VISVESVARAYA TECHNOLOGICAL UNIVERSITY
Jnana Sangama, Belagavi – 590014

A MINI PROJECT REPORT

on

SMART MEDICINE BOX

Submitted in Partial Fulfillment of the Requirement for the sixth semester mini project

Submitted by

NASEEF

(2AB20EC005)

AMEER BIN MAHFOOZ
(2AB20EC003)

Under the guidance of
PROF. TASMIYA SHAIKH
Assistant Professor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
ANJUMAN INSTITUTE OF TECHNOLOGY AND MANAGEMENT
BHATKAL- 581320
2022-2023

ANJUMAN INSTITUTE OF TECHNOLOGY AND MANAGEMENT

[Recognized by AICTE, New Delhi, Affiliated to Visvesvaraya Technological University, Belagavi]

BHATKAL -581320, KARNATAKA

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Certificate

Certified that the project work entitled **"SMART MEDICINE BOX"** is a bonafide work carried out by **NASEEF,** with **USN: 2AB20EC005, AMEER BIN MAHFOOZ,** with **USN:2AB20EC003** in partial fulfilment for the sixth semester mini project, Electronics and Communications Engineering from the Visvesvaraya Technological University, Belagavi, during the year 2022-2023. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the said degree.

_____   _____

Prof. Tasmiya Shaikh   Dr.TMP Rajkumar

(Guide)   (HOD)

Name of the Examiner

1.
2.

DECLARATION

We, **NASEEF** (2AB20EC005) and **AMEER BIN MAHFOOZ** (2AB20EC003), students of 6th semester BE in Electronics and Communication Engineering, **Anjuman Institute of Technology and Management**, Bhatkal, hereby declare that the Mini project work report entitled "**SMART MEDICINE BOX** " submitted to the **Visvesvaraya Technological University** during the academic year 2022-23, is a record of an original work done by us under the guidance of **PROF. TASMIYA SHAIKH,** Assistant Professor, Department of Electronics and Communication Engineering, Anjuman Institute of Technology and Management, Bhatkal. This Mini project work is submitted in partial fulfillment of the requirements for the award of the degree of Bachelor of Engineering in Electronics and Communication Engineering. The results embodied in this thesis have not been submitted to any other University or Institute for the award of any degree.

Date: 18/07/2023   **NASEEF**

Place: AITM, Bhatkal   **AMEER BIN MAHFOOZ**

ACKNOWLEDGEMENT

We consider it as a privilege to articulate a few words of gratitude and respect to all those deserving individuals who guided us in completing this project work.

First & foremost, we would like to thank the **Almighty** without which there is nothing possible in the world.

Next, we extend our profound gratitude and our sincere thanks to our guide **Prof. Tasmiya Shaikh**, Assistant Professor, Department of Electronics and Communication Engineering, AITM, Bhatkal for her utmost attention to every detail and who was kind enough to extend 24x7 support throughout this project.

We are thankful to **Dr. T. M. P. Rajkumar**, Professor & HOD, Department of Electronics and Communication Engineering, AITM, Bhatkal for his immense support, valuable guidance and discussions throughout this project work.

We take this opportunity to thank **Dr. K. Fazlur Rahman,** Principal, AITM, Bhatkal for his encouragement towards academics.

We respectfully thank all the teaching and non-teaching staff of Electronics and Communication Engineering Department, AITM, Bhatkal, for their impartial guidance and support throughout our U.G course and our project work.

We would like to thank our family and friends for their unconditional love and constant support throughout our studies and every step of our lives, we owe all our achievements to them.

NASEEF

AMEER BIN MAHFOOZ

ABSTRACT

Health related problems are becoming the major issue in today's world, every other person seems to be undergoing more than one problem irrespective of the age, either that problem be related to heart or brain. Forgetting things has become the most common human error nowadays and such carelessness seen in the case of taking medicines might lead to results which are catastrophic and has direct impact onto the health of an individual. Many medical errors are due to the fact that people in charge of patient or elder's medication have to deal with sorting huge amounts of pills each day.

