AUTOMATIC PILL DISPENSER MACHINE

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Abstract - Geriatrics rely on their medications to keep them healthy, but complex medication schedules can lead to mistakes like missing doses, taking incorrect amounts, or taking medicines at the wrong times. These mistakes could lead to unnecessary doctor or hospital visits, illness, and even death. Hence there is a need to design a Medication Dispensing Device that can help Geriatrics to take medication on schedule. This would prevent unplanned hospital or doctor visits related to incorrect medication use. This paper proposes a design of a smart device that dispenses medications on the prescribed schedule.

Keywords: Medication, Pill Dispenser, Embedded Technology, DHT 11, IR Sensor.

I.   INTRODUCTION

Today, 24x7 healthcare monitoring and supervisory facilities demand a great amount of money and human labour. Caring for the aged is a serious concern in developing countries. Family members are responsible for the care and management of the old. In the modern age, it is difficult for family members to be available all the time to support the aged. Today, in our society most families are nuclear. The Elderly would prefer to remain independent and their desire for independence is natural, but it is a worry for their children. Sometimes despite their best effort, the aged fail to remember to take their medication on time. The people getting busier these days tend to forget to take their medicines at the prescribed schedule. As a consequence of this Geriatrics are facing unnecessary disposure of themselves into the hospitals. Hence a device or a system is to be designed in such a way that it can dispense the pills at pre-set time. Since the target audience of the device are the Geriatrics, it must be user-friendly, handy, safe to use, and light in weight. To build a working prototype we made use of the famous Engineering Design Approach where we followed different steps to achieve different attributes. Before we begin with the actual implementation of the prototype. We listed down different attributes for the device. We took feedback from many patients and we found there is a huge need for this device in the medical field. We started working according to the feedback given by the patients and the attributes and finally we were successful in designing a smart pill dispenser device. This paper explains different steps to be followed to design the above said device using the Engineering Design approach. The reader is expected to have sound knowledge in Electronics behind stepper motors and different interfacing techniques with microcontrollers.

II.   LITERATURE REVIEW

Abdallah Kassem, et. al., (2019) provide a comprehensive approach for a Smart Medicine Dispenser (SMD) prototype. The main purpose of the proposed system is to help patients, mainly seniors, and elderly people, take their medications on time in an easy manner without the possibility of skipping pills and thus reducing the risk of accidental over/under dose treatment. An Android application is developed that is responsible for controlling the whole system as it constitutes a database awaited to be synchronised and on synchronisation the data is sent by the application that determines which motor should be rotated.

Nidhi Solanki, DR. P. H. Zope (July 2020) desiged a Smart Pill Box using GSM technology by which the system sends SMS alerts to the consumers or patients on their mobile phones like a reminder message. They used a pillbox system containing three separate small pillboxes. Each box has a led display placed on the box. For the pill system, the user can store up to three different types of pills, which can be stored in those three small separate boxes. Their main objective was to provide fast curing of patients by taking medicines on time in an appropriate dosage and in an efficient manner

Diaa Salama, Abdul Minaam. (2019) studied that consists of the conception, design and creation of a pillbox prototype intended to solve the deficiency in the medical area as it has the ability to sort out the pills by itself. The medication pill box is focused on patients who frequently take medications or vitamin supplements, or attendants who deal with the more seasoned or patients. It has 9 compartment boxes as the previous paper consists of three and it has alert remainder set through Android application. The pillbox will remind clients or patients to take pills utilising sound and light.

Ekbal Rosli and Yusnira Husaini. (2022) designed and developed a smart medicine box was designed and developed to help the introverted patients taking their medicines without the help of others. They developed a robot which replaces the nurses in the hospital which avoided emotional disturbance in between the nurses and the introverted patients. They used IOT technology to control the medicine box which used sensors and robotic programming to store the database and response would take place based on the data given by the patient or the nurse who attends the patients

Mohammed Asad Fasahate, (2020) presented a working model of an automatic pill reminder and dispenser setup that can alleviate irregularities in taking prescribed dosage of medicines at the right time dictated by the medical practitioner and switch from approaches predominantly dependent on human memory to automation with negligible supervision, thus relieving persons from error-prone tasks of giving wrong medicine at the wrong time in the wrong amount.

