POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

INNOVATION SMART AUTOMATIC MEDICINE REMINDER with IOT

MOHAMMAD SHAFIQRI

(08DEU19F2028)

JABATAN KEJURUTERAAN ELEKTRIK

SESI: 2 2021/2022

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This report submitted to the Electrical Engineering Department in fulfillment of the requirement for a Diploma in Electrical Engineering

JABATAN KEJURUTERAAN ELEKTRIK

SESI: 2 2021/2022

CONFIRMATION OF THE PROJECT

The project report titled “Smart Home Mailbox” has been submitted, reviewed and verified as a fulfills the conditions and requirements of the Project Writing as stipulated.

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Supervisor’s name :

Supervisor’s signature :

Date :

Verified by :

Project Coordinate name :

Signature of Coordinator :

Date :

“I acknowledge this work is my own work except the excerpts I have already explained to our source”

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DECLARATION OF ORIGINALITY AND OWNERSHIP

TITLE : INNOVATION SMART AUTOMATIC MEDICINE REMINDER with IOT

SESSION : SESI 2 2021/2022

1. I'm **NMOHAMMAD SHAFIQRI (IC NO: 001220-10-2127)** is a final year student of **Diploma in Electrical Engineering, Department of Electrical, Politeknik Sultan Salahuddin Abdul Aziz Shah,** which is located at **Persiaran Usahawan, 40150 Shah Alam, Selangor.**

2. I acknowledge that 'The Project above' and the intellectual property therein is the result of our original creation/creations without taking or impersonating any intellectual property from the other parties.

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Made and in truth that is recognized by.

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(Identification card No: 08DEU19F2028) MOHAMMAD SHAFIQRI

In front of me, PN. KHARUL AINA BINTI MAT DIN …….

As a project supervisor, on the date : PN. KHARUL AINA BINTI MAT DIN

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My thanks and appreciations also go to my classmates in developing the Project and people who have willingly helped me out with their abilities.

ABSTRACT

Our project's main aim is to make an INNOVATION SMART AUTOMATIC MEDICINE REMINDER with IOT 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 for their care giver. Also, 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. We saw these problems in hospitals & people around us who have such kind of diseases and thus based on these two problems we made innovation smart automatic medicine reminder with iot which solve these problems by Setting up timetable of prescribed medicines through push buttons as given in prescription. The 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. And our system has quality that it can sense if the patient had taken out pills from the box or not. Another advantage of our 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. Compare to other devices available in market are capable to generate sound at one time and afterwards it stops. Thus, result of our system provides fast curing of patient health by using our advantageous system.

ABSTRAK

Matlamat utama projek kami adalah untuk membuat INOVASI PERINGATAN PERUBATAN AUTOMATIK PINTAR dengan IOT bagi pengguna yang kerap mengambil ubat dan preskripsi ubat mereka adalah sangat panjang kerana sukar untuk diingati oleh pesakit dan pemberi penjagaan mereka. Juga, pesakit tua mengalami masalah lupa untuk mengambil pil pada masa yang betul yang menyebabkan masalah kesihatan tertentu bagi pesakit yang mempunyai penyakit Kekal seperti diabetes, tekanan darah, masalah pernafasan, masalah jantung, penyakit kanser dan lain-lain. Kami melihat masalah ini di hospital & orang ramai di sekeliling kita yang mempunyai jenis penyakit sedemikian dan dengan itu berdasarkan dua masalah ini kami membuat inovasi peringatan perubatan automatik pintar dengan iot yang dapat menyelesaikan masalah ini dengan Menetapkan jadual waktu ubat-ubatan yang ditetapkan melalui butang tekan seperti yang diberikan dalam preskripsi. Masa pemberitahuan akan disimpan dalam EEPROM. Oleh itu, pada masa mengambil sistem ubat menjana bunyi Pemberitahuan dan memaparkan cahaya terang dalam kotak pil tertentu. Jadi, pesakit boleh mengetahui bilangan kotak tertentu yang dia perlu mengambil ubat. Semua kotak pil telah dimuatkan dalam sistem yang perlu diambil oleh pesakit pada masa tertentu. Dan sistem kami mempunyai kualiti yang boleh dirasakan jika pesakit telah mengambil pil dari kotak atau tidak. Satu lagi kelebihan sistem kami termasuk keupayaan Penderiaan jika pesakit cuba menangguhkan masa pengambilan ubat dengan membuka dan menutup kotak ubat secara tiba-tiba untuk menghentikan bunyi. Bandingkan dengan peranti lain yang tersedia di pasaran mampu menjana bunyi pada satu masa dan selepas itu ia berhenti. Oleh itu, hasil sistem kami menyediakan penyembuhan cepat kesihatan pesakit dengan menggunakan sistem berfaedah kami.

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CHAPTER 1

INTRODUCTION

1.1 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. Medication management is medical treatment handled by medical therapist that aims to optimize therapeutic outcomes for patients. It is an important topic for treating the elderly who often take multiple medications simultaneously to treat different conditions and symptoms. Medications usually need to be taken in specific doses at set intervals. Missing doses or timing doses incorrectly can cause medical complications. Medication management can include everything from using devices that issue reminders to patients to take their medications to filling pill cases for patients and marking the lid of each compartment to indicate when the contents need to be taken. In this paper, we present a case study of medication reminder system that helps to alert patients who forget to take their medicines at prescribed time.

This medicine reminder is focused on patients who frequently take medications or vitamin supplements, or attendants who deal with the more seasoned or patients. Our Medicine reminder is programmable that enables medical caretakers or clients to remind to take pills, and the service times for every day. At the point when the pills time has been set, the medicine reminder will remind clients or patients to take pills utilizing sound, light, notification to the smart phone and vibration. The warning of pills should be taken will be shown by an android application which is held by the patient.

Contrasted and the conventional medicine reminder that requires clients or attendants to stack the crate each day or consistently. This shrewd medicine reminder would essentially discharge medical attendants or clients' weight on much of the time preloading pills for patients or clients and overlook the measurements which must be taken. The remarkable problem is that patients forget to take the proper medicines in proper proportion and in proper time.

Medication adherence, which refers to the degree or extent to which a patient takes the right medication at the right time according to a doctor's prescription, has recently emerged as a serious issue because many studies have reported that non-adherence may critically affect the patient, thereby raising medical costs. Medication nonadherence is a common, complex, and costly problem that contributes to poor treatment outcomes and consumes health care resources. There can be a lot of individuals out there who need constant help – may it be our elderly people, family members, the ones who have special needs. Elders are more affected by the timing of taking a certain drug than others, to prevent any dysfunction or illness timing is a must. But as with aging comes poor eyesight and poor memory, what if the patient has a dementia like Alzheimer.

Some people may forget to take the medicines at the correct time and can forget the medicines which they have to take. To eliminate the factors of always needed observation like nurses or taking a risk of a missed dose, we had to find an easy, portable, and efficient solution. Medicine reminder already exist but most of them are either has limited use, does not fit for elder ages, or even has a big size that makes it not suitable to take it with you anywhere. To make a useful medicine reminder it had to be easily integrated with the recent sweeping smart technologies. While at the same time it had be fit for the elders and their limited knowledge and experience to implement the ease of use. Size and portability were also an important fact that we had to keep in mind. For it to be called smart, its connected through a wireless network, which enables it to be connected to the internet for future applications and integration, also its distinguished by the wide range field communication, and erase the need for any wires or wired connection which enables portability in the first place.

