CHAPTER -1

INTRODUCTION

Pill dispensers are devices that distribute medication at predetermined intervals. Their goal is to assist senior adults and those who may have difficulty adhering to their recommended pharmaceutical regimen. Pill dispensers are frequently used for medical purposes, as well as to assist persons, whether old or chronically ill, in taking their prescription medication, over-the-counter medication, or daily vitamins on a set schedule.

1.1 OVERVIEW AND LITERATURE SURVEY

Medicine hasn't always been the precise science which we know nowadays, in fact, throughout history a vast majority of maladies and afflictions would have resulted in probable death. Fortunately, medicine has experienced a great development in the last century, resulting in an increased life expectancy and the possibility to cure a great quantity of diseases and health disorders.Pills are one of the pillars of medicine, being used as direct treatments of some sort of illness as to assuring some medical condition remains stable (people with organ transplants or patients suffering from a chronic disease such as VIH).

This project is basically developed for the patients suffering from chronic disease and for old age people. Automatic pill dispenser is a system that helps to dispense the right medication at the right time. It is the simplest way to manage the most complex medication regimes. Since older population find it difficult to keep track of medications, and automatic pill dispenser helps them to adhere to timely medications. The pill dispenser is considered a very efficient device of improving medication adherence.

Given the device's intended audience that is mainly the old age people or patients having illness like Alzheimer's, etc. It must be user pleasant, convenient, safe to use, and lightweight. To create a functional prototype, we used the well-known Engineering Design Approach, which entails a series of stages to accomplish certain characteristics. Prior to

beginning the actual development of the prototype, we created a list of the devices many characteristics. We gathered input from many patients and discovered a critical need for this technology in the medical sector. We began by analyzing patient comments and attribute data, and eventually succeeded in developing an automatedpill dispenser.

The primary goal of this device is to assist patients, especially elderly, in taking their medicines on time and without skipping tablets, while also reducing the danger of inadvertently overdosing or under dosing. Incorrect drug administration may have severe effects, including delayed healing, sickness, and even death. The automated pill dispenser has the potential to resolve these issues by notifying and alerting patients to take the correct dosage at the proper time. Additionally, it facilitates direct contact between patients and caregivers by notifying the caregiver instantly if the patient misses a medication.

According to a study by India's patient safety authorities, 74% of hospital deaths are caused by overdose or underdose. Numerous medical mistakes occur as a result of the fact that those responsible for a patient's or elder's medicine must sort enormous quantities of pills each day. This article details the idea, design, and fabrication of a pillbox prototype that addresses this shortcoming in the medical field by automatically sorting pills and including a variety of other sophisticated features, with the device intended for usage in hospitals or senior homes. Clinical analysts examined479 event reports provided to the Indian Patient Safety Authority between June 2004 and November 2008 that explicitly highlighted pharmaceutical mistakes caused by failures in the process of collecting, recording, and/or transmitting patient weights. The alarming news is that 448 (93.5 percent) of the 479 reports reflect the five most common medication mistake event types, with the most often reported event type being incorrect dose/over dosage (43.4 percent) and wrong dose/under dosage. In developing nations, caring for the elderly is a major issue. Family membersare accountable for the elderly's care and administration. It is difficult for family members to be accessible 24/7 to assist the elderly in the contemporary day. Today, majority of families in our culture are nuclear. While the elderly wants to stay independent, and this desire is normal, it causes concern for their offspring. Occasionally, despite their best efforts, the elderly forgets to take their medicine on time. Automatic medication dispensers are one way to assist patients in

taking their medications effectively. As the expense of in-home medical care continues to increase, it hasbecome more important for people to choose a device that properly manages their medicines. The automated medication dispenser is functional. In today's fast-paced world, individuals often forget totake their medicine on a recommended and planned timetable. As a result, geriatrics often end up in hospitals. Thus, a system must be built in such a manner that it will administer the necessary medicines at the time specified by the caregiver. Because the gadget is intended for use by the elderly, it must be user pleasant, portable, safe to use, and lightweight. To create a functional prototype, the following procedures were performed to accomplish certain characteristics. Accordingon comments from many patients, it was determined that this gadget is in desperate need in the area of medicine. Medicine adherence is a rising problem for physicians, healthcare systems, and other stakeholders (insurance companies) in the healthcare sector, since the aged or senior patients' medication has a high rate of drug abuse. They are extremely prone to forget to take their medicationon time.