Jabeena, et. al., (2019) said that medicines play an important part in preventing illness, maintaining the health conditions, and also curing disease. It is a tedious task to distribute the medicine for the people in remote areas and also in case of minor accidents on highways there is a requirement of primary medications. In such cases, we require medicine dispensing machines. So in this paper, we have come up with a concept of IoT based automated medicine dispenser machine which is a computerised medicine storage system that ensures the supply of the medicine 24x7 hence it can also be named as Any Time Medicine (ATM) machine and also delivers the medicine in emergency conditions. In this IoT based automated medicine dispenser, we use a controller (Arduino mega) that controls the subsystems such as RFID reader, GSM module, Medicine dispenser, Inventor control, Wi-Fi module, and Servo motor. This project mainly focuses on delivering three types of OTC medication: Diabetes, Hypertension, and first aid kit. Finally, the paper concludes by describing the advantages, disadvantages, and future scope of the IoT based automated medicine dispenser.

K. K. and S. H. S.K., (2019) IoT is the progression of ultra-automation technology. The maintenance should be less and it performs at a very high immense level and it connects all devices by using the Internet. Its new and progressive elements bring ultra-changes in the dispatch of stocks, goods, and services, and the civil, economic, and political impact of those changes are unique identifiers with an ability to alteration of data without interaction of human to human, human to computer. This project works on helping people to take medicines in time without any human interaction. A Dispenser will deliver the medicines according to the schedule given by the cloud app or mobile appalling with these medicines we need to provide a glass of water for every consignment. An alert system which in place will give a person an alarm after dispensing medicine and water, then it will note down the timings when a person has consumed his or her medicine.

III.   METHODOLOGY

The automated pill dispenser facilitates the user to constantly monitor the health of the patient without the need to be physically present with the patient. Pill dispensers are items which release medication at specified times, to assist patients in adhering to their prescribed medication regime. In this paper, we used embedded technology. We used arduino uno as a microcontroller and as a sensor, we used IR sensor and DTH 11. The DTH 11 sensor will monitor the temperature and display it in LCD (shown in fig. 8). Size of the project is 1*1*2 feet vertically. We made one large cone shape of plastic material to drop medicine at a one place (Shown in fig.4).
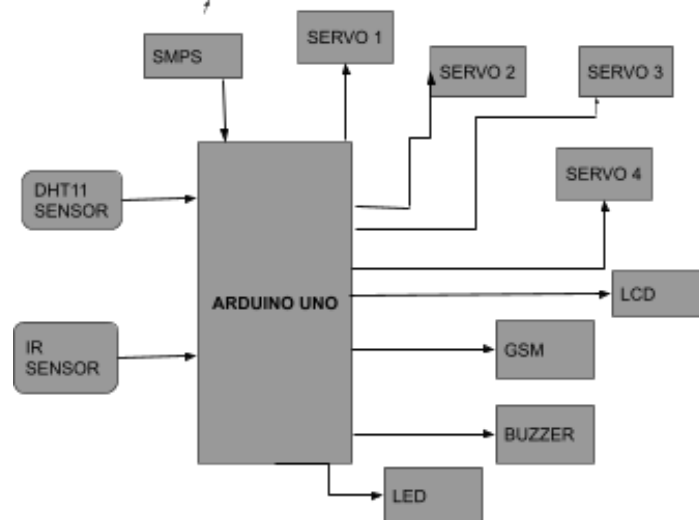

Fig 1. Block Diagram of Arduino UNO Connections

In this study we used Arduino UNO as a microcontroller. As an input device we used a DTH 11 sensor to the microcontroller. Then we used four Servo Motors name as SG 90 servo motors, LCD, GSM Module, LED, Buzzer as output device connecting to the microcontroller. As a display unit we used LCD to show all the notifications.

