sundaram, "Patient Medicine Reminder System Using UTLP Kit", *International Journal of Innovative Research in Science, Engineering and Technology* Vol. 4, Special Issue 6, May 2015.
4. Nitesh P. Sonawane, Vijay D. Chaudhari, Dr. K. P. Rane, "Automatic medicine reminder with rtc interface through mobile & WhatsApp", international journal of innovative research in technology August 2016.
5. Priyadarshini. R, Ramya. S, Kalaiyarasi. S, Maithuna. S, Manivannan. L, "A Novel Approach of Microcontroller based Automatic Medication Reminder (AMR) System for Patients", *International Journal of Engineering Research & Technology* (IJERT)ISSN: 2278-0181, Vol. 4 Issue 04, june-2015.
6. AkshayPande, Rahul kumar, Vinay Yadav, prof. V N. Dhawas, "Med minder: A Medicine intake Scheduler and Reminder", *International journal of advance Engineering and Research development*, Vol.3, issue 5, May 2016.
7. Deepti Ameta, Kalpana Mudaliar and Palak Patel, "medication reminder and healthcare-an android application", *International Journal of Managing Public Sector Information and Communication Technologies* (IJMPICT) Vol. 6, No.2, June 2015.
8. Namrata Kataki, Abhishek Nath, Manasweta Das, "Portable Medicine Reminder and Automatic Monitoring System". *International Journal for Research in Engineering Application & Management* (IJREAM) ISSN: 2454-9150 Vol-04, Issue-03, June 2018.
9. Animesh Kumar Sahu, A. Jabeena, N. Sardar Basha, "Automatic Pill Reminder for Easy Supervision". *International Journal for Research in Engineering* November 2017, https://www.researchgate.net/publication/321325517.
10. Abhishek Dimri, DR Bindu Thakral, "Automatic Medicine and Health Admonisher Using Arduino" , *International Journal of Science, Engineering and Management* (IJSEM) Vol 5, Issue 6, June 2020.
11. Sanjay Bhati, Harshid Soni, Vijayrajsinh Zala, "Smart Medicine Reminder Box". IJSTE - *International Journal of Science Technology & Engineering* | Volume 3, Issue 10, April 2017.
12. Ni Ni San Hlaing, San San Naing, "Alarm System for Medicine Reminder Based on Microcontroller", *International Journal of Trend in Scientific Research and Development* (IJTSRD) Volume 3 Issue 5, August 2019 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470.
13. Waleed Humaid, Mohammad Mohtarma, "Automatic Medicine Remainder using Arduino", *International Research Journal of Engineering and Technology* (IRJET) Volume: 06 Issue: 11, Nov 2019 www.irjet.net .
14. P. Raga Lavima, G. SubhramanyaSarma, "an iot based intelligent medicine box", *International Journal of Computer Science and Mobile Computing* October 2015.
15. Huai-KueiWu, Member, Chi-Ming Wong, Pang-Hsing Liu, Sheng-Po Peng, Xun-Cong Wang, Chih-Hi Lin and Kuan-HuiTu, "A smart pill box with remind and consumption confirmation functions" 2015 IEEE 4th Global Conference on Consumer Electronics (GCCE).
16. Shivani Sharma, Katyani Tyagi, Pooja shish Odia, "Salburity- A Medicine Reminder Application using Android", *International Journal of Advance Research and Innovations in Technology*, volume 4, issue 2 2018.
17. MacLaughlin, Eric J., et al. "Assessing medication adherence in the elderly." *Drugs & aging* 22.3 (2005): 231-255.
18. G. Eason, B. Noble, and I.N. Sneddon Lewis, Kermit E., and Arthur S. Roberts Jr. "Automatic pill dispenser and method of administering medical pills." U.S. Patent No. 4,573,606. 4 Mar. 1986.
19. Shaw, Thomas J. "Automatic pill dispensing apparatus." U.S. Patent No. 5,609,268. 11 Mar. 1997.
20. MacLaughlin, Eric J., et al. "Assessing medication adherence in the elderly." *Drugs & aging* 22.3 (2005): 231-255. 2005): 231-255.