Through that same network its connected to the mobile phone, which with it you can set the timing interval for the dose and notifies you by many ways when the dose time comes. Also, we added a buzzer with a LED to make a type of physical warning, so that it leaves you no choice but to remember the pill time and take it. The aim of this study is to build a Medicine Reminder. When the pill time has been set, the pillbox will remind clients or patients to take pills utilizing sound and light. The warning of pills should be taken will be shown by an android application which is held by the patient. Contrasted

and the conventional pill box that requires clients or attendants to stack the crate each day or consistently. This model can aid in help elders to take their medication.

1.2 Background Research

This research introduces an application whose objective is to remind the patients of their dosage timings through buzzer ringing system and smart phone so that they can stay fit and healthy. Through navigation they can search doctors and hospitals and contact details so that they can easily get proper treatment on time. This application focusses on the people who forget to take medicines on time. It allows users to set an alarm along with the fields of date, time and medicine description which will allow them to set alarm for multiple medicines at different time intervals.

The notification system will send a notification after setting an alarm. The user can activate or deactivate the notification accordingly. It will be sent message as selected by the user. The patients can search doctor disease wise and area wise which will provide easy searching facility along with doctor's contact information, visiting place and availability time. Medication reminders help in decreasing medication dispensing errors and wrong dosages. The application is designed on Blynk. It can be helpful in defense sector and emergency conditions (accidents) and can spread health care awareness. It is lifesaving, money saving and time saving application which is easy to use and provides a good user interface.

1.3 Problem Statement

At hospitals, there are many patients, and it is difficult to remind every patient to take medicine on time. The elderly when they come to senile, they were difficult on remember times they should take the medication. Most of sick people need something just like alarm to them so that they have encourage to be more alert on something. When it comes to our loved ones, we always want to stay them healthy and fit. But what will happen if they get ill and forget to take medicine on time.

1.4 Research Objectives

- To study the effectiveness of the Arduino application in this project.
- To design medicine reminder using Arduino and IOT.

- To develop a suitable function for elderly that easily use and easy to carry everywhere.

1.5 Scope of Research

This project is specially designed for the elderly between the ages of 65-90+ and people who always busy. It is also suitable for those with Alzheimer's problem. It can help remember the time to take medicine to the senile. There are those who are late in life are also encouraged to use this tool to help them be more alert. Besides, the category of patients involves all human beings-teachers, students, businessmen, housewives, children, and all of us have a busy hectic schedule. Today's life is full of responsibilities and stress. So, people are prone to diseases of different types, and it is our duty to make ourselves stay fit and healthy. If the patient stays at home, then he or she might get someone to look after him/her but when one is no at home, is out of the city or state away from home then it is hard for the family members to call them and remind them their dosage timings every time.

1.6 Project Significance

This project is very important to help the elderly nowadays who are less taken care of. With the structure of this project can help the elderly and people who has pack schedule to take medicine on time. Without this Smart Automatic Medicine Reminder with IoT, the elderly and people who has pack schedule may be neglected and unattended when they take medication. Without supervision by the young they will not take at the right time. Medication reminders serve as a good way to stay on track and uphold an appropriate schedule. Ensuring that you or your loved one is properly taking their medications can help avoid unnecessary risk and serious illness. Another option is that when set, can sound an alarm, or vibrate and through notification on smart phone to remind patients to take their medications. The purpose of medicines information for patients is to allow people to make informed decisions about whether a medicine is right for them and to maximum the best use of those medicines after the decision has been made to take them.

1.7 Chapter Summary

In this first chapter, I discussed the background research for the original idea for the start of this project in this first chapter. Then, Identified the issues that are currently

occurring. This also showed the project's objectives and deleted the scope of the study I acquired from the objective study. Finally, I came up with an important project.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

In this chapter is significance it will cover research of this project and information related the investigation. This part additionally will talk about research that comparative with this undertaking. A few articles and journals have been checked on furthermore, be references to this venture since it previously done to increase a few information. This section also is about anatomy research for developing this device.

2.2 LITERATURE REVIEW PAPER 1

2.2.1 SUBTOPIC TOPIC 1 LITERATURE REVIEW

Paper 1: Aisyah Rahimi Hamimi Zakri Azira Khalil Malaysian Journal of Science Health & Technology (2021)

https://www.mendeley.com/cat alogue/2cc8a6fd-5a78-3765- bc46-0202c4835322

- **Titles**: Development of Automatic Reminder System for Geriatric Medicine Intake.
- **Objectives**: Developed as an improved community element, acting as a system that can help geriatric in taking their medicine on time, thus, boosting their health condition.
- **Problem Statement**: Geriatrics often forget to take their medicine, and this problem can be overcome by using an automatic reminder system.

- **Methodology**: Arduino UNO as the microcontroller, with the notification system, Blink Application, a buzzer, and a light-emitting diode (LED) system. To make this reminder system more versatile, the buzzer will alarm during the medicine intake time, giving information to the elderly on which medicine to take. When the time has reached to take medication, the buzzer will produce a sound.

Sensor Used: Suppose the medicine box opens after the buzzer's sound and is detected by the passive infrared sensor (PIR sensor). In that case, the caretaker will receive a notification through the Blink application that the geriatric already took medicine. On the contrary, if the medicine box is not open after 3 minutes following the buzzer's sound, which indicates that the geriatric did not take their medicine, the system will not send a notification to their caretakers on the status. This prototype is tested on ten users for its accuracy and effectiveness. It is believed that this system can provide geriatrics more alert in taking their medicine on time, enhancing their health status.

2.2.2 SUBTOPIC LITERATURE REVIEW TOPIC 1

Paper 2: International Journal of Innovative Technology and Exploring Engineering (2019)

https://www.mendeley.com/catalogue/6a1fd506-df0a-3587-bbc7-a2f7bca90c67/

- **Titles**: GSM Controlled Automatic Medicine Remainder System
- **Objectives**: to take their pills through both sound what's more, visual alerts, showing the medicine timings, and showing the drug name. Develop more established, they depend more vigorously upon outside help for wellbeing evaluation and medicinal consideration. The present medicinal services foundation in later society is broadly viewed as lacking to address the issues of an undeniably more established populace.
- **Problem Statement**: Our parents and grandparents are often they forget to take their medications or take overdose of it, resulting in further health deterioration.
- **Methodology**: A mechanical methodology which makes a difference individuals age set up by ceaselessly giving medicinal information. The usage of Information and Communication Technologies in the drug stores in the course of the most recent

decades has involved the likelihood of utilizing robotized choice emotionally supportive networks creating cautions to push drug specialists to distinguish drug related issues while apportioning medicines [1]. The old and debilitated are regularly endorsed a few prescriptions each with shifting times, for example, measurements sums and times to be taken.

- **Sensor Used:** This system includes the DS1307 Real Time Clock RTC module, L298N motor driver. The Automated Medication Reminder System (AMRS) will altogether enhance the pill take care of by administering to five extraordinary prescriptions, cautioning the client when to take their pills through both sound what's more, visual alerts, showing the medicine timings, and showing the drug names.

2.2.2 SUBTOPIC LITERATURE REVIEW TOPIC 1

IJSTE - International Journal of Science Technology & Engineering | Volume 3 | Issue 10 | April 2017

Smart Medicine Reminder Box (ijste.org)

- **Titles**: Smart Medicine Reminder Box
- **Objectives**: Our project's main aim is 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 for their care giver.
- **Problem Statement**: 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. We saw these problems in hospitals & people around us who have such kind of diseases
- **Methodology:** Setting up timetable 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 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. And our system has quality that it can sense if the patient had taken out pills from the box or not

- **Sensor Used:** Another advantage of our 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.