WORKING OF SYSTEM

The proposed system is invented to control the medication of the patient. Here we proposed 4 medicine prototypes. The hardware design includes components and modules that support this process. The Programming is done by using Arduino IDE. The paper is based on Embedded technology. The size of the paper is about 1*1*2 feet vertically. The working of the proposed system is very easy to understand. The DHT11 sensor is used to measure the temperature of the patient. After measuring the temperature of the patient it displays on the LCD. here displaying unit is LCD all the parameters are shown on the LCD. After each 30 Sec of time medicine needs to take by patients and it plays on the LCD. if patients do not take medicine then an SMS will be sent to the number of parents by using GSM (Shown in fig.9). The medicine times come in an alert by the Glowing LED and by beeping the buzzer. so can easily understand. After displaying on LCD the dispenser dispenses the medicine using servo motor the PVC pipe gets open and dispense the medicine. 1 large cone shape of plastic to drop medicine in one place. One IR sensor at the gate of cone end. So if medicine is not taken by patients in 30 seconds then GSM Module will send the message to family member.
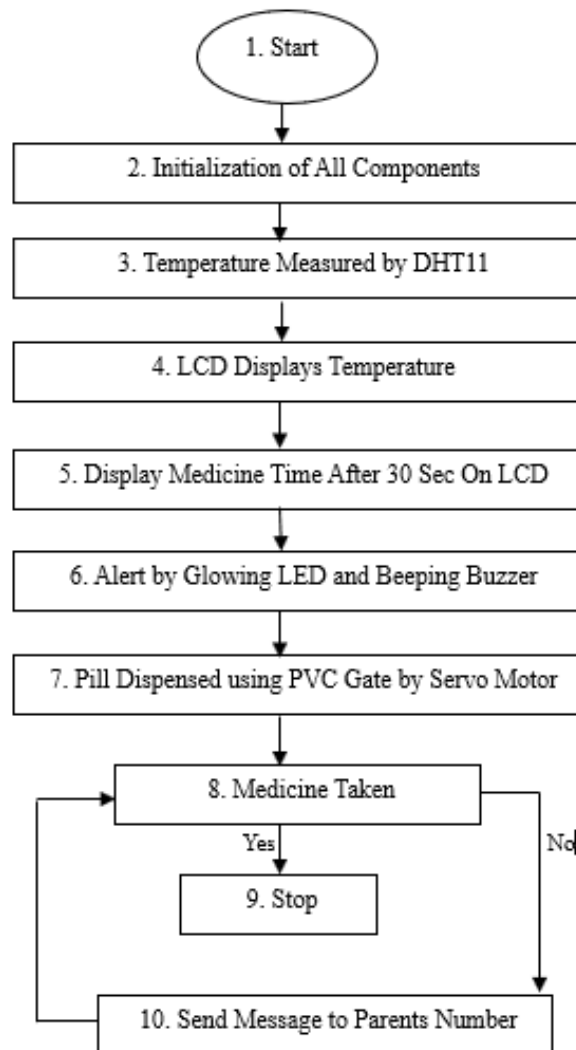

Fig 2. Process Flow Chart

IV. SOFTWARE

1.   Arduino IDE :-

The Arduino IDE is a software application used for programming Arduino boards, which are open-source hardware platforms for creating interactive electronic projects. It provides a user-friendly interface for writing, compiling, and uploading code to Arduino boards. The IDE supports the Arduino programming language, offers features like syntax highlighting and code auto-completion, and includes a library of pre-built examples (shown in fig. 3). It simplifies the process of programming and prototyping with Arduino boards, making it accessible to users with varying levels of programming experience.
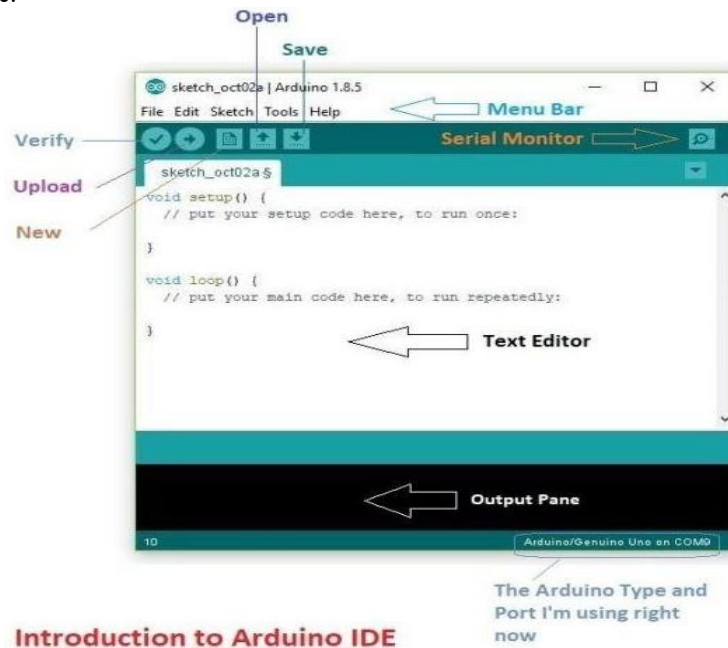