This paper consists of the design, methodology and implementation of a smart medicine box prototype intended to solve this problem in the medical area. This medication pill box is focused on patients who frequently take medications or vitamin supplements, or attendants who deal with the more seasoned or patients.

Our smart pill box is programmable that enables medical caretakers or clients to determine the pill amount and timing to take pills, and the service times for every day. 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 Bright light in certain 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.

CONTENTS

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Medication adherence is a growing concern throughout the healthcare industry with doctors, healthcare systems, and other stakeholders (insurance companies) since the elderly or senior patients' medication has a big issue of drugs misuse. It is very likely for them to forget to take their pills on time. Especially, those who take multiple medications at the same time. Also, they might take wrong dosage accidentally which may lead to unfortunate consequences such as death. This is a clear proof that it is a widespread problem and clearly related to adverse patient outcomes and higher healthcare costs.

In addition, a study has been done by group of professors at University of Washington about medication adherence in three home healthcare agencies on one hundred forty-seven older participants taking three or more medications, which resulted in 30.6% participants were under adherent and 18.4% participants were over adherent with at least one medication.

The main purpose of smart medicine box system is to help the patients, primarily seniors, take their medications on time in an easy way without the possibility of missing pills. It can also reduce the risk of over or under dosing accidentally. The smart medicine box could solve such problems by informing and alerting the patients to take the appropriate dose at the right time.

In day-to-day life most of the people need to take medicines which was not there in past couple of years and the reason behind this is diseases are increasing in large amount. So sooner or later many people come in contact with these diseases. Some diseases are temporary diseases while many are permanent life-threatening diseases.

CHAPTER 2

LITERATURE REVIEW

The important step in project development system is literature survey, where the concentration is on existing system's methodology to determine the reliability factor and accessibility. By using some of the components and technology of existing system, we propose a system that can be useful for future purpose with ease of accessibility. Before developing the system, it necessary to take all literature survey into consideration before performing further future work. The following are some of the references for the existing system.

1. Sanjay Bhati, Harshid Soni in 2017, in their paper "Smart Medicine Reminder Box" proposed to make a Smart medicine box for those users who regularly take medicines and the prescription of their medicine is very long as it is hard to remember to patients and also for their care giver. Old age patients suffer from problems of forget to take pills on proper time which causes certain health issues for patients having Permanent diseases like diabetes, blood pressure, breathing problem, heart problems, cancer diseases etc. These problems in hospitals & people around us who have such kind of diseases and thus based on these two problems we made smart medicine box which solve these problems by Setting up timetable of prescribed medicines through push buttons as given in prescription.

2. D.S. Abdul Minaam, M. Abd-Elfattah in his paper "Smart drugs: Improving healthcare using Smart Pill Box for Medicine Reminder and Monitoring System" proposed that many medical errors are due to the fact that people in charge of patient or elder's medication have to deal with sorting huge amounts of pills each day. This medication pill box is focused on patients who frequently take medications or vitamin supplements, or attendants who deal with the more seasoned or patients. The warning of pills that should be taken will be shown by an android application which is held by the patient.

2.1   PROBLEM STATEMENT

- Many patients consume medicines as pills have taken an important role in fighting of the diseases. there has been an increase in the number of cases where patients have taken the wrong medication.

- By seeing these cases it is evident that the correct medication should be taken at the proper time. As people grow old the human body tends to malfunction and the number of pills the average person has to take when certain age is reached greatly increases.

- In a large setting like hospitals or old age homes, it becomes difficult to track the pill intake of all the patients and elderly people. Here the smart medicine box would serve to be useful.

2.2   OBJECTIVES

- To design and create a prototype which will enable the owner to track every pill to ingest in an easy and simple way requiring no training or complex learning from their side in order to operate the device.

- To remind the patients and elderly people in hospitals and old age home to take the correct medication at the correct time with the proper dosage.

- It is designed to reduce or prevent errors in hospitals and old age homes where the elderly patients take multiple medication based on their difficulties.