2.3 LITERATURE REVIEW TOPIC 2

2.3.1 Research about Alzheimer's Disease.

Alzheimer's is the most widely recognized type of dementia, a general term for memory misfortune and other intellectual capacities sufficiently genuine to meddle with day-by-day life. Alzheimer's illness represents 60 to 80 percent of dementia cases. Alzheimer's isn't an ordinary piece of maturing. The best-known hazard factor is expanding age, and the dominant part of individuals with Alzheimer's are 65 and more seasoned. In any case, Alzheimer's isn't only an illness of seniority. Around 200,000 Americans younger than 65 have more youth-full beginning Alzheimer's infection (otherwise called early beginning Alzheimer's).

2.3.2 Research about Missed dose.

The build 'missed dose' is integral to numerous appraisals of medication adherence. Nonetheless, few examinations have explored how patients or clinicians conceptualize missed dosages or the degree of the concordance or harshness amongst clinicians and patients. Patients revealed a stricter meaning of missed measurements than did clinicians. Fifty-five percent of patients suspected that a pill-taking postponement of 6 h past the endorsed dosing time constituted a missed measurement, by correlation, just a single doctor concurred with this evaluation. More than 33% of patients believed that the best possible reaction to a missed dosage is skipped it through and through, yet just around 12% of clinicians concurred

2.4 CHAPTER SUMMARY

This section focusing on two different sections, which is one section is for gathers up all the information based on the journal which is "development of Automatic Reminder System for Geriatric Medicine Intake" about a review and about methodology of Arduino UNO as the microcontroller, with the notification system, Blink Application, a buzzer, and a light-emitting diode (LED) system. This section review both software and hardware of the project. Different components used in different journal help to differentiate which one is more suitable to use for projects. Besides, other section is for gathers up all the information based on the journal which is "GSM Controlled Automatic Medicine Remainder System" about a review and about to take their pills through both sound what's more, visual alerts, showing the medicine timings, and showing

the drug name. Lastly, other section is for gathers up all the information based on the journal which is “Smart Medicine Reminder Box” is about a review and about medication pill box that was focused on patients who frequently take medications or vitamin supplements, or attendants who deal with the more seasoned or patients. After that, the second section is research about Alzheimer’s disease to make sure that all the objectives for developing this device are relevant with fact about Automatic Medicine Reminder.

2.5 System Architecture

The suggested method attempts to improve the security of one specific link in the logistics chain. When crucial documents and shipments are delivered, the courier will typically ask for a signature. However, in order to do so, the recipient must wait at home, which can be inconvenient at times. The prototype allows the user to securely receive a document or shipment regardless of whether he is at home or not. The courier can only leave the shipment in the Smart Mailbox when the user has remotely opened it, and the user can only receive the shipment at a convenient time if the system has cleared him as a legitimate user.

2.6 Application Wireless Sensor ESP8266 For Smart Home Automation.

The current data is read by an ACS712 sensor, and the voltage data is read by a ZMPT101B transformer sensor. The ADC ADS1115 converts the analogue data to digital, which is subsequently read by the ESP8266. DHT 22 reads temperature and humidity data, which is then transferred directly to the ESP8266. ESP8266 uses the MQTT (Message Queuing Telemetry Transport) protocol to send the read data to the web server. On the Raspberry Pi web server, data will be updated on a regular basis.

2.7 Chapter Summary

The research approach chosen for this project was experimental testing because it is centred on product innovation. When this product is ready to be built, it will be put to the test in order to see how effective it is at solving the problem. Furthermore, this literature review aids in the development of a theoretical framework consisting of research concepts and hypotheses whose success can be evaluated, as well as providing information for research relevance and coherence.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Introduction

The procedures or strategies used to find, select, process, and analyze information about a topic are referred to as research methodology. The method is to meet the project's goal, which is to contribute to a perfect outcome. This chapter will go over the detailed explanations that are being used to complete and test this project. Some patients are so occupied with their day-to-day activities that they just forget to take their medications. This is particularly true for old patients who must take more than one medicine at more than one time in a day. Setting alarm clocks is a tedious task which patients are too lazy to set again and again. If asked about what time people must take their medicines, many forget to answer the correct times or remember whether they have already taken the medicine in the day already. Elderly people specially face this problem because of their degrading memory and in severe cases, forget that they have already taken their prescription and retake the same medicine 2 or 3 times in the same duration. This may not be harmful for lighter medicines, but for some strong and concentrated medicines, it can have further harmful effects to the body. This is exactly where our medicine reminder system can help.

3.2 Project Design and Overview

Schematic capture in the Proteus Design Suite is used for both the simulation of designs and as the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations. The PCB Layout module is automatically given connectivity information in the form of a netlist from the schematic capture module. It applies this information, together with the user specified design rules and various design automation tools, to assist with error free board design. PCB's of up to 16 copper layers can be produced with design size limited by product configuration.

3D Verification.

The 3D Viewer module allows the board under development to be viewed in 3D together with a semi-transparent height plane that represents the boards enclosure. STEP output can then be used to transfer to mechanical CAD software such as Solid works or Autodesk for accurate mounting and positioning of the board.