Fig 3. Arduino IDE Software Intro

2.   Proteus :-

Proteus is a software tool utilized for simulating and designing electronic circuits. It provides a virtual environment for users to create and test circuit designs before implementation. With a user-friendly interface, users can draw circuit diagrams, add components, and simulate circuit behaviour to identify and rectify any design issues. Proteus supports the simulation of microcontroller-based systems, enabling code writing and debugging. Additionally, it offers tools for PCB layout design and 3D visualization. Proteus plays a vital role in the research field by facilitating circuit prototyping and validation, enhancing efficiency and accuracy of electronic system development.

V. RESULT & DISCUSSION

Proposed System Automated Pill Dispenser hosts several functionalities which makes this device a helpful and reliable alternate solution to the existing medical assistants. We have taken several tests and solved every challenge. We have connected one SMPS for more power supply.

The Result output of the proposed system is 4 medicines will dispense from the pill dispenser after every 30 sec. The notification of the timing of each medicine is shown on the LCD (shown in fig.7). By using DHT 11 sensor we measure the temperature and are notified on the LCD (shown in fig.8).

If medicine is not taken on time it sends the message of "Medicine Not Taken" to the two numbers set in the system using GSM (Shown in fig.9). And the LED and buzzer show medicine time comes.

Fig 4. Front view of Pill dispenser Machine

Fig 5. Top View of pill dispenser machine

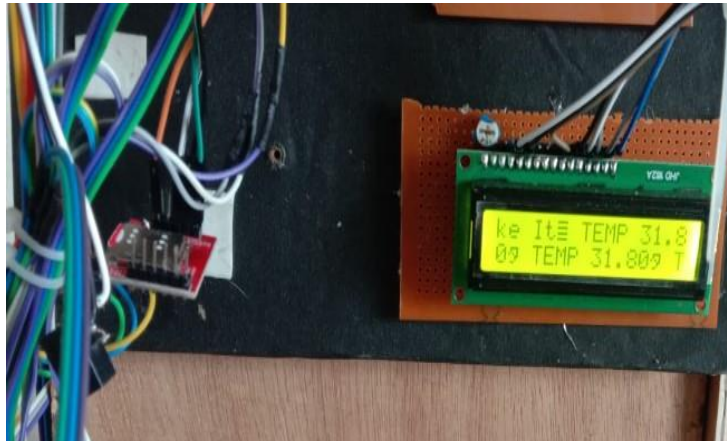**Fig 6. Side View of pill dispenser machine**

Fig 7. Shows the LCD Output Showing the Medicine Time

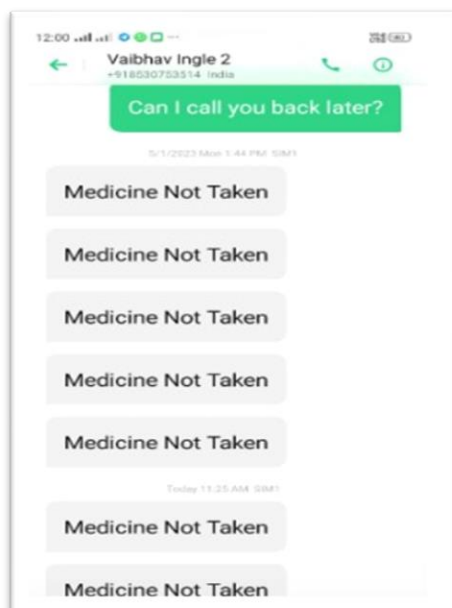**Fig 8. Shows the LCD Output Showing the Temperature**

Fig 9. Shows the Message on Number About Medicine

VI. CONCLUSION

A low-cost, useful model for an automatic pill reminder and dispenser system has been designed using simple electronic applications. So, the person in concern takes his pill in time in the right quantity without personalised supervision. The device also records the time and date of taking pills as a useful database for future medical consultation. Family members are alerted, if pills are not taken on time. This easy-to-use device can be a convenient option for households where family members have work-hour compulsions or are compelled to keep a mistress for the member with medical complications.

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