- To track the medicine intake. This can help patients and caregivers see how well they are doing and make adjustments to the medication.
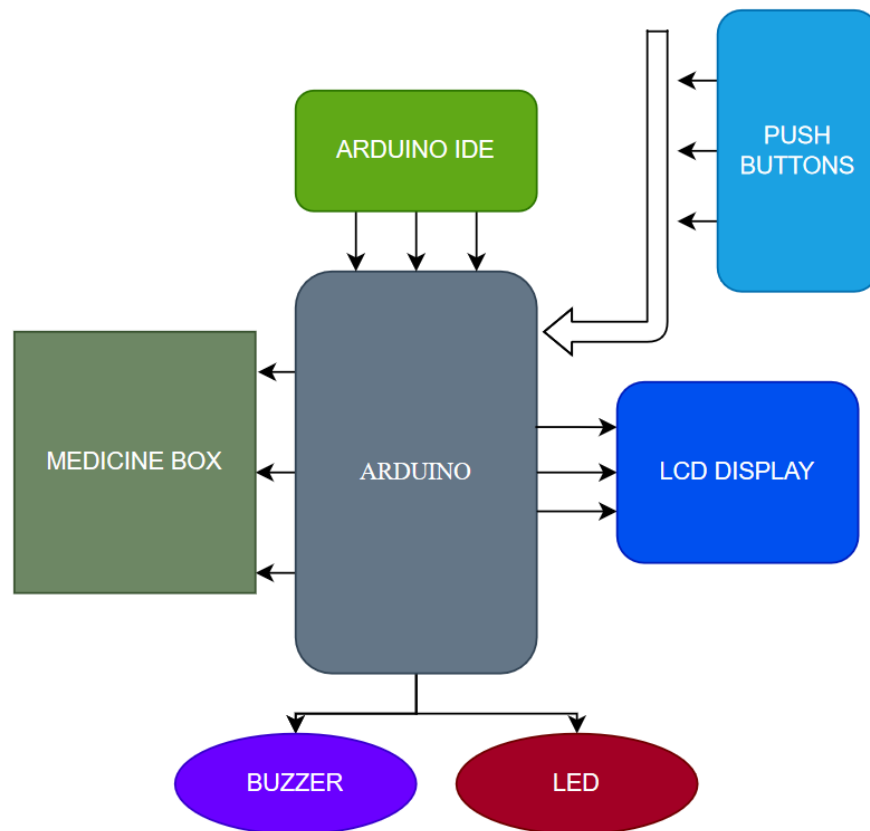
CHAPTER 3

METHODOLOGY

Fig 1. Block diagram of system

The working of a smart medicine reminder using Arduino is as follows:

1. The Arduino is connected to a real-time clock (RTC) module. The RTC module keeps track of the current time and date.

2. The Arduino is also connected to a display, such as a LCD screen. The display is used to show the user the current time and date, as well as any reminders that are set.

3. The Arduino is also connected to a buzzer or other alarm device. The alarm device is used to alert the user when it is time to take their medicine.

4. The user can set reminders for different times of day. The reminders can be for specific medicines or for general reminders, such as "Take 2 pills".

The smart medicine reminder can be programmed to remind the user to take their medicine at specific times of day. For example, the user could set a reminder to take their morning medicine at 7:00 AM, their afternoon medicine at 12:00 PM, and their evening medicine at 7:00 PM. The reminder can also be programmed to remind the user to take their medicine more frequently, such as every four hours.