3.2.1 Block Diagram of the Project

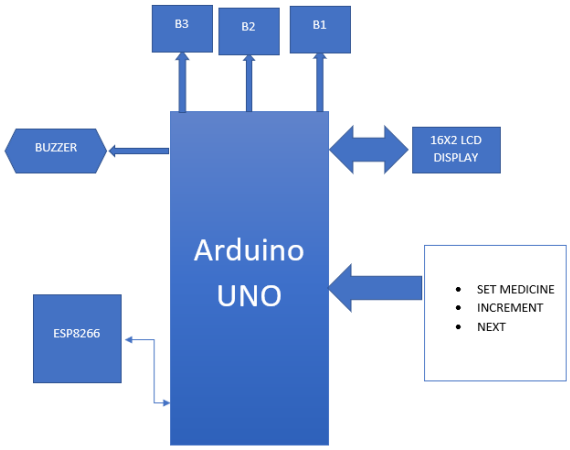

Figure 3.2.1: Block Diagram of the Project

3.2.2 Flowchart of the Project

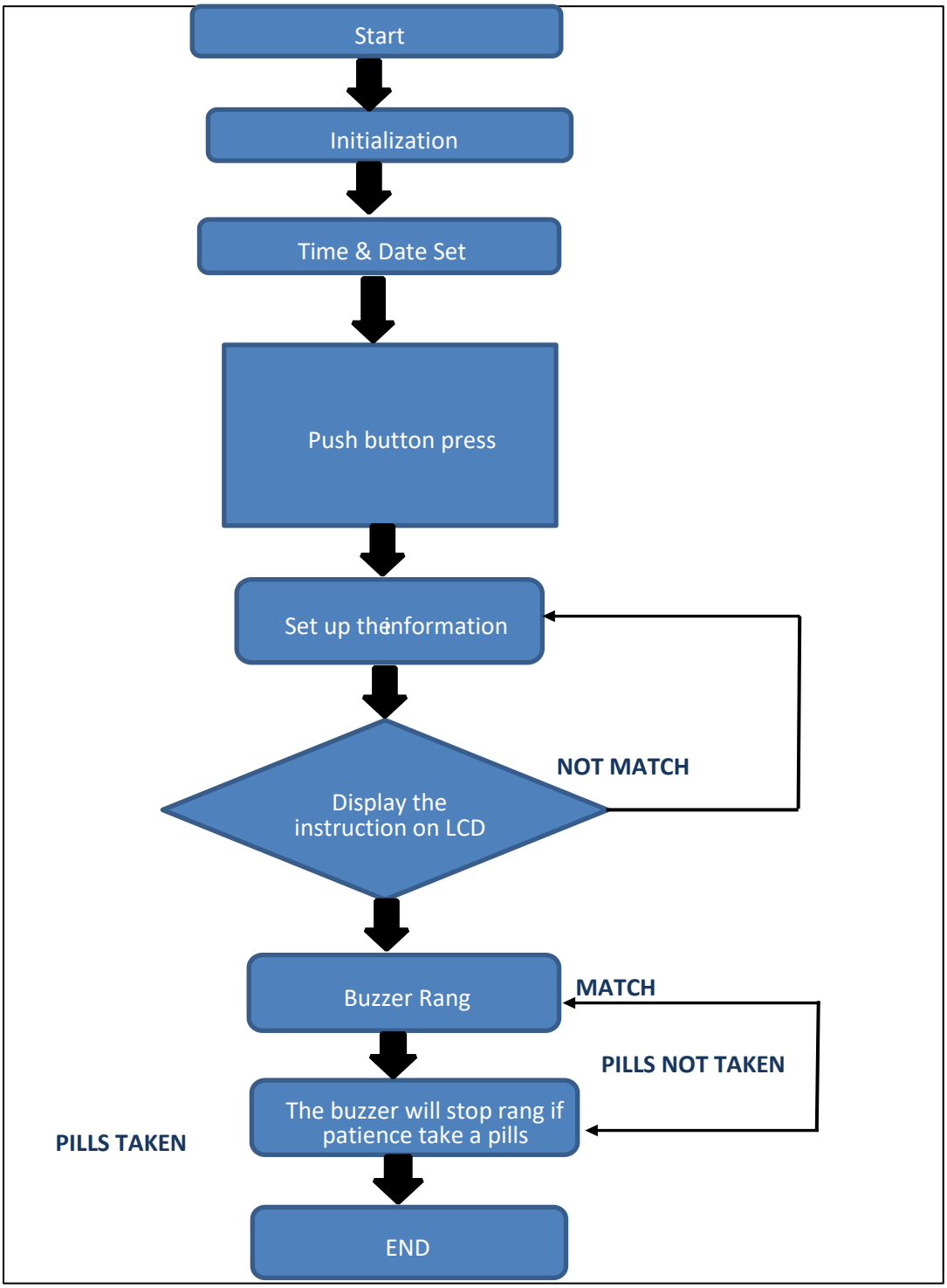

Figure 3.2.2: Flowchart of the Project

3.2.3 Project Description

For this project, as shown in flowchart when time & date are set through push buttons, devise will continuously compare the real time & set time. If the time is matched, LED will blink & buzzer will ring. It then senses the box is opened by the user or not. If box is opened, LED & buzzer stops and if it is not opened, LED will continuously blinks & buzzer will continuously ring.

3.3 Project Hardware

This section contains specifications of the hardware and components involved in the development of this project.

Hardware Specification:

- Arduino Uno
- 16 x 2 LCD
- ESP8266 Wi-Fi
- Buzzer

3.3.1 Schematic Circuit

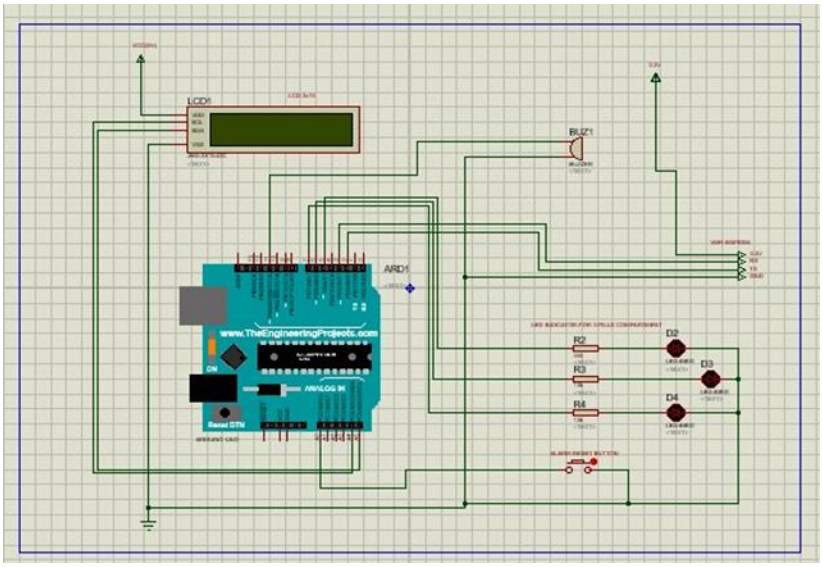

Figure 3.3.1: Schematic Circuit

3.3.2 Description of Main Component

This section contains details components involved in development of this project.

4.4.2.1 Atmega Based Microcontroller (Arduino Uno)

Figure 3.3.2.1: Arduino UNO

Arduino/Genuino Uno is a microcontroller board based on the Atmega328P. it has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller.

The Arduino Uno board can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non -USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and Vin pin headers of the POWER connector.

Input and Output. Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(),digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive 20 mA as recommended operating condition and has an internal pull-up resistor (disconnected by default) of 20-50k ohm. A maximum of 40mA is the value that must not be exceeded on any I/O pin to avoid permanent damage to the microcontroller.

3.3.2.2 16 X 2 LCD

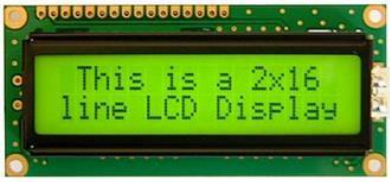

Figure 3.3.2.2: 16 X 2 LCD

Display The LCD screen is set to cycle in three screens. The 1st screen shows massage as “Stay Healthy, Get Well Soon”. The second screen is a help screen which tells to press select push button to select any one timeslot to remind (once/twice/thrice in a day). The time slot is changeable in program and can be configured accordingly. Right now, we have fixed this into three durations i.e., 7am, 3pm, and 7pm.

3.3.2.3 ESP8266 Wi-Fi Module

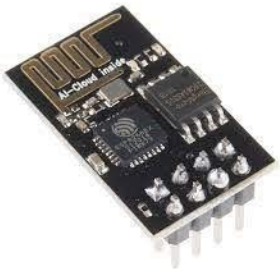

Figure 3.3.2.3: ESP8266 Wi-Fi Module

The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, that we can simply hook this up to your Arduino device and get about as much Wi-Fi-ability as a Wi-Fi Shield offers (and that’s just out of the box)! The ESP8266 module is an extremely cost-effective board with a huge, and ever growing, community.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its

GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions and requires no external RF parts.

Pin	Name	Description
1	TXD	1) UART_TXD, sending; 2) General Purpose Input/Output: GPIO1; 3) Pull-down is not allowed when startup;
2	GND	GND
3	CU_PD	1) Working at high level; 2) Power off when low level is supplied
4	GPIO2	1) It should be high level when power on, hardware pull-down is not allowed; 2) Pull-up by default;
5	GPIO16	External Reset signal, reset when low level is supplied; work when high level is supplied (high level by default);
6	GPIO0	1) WiFi Status indicator; 2) Operation mode selection: Pull-up: Flash Boot, operation mode Pull-down: UART Download, download mode
7	VCC	Power Supply(3.3V)
8	RXD	1) UART_RXD, Receiving 2) General Purpose Input/Output: GPIO3;

Figure 3.3.2.4: Function of every pin for ESP8266

3.3.2.4 Buzzer

Figure 3.3.2.4: Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train, and confirmation of user input such as a mouse click or keystroke.

Along with this a buzzer rings to alert the patient. LEDs are also used to indicate from which box the medicine is to be taken. They are placed near the boxes as indicators. After one event, the LCD displays the time for the next medicine and indicates from which box it is to be taken.

3.3.3 Circuit Operation

The Circuit diagram for this project is shown in the figure above, The SMART AUTOMATIC MEDICINE REMINDER with IOT is powered using 5V supply. When it first boots up, it shows a welcome massage as "Welcome to Circuit Digest". The LCD screen is set to cycle in three screens. The 1st screen shows massage as "Stay Healthy, Get Well Soon". The second screen is a help screen which tells to press select push button to select any one timeslot to remind (once/twice/thrice in a day). The time slot is changeable in program and can be configured accordingly. Right now, we have fixed this into three durations i.e., 7am, 3pm, and 7pm.

We have divided time slots into three modes. Mode 1 selects to take medicine once/day at 7am when user presses 1st push button. Mode 2 selects to take medicine twice/day at 7am and 7pm when user presses 2nd push button. Mode 3 selects to take medicine thrice/day at 7am, 3pm and 7pm if user presses 3rd push button.

We can also add a feature to snooze the buzzer for 10 minutes (not included in this project). When user selects desired slots by pressing push buttons, the user input is recorded, and the time is taken from ESP8266. When time is matched with selected time slot then the buzzer starts buzzing. User can stop the buzzer by pressing STOP button. The same process continues for the next slot reminder.

3.4 Project Software

These projects will use 3 development software:

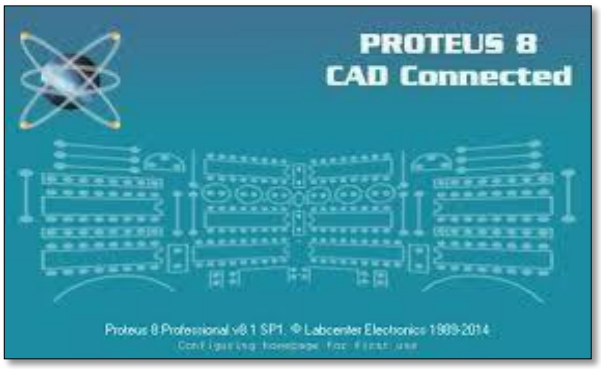

Figure 3.4.1.1: PROTEUS 8

Proteus 8

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

The Proteus Design Suite is a Windows application for schematic capture, simulation, and PCB layout design. It can be purchased in many configurations, depending on the size of designs being produced and the requirements for microcontroller simulation. All PCB Design products include an autoroute and basic mixed mode SPICE simulation capabilities.

Figure 3.4.1.2: Arduino IDE

Arduino IDE

The Arduino Integrated Development Environment – or Arduino Software (IDE) – is a software tools that can be used to develop structure code for the Arduino controller. It contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. Tinkercad is a free-of-charge, online 3D modeling program that runs in a web browser. Since it became available in 2011 it has become a popular platform for creating models for 3D printing as well as an entry-level introduction to constructive solid geometry in schools.

Figure 3.4.1.3: TINKERCAD SOFTWARE

TINKERCAD SOFTWARE

Tinkercad is a free-of-charge, online 3D modeling program that runs in a web browser. Since it became available in 2011 it has become a popular platform for creating models for 3D printing as well as an entry-level introduction to constructive solid geometry in schools.

3.4.2 Flowchart of the System

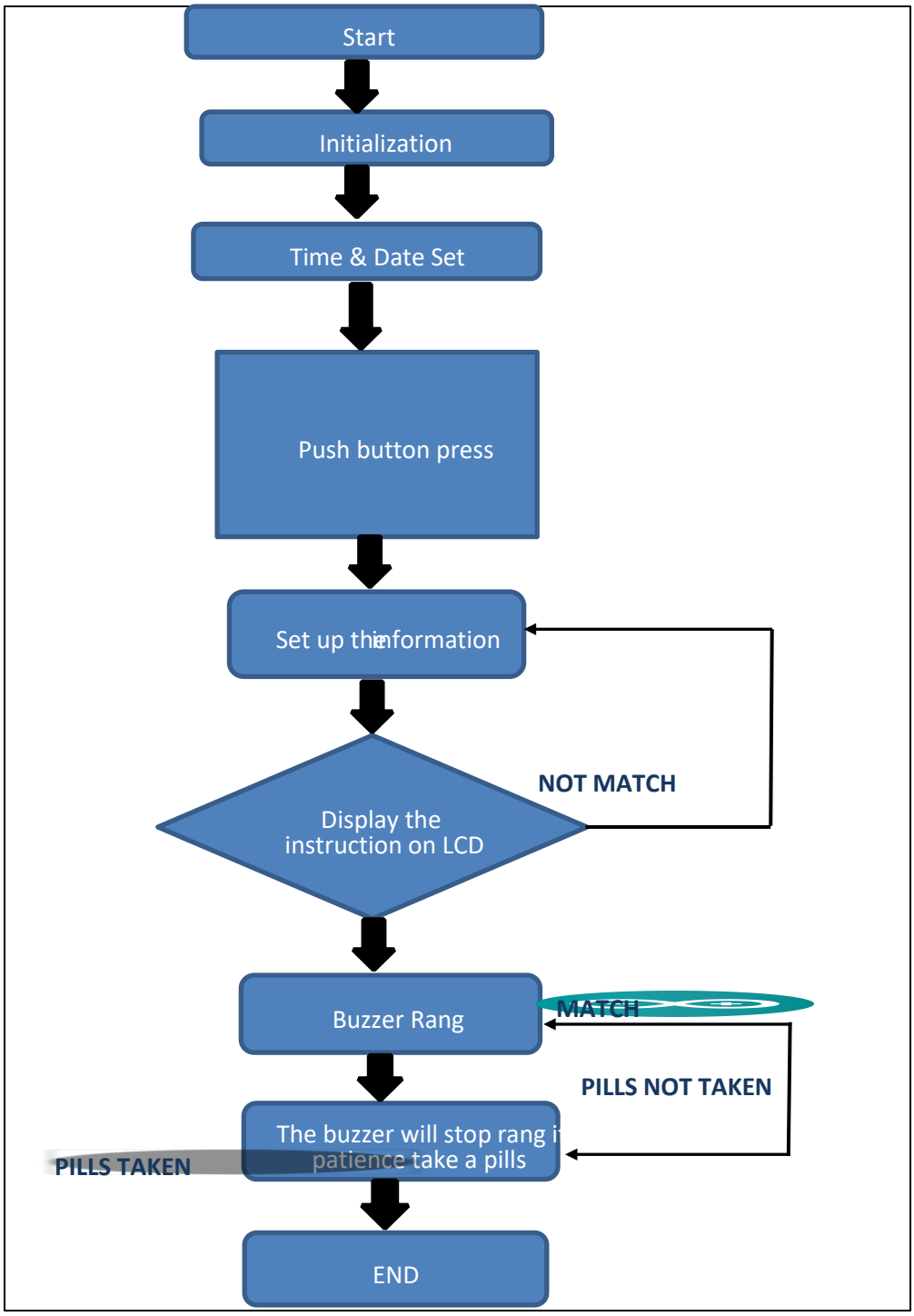

Figure 3.4.2: Flowchart of The System

3.4.3 Description of Flowchart

As shown in flowchart when time & date are set through push buttons, devise will continuously compare the real time & set time. If the time is matched, LED will blink & buzzer will ring. It then senses the box is opened by the user or not. If box is opened, LED & buzzer stops and if it is not opened, LED will continuously blinks & buzzer will continuously ring.