The smart medicine reminder can be a valuable tool for people who have difficulty remembering to take their medicine. It can also be used by people who need to take multiple medications at different times of day. The smart medicine reminder can help to ensure that people take their medicine on time and as prescribed by their doctor.
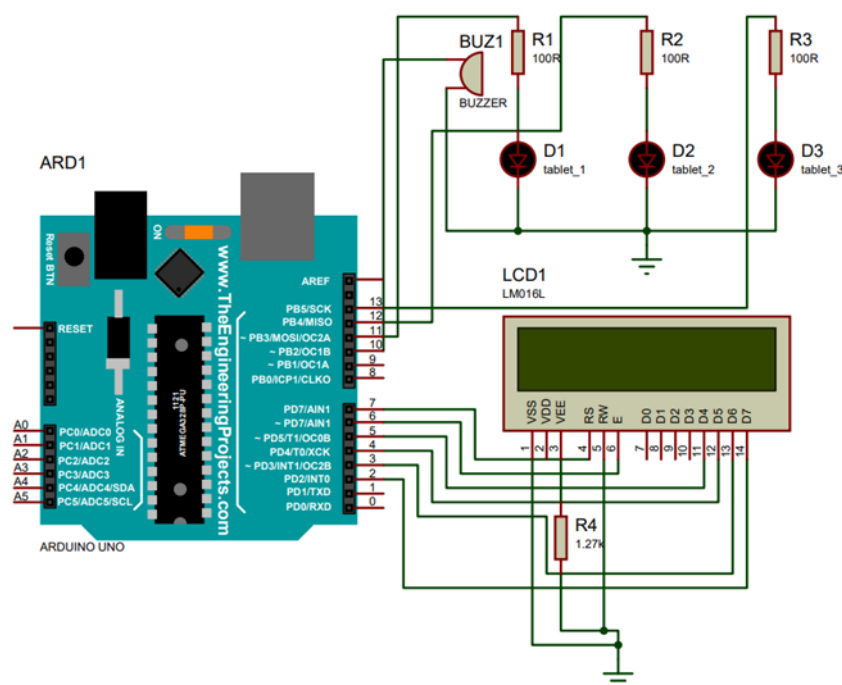

Fig 2. Circuit diagram of the project

3.1 COMPONENTS REQUIRED

3.1.1 ARDUINO UNO

Fig 3. Arduino Uno

The Arduino UNO is a standard board of Arduino. Here UNO means 'one' in Italian. It was named as UNO to label the first release of Arduino Software. It was also the first USB board released by Arduino.It is considered as the powerful board used in various projects. Arduino.cc developed the Arduino UNOboard. Arduino UNO is based on an ATmega328P microcontroller. It is easy to use compared to other boards, such as the Arduino Mega board, etc. The board consists of digital and analog Input/Output pins(I/O), shields, and other circuits.

The Arduino UNO includes 6 analog pin inputs, 14 digital pins, a USB connector, a power jack, and an ICSP (In-Circuit Serial Programming) header. It is programmed based on IDE, which stands for Integrated Development Environment. It can run on both online and offline platforms. Arduino UNO isa low-cost, flexible, and easy-to-use programmable open-source microcontroller board that can be integrated into a variety of electronic projects. This board can be interfaced with other Arduino boards, Arduino shields, Raspberry Pi boards and can control relays, LEDs, servos, and motors as an output.

3.1.2   REAL-TIME CLOCK(RTC)

Fig 4. RTC Module

A real-time clock (RTC) is an electronic device that measures the passage of time. It is most often in the form of an integrated circuit (IC). RTCs are used in a wide variety of devices, including computers, servers, embedded systems, and even some appliances.

The RTCs typically use a crystal oscillator to keep time. The crystal oscillator generates a signal with a very precise frequency, which is used by the RTC to keep track of the time. The crystal oscillator is usually calibrated to run at 32.768 kHz, which is the same frequency used in quartz clocks and watches.

RTCs can be powered by the main power supply of the device they are in, or by a battery. This allows the RTC to keep time even when the device is turned off or in a low-power state.

RTCs are used for a variety of purposes, including:

- Keeping track of the current time
- Enabling features such as alarms and timers
- Logging events that occur over time
- Synchronizing devices with each other
- Providing timestamps for data

3.1.3   LCD SCREEN DISPLAY

Fig 5. LCD screen

An electronic device that is used to display data and the message is known as LCD 16×2. As the name suggests, it includes 16 Columns & 2 Rows so it can display 32 characters (16×2=32) in total & every character will be made with 5×8 (40) Pixel Dots. So, the total pixels within this LCD can be calculated as 32 x 40 otherwise 1280 pixels.