3.5 Prototype Development

The design of my project is the size should be suitable to be placed in the place that has been targeted.

3.5.1 Mechanical Design/Product Layout

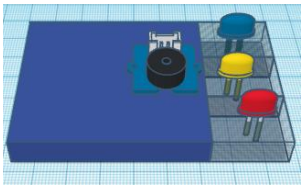

Figure 3.5.1: Mechanical Design/Product Layout

3.6 Sustainability Element in the design Concept

The design concept of my project has been designed using Tinkercad. This is suitable for an array of modern-day deliveries.

3.7 Chapter Summary

In this chapter of research methodology, each project will adopt a particular technique to ensure that it is successful and runs smoothly. The research format, project completion techniques, and relevant project components have all been described in this chapter. The components are chosen based on their cost and function. It also gives an overview of the process and explains the definitions and criteria that were employed. This section also includes an overview of schematic circuits and hardware projects, as well as the components that were used.

CHAPTER 4

PROJECT MANAGEMENT AND COSTING

4.1 Introduction

Project and Cost Management is an important component since it outlines and illustrates the management decisions made throughout the project's execution and presentation using a Gantt Chart. This is incredibly important since we can easily see how far we've come in completing this project, from planning and gathering information to the project being completed on time. In addition, the cost of expenditure is described in order to see how much money was spent on the project. We can view the cost of each purchased component and estimate the project's budget.

4.2 Gant Chart and Activities of the Project

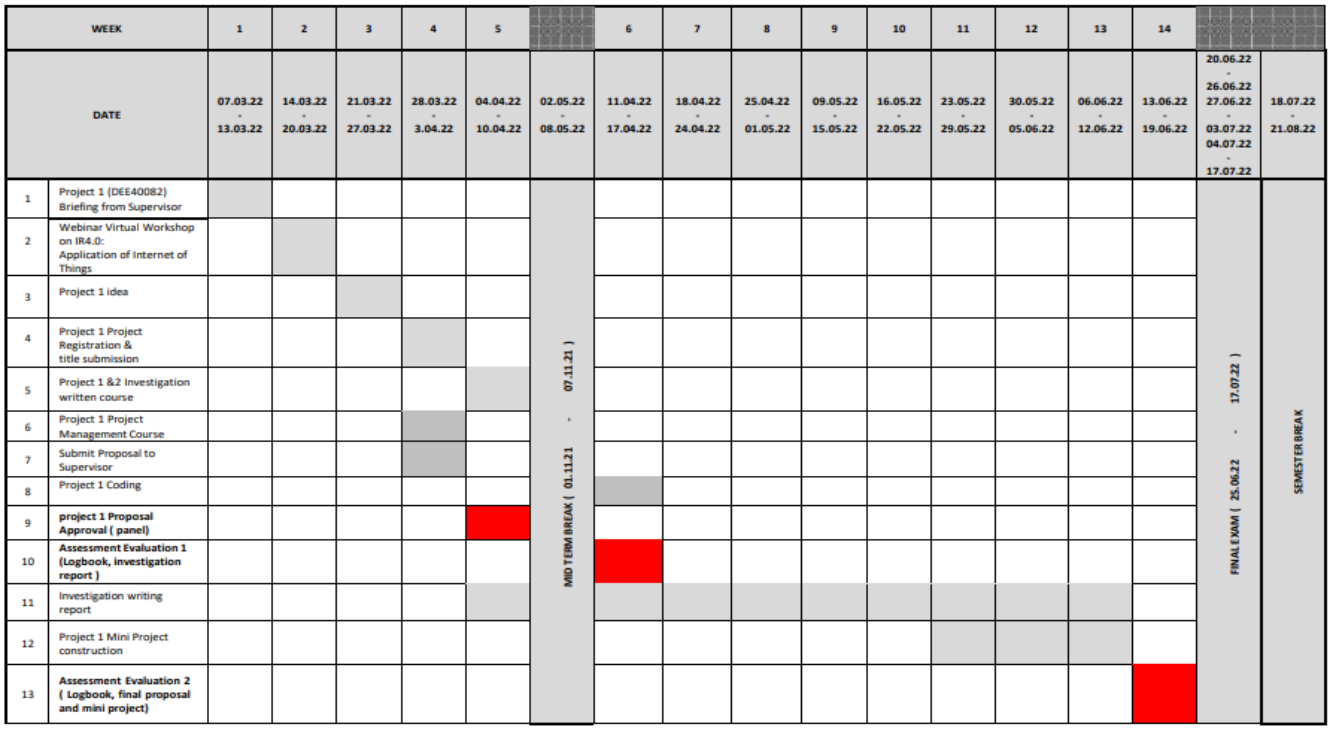

Figure 4.2: Gant Chart and Activities of the Project

4.3 Costing and Budgeting

The cost of procuring components and materials for this project will be incurred during its implementation. Hardware Arduino UNO,16 X 2 LCD, ESP 8266 Wi-Fi, Buzzer , and other materials are cost-involved components.

LIST OF COMPONENTS

No	Component Description	Quantity	Price/Unit	Total Price
1	Arduino UNO R3	1	RM 109.00	RM 109.00
2	Wi-Fi ESP8266	1	RM 37.72	RM 32.72
3	Casing box	1	RM 40.00	RM 40.00
4	Male to female wire jumper	1	RM 4.29	RM 4.29
5	Female to female jumper wire	1	RM 4.29	RM 4.29
6	USB Cable	1	RM 5.00	RM 5.00
7	16 x 2 LCD	1	RM 9.45	RM 9.45
8	BUZZER	1	RM 3.90	RM 3.90
			Total:	RM 213.65
	List of other costing			
1	Postage			-
2	Craft work			-
3	Internet		RM30	RM 30
4	Application			-
			Total:	RM 30
			Overall Total	RM 243.65

Table 4.0: Costing and Budgeting

4.4 Chapter Summary

In this chapter, I've detailed and illustrated a Gant Chart that depicted the progress of my project from the start to completion. The cost of expenses that I used to purchase components and items for this project is then described. We may view the pricing of each component as well as the project's other costs in detail.

CHAPTER 5

RESULT AND DISCUSSION

5.1 Introduction

Many Medication Reminder Systems have been developed on different platforms. Many of these systems require special hardware devices to remind the patients about the medicine in-take timings. Purchasing new hardware devices becomes costly and more time and money

consuming. So, in the given work an attempt has been made to implement a system which is economical, easily accessible and improves medication adherence. Medication non-adherence reduces the effectiveness of a treatment and imposes a financial burden on health care systems. The patients will get the schedule of medicine in-take time with medicine description, starting and ending date of medicine, notification through message or email, automatic alarm ringing system and navigation system. The scheduled reminder will not suggest any kind of medicine which is not prescribed by the doctor that will assure the safety of the patient and will avoid wrong dosages. Most people require medicines in their daily lives that were not available a few years ago, and the reason for this is that This means that the number of diseases is increasing. So sooner or later, many people come into contact with these diseases. Some Diseases are temporary diseases, while many are permanent life-threatening diseases. Life-threatening diseases get mixed in with the human body in such a way that they can never leave, and they grow at a rapid rate. Human life expectancy has decreased. Because of such diseases, we need to take medicines regularly and in large amounts to overcome them or live a better life. We must follow the advice of a doctor who instructs us on how to take desired pills in the desired manner so that patients do not experience problems such as forgetting them pills to take at the appropriate time, and when the doctor changes the medication prescription, patients must remember the new schedule of medicine. This problem of forgetting to take pills at the right time, taking wrong medicines, and accidentally taking expired pills. Medicine causes health problems in patients, which leads to an unhealthy lifestyle. Our project is to make an ESP8266-based smart medicine box, which uses a real-time clock. Our project's new and anticipated feature is that our system is intelligent enough that the patient has taken medicine or not, and thus the patient can’t postpone the time at which he needs to take pills. It is mandatory for the patient to take pills from the box at the right time; otherwise, our systems continue to make a loud sound until the medicine is taken out from the box. This notification feature extends the patient's life, so it is not available in any device, which is the case necessity for present days.

5.2 CONLUSION

Based on our product, we assume that the device helps in keeping track of regular medical activities and reduces manual supervision and human effort. With simple circuitry and effort, the

simple and inexpensive device is a boon for the young and the elderly, providing a simple solution for mothers caring for their adolescents and caregivers caring for the elderly and suffering. It can find use in every household or hospital that has a medical supervision issue and can be marketed to us as a cost-effective solution. The goal of our project is to provide a healthy and tension-free life to those users who are taking pills regularly and to provide this product at an affordable cost as well. Our project is also reusable by exchanging those other medicine boxes that have only an alerting system and are non-usable or unaffordable compared to our product days. The proposed model is easy to use and easily installed by the user. With this model anyone can guide the patient to take their medicine at the right time. We consider the system to be an effective part of remote medical care. It provides the possibility for distant supervision of patent medication. It also allowed to alert the supervisor or other persons that have access to the mobile app, which is part of the system. Therefore, the supervisor person does not need to be in close contact with the patient, that is they and the patient can be in different rooms.

5.3 RECOMMEDATION

If there are some elders in the home that need medication, the supervision can be done by adding a GSM module with a Bluetooth module to get alert messages directly to the respective mobile. With this model, the system can be used by the elderly people who are living alone. This model has the capacity to store one day's worth of all tablets and timings. It notifies the patient about the medication details when the time comes. He/she can just take the medicine according to the LCD display. This model can upgrade the Bluetooth connection to enable the user to get the details directly to their phone in addition to the LCD display. During system testing, patients were observed to be able to use three or four medications. Given that the user for patient. For instance, when the use of a microcontroller became limited because its capacity was three or four medications. Such situations could be avoided by inserting memory and changing the code on the microcontroller. This would entail creating a model of the code and memory that contains the information that could be transferred from one patient to another multi-patient.

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GSM Controlled Automatic Medicine Remainder System