Specifications of LCD 16x2

- The operating voltage of this display ranges from 4.7V to 5.3V
- The display bezel is 72 x 25mm
- The operating current is 1mA without a backlight
- PCB size of the module is 80L x 36W x 10H mm
- HD47780 controller
- LED color for backlight is green or blue
- Number of columns – 16
- Number of rows – 2
- Number of LCD pins – 16
- Characters – 32
- It works in 4-bit and 8-bit modes
- Pixel box of each character is 5×8 pixel
- Font size of character is 0.125Width x 0.200height

3.1.4   BUZZER

Fig 6. Buzzer

A buzzer is an audio signaling device that converts audio signals into sound signals. It is usually powered by DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.

There are two main types of buzzers:

- **Electromechanical buzzers:** These buzzers use a small electromagnet to vibrate a metal diaphragm, which produces the sound.
- **Piezoelectric buzzers:** These buzzers use a piezoelectric crystal to vibrate, which produces the sound.

Electromechanical buzzers are typically louder than piezoelectric buzzers, but they also consume more power. Piezoelectric buzzers are more compact and consume less power, but they are not as loud.

CHAPTER 4

IMPLEMENTATION

Fig 7. Implementation of the Project

The Smart Medicine Box involves the use of an Arduino Uno microcontroller, Real-time clock and a buzzer. The user would first need to create a medication schedule in the software. This schedule would include the name of the medication, the dosage, and the time of day that it needs to be taken. The software would then generate reminders based on the schedule. The reminders could be sent in a variety of ways, such as through a buzzer.

The hardware would be responsible for generating the reminders. This would be done by the RTC, which would keep track of the time. The buzzer would be used to generate an audible reminder, and the display could be used to show a visual reminder. The user would interact with the smart medicine reminder through the software. The user would create the medication schedule, and they would also be able to view the reminders and change the schedule as needed.

CHAPTER 5
RESULTS AND DISCUSSION

With the help of Arduino Uno and RTC module we were able to achieve the following

- We made a functional box for medicine storage which has multiple compartments which can be used for different medicines.

- An automatic alarm system which buzzes at the time of pill intake which can be programmed to give a sound alert once or keep buzzing until the patient turns it off.

- An LCD to display the number of pills to be taken and the name of the pills to be taken at the time of intake.

- The medicine storage containers are illuminated by the LEDs according to the prescription. The LEDs are programmed as per the prescription and can be changed accordingly.

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

Smart medicine reminders are a valuable tool for improving medication adherence. They can help people remember to take their medication on time, which can improve their health outcomes. Smart medicine reminders can also be used to track medication intake and send alerts if a dose is missed. This can help to prevent medication errors and ensure that people are taking their medication as prescribed.

The future of smart medicine reminders is bright. As technology continues to develop, smart medicine reminders will become more sophisticated and user-friendly. They will also be able to integrate with other health care devices, such as glucose monitors and blood pressure cuffs. This will allow smart medicine reminders to provide a more comprehensive view of a person's health and help them to manage their health more effectively.

Here are some of the potential future developments of smart medicine reminders:

- **Integration with other health care devices:** Smart medicine reminders could be integrated with other health care devices, such as glucose monitors and blood pressure cuffs. This would allow the reminders to provide a more comprehensive view of a person's health and help them to manage their health more effectively.
- **Remote monitoring:** Smart medicine reminders could be used to remotely monitor a person's medication intake. This would allow doctors and caregivers to track a person's medication adherence and intervene if necessary.

REFERENCES

1. D. Diaa Salama Abdul Minaam, Mohamed Abd-ELfattah, "Smart drugs: Improving healthcare using Smart Pill Box for Medicine Reminder and Monitoring System", Future Computing and Informatics Journal, Volume 3, Issue 2, 2018, Pages 443-456, ISSN 2314-7288,

2. Bhati, Sanjay, et al. "Smart medicine reminder box." *IJSTE-International Journal of Science Technology & Engineering* 3.10 (2017): 172-177.