6 APPENDICES

APPENDIX A – PROGRAMMING

```
#include <LiquidCrystal.h>

#include <ErriezDS1302.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27, 2, 1, 0, 4, 5, 6, 7, 3, POSITIVE);  // Set the LCD I2C address
//LiquidCrystal_I2C lcd(0x3F, 2, 1, 0, 4, 5, 6, 7, 3, POSITIVE);  // Set the LCD I2C address


#define SW1 A0
#define SW2 A1
#define SW3 A2
#define SW4 A3
#define SWM 8
#define Buzz 12
#define led1 13


// Connect DS1302 data pin to Arduino DIGITAL pin
#if defined(ARDUINO_ARCH_AVR)
#define DS1302_CLK_PIN      2
#define DS1302_IO_PIN       3
#define DS1302_CE_PIN       10
#elif defined(ARDUINO_ARCH_ESP8266)
// Swap D2 and D4 pins for the ESP8266, because pin D2 is high during a
// power-on / MCU reset / and flashing. This corrupts RTC registers.
#define DS1302_CLK_PIN      D4 // Pin is high during power-on / reset / flashing
#define DS1302_IO_PIN       D3
#define DS1302_CE_PIN       D2
#elif defined(ARDUINO_ARCH_ESP32)
#define DS1302_CLK_PIN      0
#define DS1302_IO_PIN       4
#define DS1302_CE_PIN       5
#else
#error #error "May work, but not tested on this target"
#endif
```

```
int MainMode=0;
int hr1=8;
int mn1=0;
int hr2=14;
int mn2=0;
int hr3=20;
int mn3=0;
int mode=0;
int hr=0;
int Alm1=0;
int Alm2=0;
int Alm3=0;
int minx=0;
int secx=0;
String Time="00:00:00";
String Date="24/06/2021";
String Timex="";
String Datex="";

int Disp=0;

// Create DS1302 RTC object
ErriezDS1302 rtc = ErriezDS1302(DS1302_CLK_PIN, DS1302_IO_PIN, DS1302_CE_PIN);

// Global date/time object
struct tm dt;

  //---------------------------------------------------------------

void rtcInit()
{
    // Initialize RTC
    while (!rtc.begin()) {
        Serial.println(F("RTC not found"));
        delay(3000);
    }

    // Enable RTC clock
    rtc.clockEnable(true);
}

bool getBuildTime(const char *str)
{
    int hour;
    int minute;
```

```
    int second;

    // Convert build time macro to time
    if (sscanf(str, "%d:%d:%d", &hour, &minute, &second) != 3) {
        return false;
    }

    dt.tm_hour = hour;
    dt.tm_min = minute;
    dt.tm_sec = second;



    return true;
}

bool getBuildDate(const char *str)
{
    const char *monthName[] = {
        "Jan", "Feb", "Mar", "Apr", "May", "Jun",
        "Jul", "Aug", "Sep", "Oct", "Nov", "Dec"
    };
    uint8_t monthIndex;
    char month[12];
    int dayMonth;
    int year;
    time_t t;

    // Convert build time macro to date
    if (sscanf(str, "%s %d %d", month, &dayMonth, &year) != 3) {
        return false;
    }

    // Convert month string to month number
    for (monthIndex = 0; monthIndex < 12; monthIndex++) {
        if (strcmp(month, monthName[monthIndex]) == 0) {
            break;
        }
    }
    if (monthIndex >= 12) {
        // Not found
        return false;
    }

    // Set date
    dt.tm_mday = dayMonth;
```

```
    dt.tm_mon = monthIndex;
    dt.tm_year = year - 1900;

    // Calculate day of the week
    t = mktime(&dt);
    dt.tm_wday = localtime(&t)->tm_wday;



    return true;
}

bool rtcSetDateTime()
{
    // Convert compile date/time to date/time string
    if (!getBuildDate(__DATE__) || !getBuildTime(__TIME__)) {
        Serial.print(F("Build date/time error"));
        return false;
    }

    // Print build date/time
    Serial.print(F("Build date time: "));
    Serial.println(asctime(&dt));

    // Set new date time
    Serial.print(F("Set RTC date time..."));
    if (!rtc.write(&dt)) {
        Serial.println(F("FAILED"));
    } else {
        Serial.println(F("OK"));
    }

    return true;
}
//Set serial baud rate
void setup() {
 // delay(10000);
  // initialize serial:
 pinMode(led1,OUTPUT);

pinMode(Buzz,OUTPUT);
pinMode(SW1,INPUT);
pinMode(SW2,INPUT);
pinMode(SW3,INPUT);
pinMode(SW4,INPUT);
pinMode(SWM,INPUT);
```

```
digitalWrite(SW1,HIGH);
digitalWrite(SW2,HIGH);
digitalWrite(SW3,HIGH);
digitalWrite(SW4,HIGH);
digitalWrite(SWM,HIGH);



  Serial.begin(9600);
lcd.begin(16, 2);
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Initializing..");
  lcd.setCursor(0, 1);
  lcd.print("pls wait");
  delay(2500);


  // reserve 200 bytes for the inputString:
 lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("   WELCOME");
  delay(2500);
  rtcInit();

    // Set date/time
   /*
    if (!rtcSetDateTime()) {
        // Could not parse build date/time to program RTC
        while (1) {
            delay(1000);
        }
    }

  */

}

void loop() {

   if (!rtc.read(&dt)) {
        Serial.println(F("RTC read failed"));
    } else {
        //Serial.println(asctime(&dt));
    }
    Timex=String(dt.tm_hour) + ":" + String(dt.tm_min)+":"+String(dt.tm_sec);
```

```
  Datex=String(dt.tm_mday) + "/" + String(dt.tm_mon+1)+":"+String(dt.tm_year + 1900);

  hr=dt.tm_hour;
  minx=dt.tm_min;

if (Alm1==1){
  Disp++;
  if (Disp==1){
    lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Medicine reminder!!");
delay(100);

  }
  if (Disp==2){
    lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Amount must be");
lcd.setCursor(0, 1);
lcd.print("taken: 1");
 delay(100);

  }
   if (Disp==3){
    lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Take medicine");
lcd.setCursor(0, 1);
lcd.print("with warm water");
Disp=0;
 delay(100);

  }
  digitalWrite(led1,HIGH);
  digitalWrite(Buzz,HIGH);
  if (digitalRead(SW4)==0){
    Alm1=0; Disp=0;
    digitalWrite(led1,LOW);
  digitalWrite(Buzz,LOW);
  }
}
if (Alm2==1){
   Disp++;
  if (Disp==1){
    lcd.clear();
lcd.setCursor(0, 0);
```

```
 lcd.print("Medicine reminder!!");
  delay(100);

   }
   if (Disp==2){
     lcd.clear();
 lcd.setCursor(0, 0);
 lcd.print("Amount must be");
 lcd.setCursor(0, 1);
 lcd.print("taken: 2");
  delay(100);

   }
    if (Disp==3){
     lcd.clear();
 lcd.setCursor(0, 0);
 lcd.print("Take medicine");
 lcd.setCursor(0, 1);
 lcd.print("with warm water");
 Disp=0;
delay(100);
   }
   digitalWrite(led1,HIGH);
   digitalWrite(Buzz,HIGH);
   if (digitalRead(SW4)==0){
     Alm2=0; Disp=0;
     digitalWrite(led1,LOW);
   digitalWrite(Buzz,LOW);
   }
 }
 if (Alm3==1){
    Disp++;
   if (Disp==1){
     lcd.clear();
 lcd.setCursor(0, 0);
 lcd.print("Medicine reminder!!");
delay(100);
   }
   if (Disp==2){
     lcd.clear();
 lcd.setCursor(0, 0);
 lcd.print("Amount must be");
 lcd.setCursor(0, 1);
 lcd.print("taken: 3");
  delay(100);
```

```
   }
    if (Disp==3){
     lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Take medicine");
  lcd.setCursor(0, 1);
  lcd.print("with warm water");
  Disp=0;  delay(100);

   }
   digitalWrite(led1,HIGH);
   digitalWrite(Buzz,HIGH);
   if (digitalRead(SW4)==0){
     Alm3=0; Disp=0;
     digitalWrite(led1,LOW);
   digitalWrite(Buzz,LOW);
   }

  }


if (MainMode==1 || MainMode==2 || MainMode==3  ){
 if (hr==hr1 && minx==mn1 && secx==0){
  Alm1=1;
 }
}
if ( MainMode==2 || MainMode==3  ){
 if (hr==hr2 && minx==mn2 && secx==0){
  Alm2=1;
 }
}
if (MainMode==3  ){
 if (hr==hr3 && minx==mn3 && secx==0){
  Alm3=1;
 }
}

Time="0" + String(hr)+ ":0" + String(minx)+ ":" + String(secx);
if (mode==0){
  if (Alm1==0 && Alm2==0 && Alm3==0){
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print(Timex);
  lcd.print(" ");
  lcd.setCursor(0, 1);
  lcd.print(Datex);
```

```
  }

  delay(800);
  if (digitalRead(SW3)==0){
    MainMode=1;
    lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Reminder Slot 1");
  lcd.setCursor(0, 1);
  lcd.print("selected..");
  delay(2500);
  }
   if (digitalRead(SW4)==0){
    MainMode=2;
    lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Reminder Slot 2");
  lcd.setCursor(0, 1);
  lcd.print("selected..");
  delay(2500);
  }
  if (digitalRead(SW1)==0){
    MainMode=3;
    lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Reminder Slot 3");
  lcd.setCursor(0, 1);
  lcd.print("selected..");
  delay(2500);
  }

}

if (digitalRead(SWM)==0){
  mode++;
  if (mode>3){
    mode=0;
  }
  delay(500);
}

if (mode==1){
   lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Set slot1 time");
  lcd.setCursor(0, 1);
```

```
  lcd.print(hr1);
  lcd.print(":");
  lcd.print(mn1);

  if (digitalRead(SW3)==0){
    hr1++;
    if (hr1>23){
      hr1=0;
    }
    delay(100);
  }
  if (digitalRead(SW4)==0){
    mn1++;
    if (mn1>59){
      mn1=0;
    }
    delay(100);
  }
}
//-------------------------------------------------------
if (mode==2){
   lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Set slot2 time");
  lcd.setCursor(0, 1);
  lcd.print(hr2);
  lcd.print(":");
  lcd.print(mn2);

  if (digitalRead(SW3)==0){
    hr2++;
    if (hr2>23){
      hr2=0;
    }
    delay(100);
  }
  if (digitalRead(SW4)==0){
    mn2++;
    if (mn2>59){
      mn2=0;
    }
    delay(100);
  }
}
//-------------------------------------------------
if (mode==3){
```

```
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Set slot3 time");
  lcd.setCursor(0, 1);
  lcd.print(hr3);
  lcd.print(":");
  lcd.print(mn3);

  if (digitalRead(SW3)==0){
    hr3++;
    if (hr3>23){
      hr3=0;
    }
    delay(100);
  }
  if (digitalRead(SW4)==0){
    mn3++;
    if (mn3>59){
      mn3=0;
    }
    delay(100);
  }
}
delay(100);

 }



 void serialEvent() {
  while (Serial.available()) {

  }
}
```

APPENDIX B – GANT CHART OF THIS PROJECT