Particularly those who take several medicines concurrently. Additionally, kids may take the incorrectdose unintentionally, which may result in adverse effects such as poisoning and death. This demonstrates unequivocally that it is a common issue that is obviously associated with poor patient outcomes and increased healthcare expenditures. The primary goal of the automated pill dispenser system is to assist patients, especially elderly, in taking their medicines on time and easily, without the risk of missing a pill. Additionally, it may help minimize the danger of inadvertently overdosing or underdosing. The automated pill dispenser has the potential to address these issues by educating and alerting patients to take the proper dosage at the appropriate time [16]

1.1.1 Research on Pill Box

David P. Wagner obtained his patent on “medicine” on August 4, 1964. Wagner was motivated to launch the device when he and his wife had trouble remembering that she had taken his daily pill or not. The patent included the various uses of the device “which helps to take the medicine by a personwith an unusual schedule that is easily adapted to the user's menstrual cycle and a clear indication of whether a person should take the pill and dispense

only one dose at a time. In an inseparable part of the ‘glittering lady’ of makeup and was modified to be treated amidst the effects of a woman in abag without giving visible wisdom in matters that do not concern others.” Wagner's patent” includes both, a circular design and a rectangular calendar design. This item represents a circular design. Copyright handled three major issues with Pill packaging, compliance, compliance, and reuse. Wagner tried to sell his patent to Ortho and Searle and was initially denied both. Later, when Ortho introduced DialPak, Wagner successfully defended his patent, and Ortho paid him $ 10,000 not tosue and the small amount of all DialPak produced thereafter. Problem statement: It was found that the pills that are stored in the box won’t last for long and the material used was sterilized plastic but in order to keep the pill intact the material used must be polypropylene, Polyvinyl chloride, etc.[16]

Fig:1.1 Original design proposed by David P. Wagner [13]

1.1.2 Research on Medready Pill Dispenser [13]

Medready pill dispenser was patented back in 2010 which later on got published in 2012.In this model of Pill Dispenser the user is required to set an alarm for the time to dispense the pill. The device is capable of dispensing 4 pills per day and the user can set the alarm either by using the buttons or using the website portal. Each time the alarm goes off, the internal mechanism of the device rotates and allows the next "pill group" to be accessed. Each compartment allows different medicines to be stored in them, when the alar sets off, the user has to take the pills themselves.[13]

Problem statement: The user can only have four doses a day and each compartment carry multiple pills depending upon the size of the pill and the capacity of the container. The device is not fully automated as it does not dispense any pill as the user has to take out the pill manually.[13]

Fig:1.2 Design proposed by the Medready [13]

1.1.3 Research on Tabsafe Medication Dispenser [15]

Tabsafe Pill Dispenser was designed in 1998 and then got patented in 2003. Its application was granted in 2006 and then got published the same year. However, the company later discontinued this device in 2019 due to unknown reasons. This device works on a different mechanism in accordance with the other pill dispensers out there, it contains separate pill trays for each dose, suppose the user has to take 4 doses in a day then the device uses 4 trays to dispense those pills. Each tray has 16 or32 compartments in it. This device is not considered user friendly as its mechanism is a little hard to understand that how to fill the compartments and how set the time intervals among the doses. So, itis preferable that trained nurses or the family members of the patient controls the device.[15]

Problem statement: Similar to the other models this device can only dispense only four doses a day as the basic model of the device possess only four pill trays however it is expandable and canpossess up to twelve pill trays which can serve up to twelve doses a day, but the user has to buy it from the market. Lastly, the compartments of each pill are relatively small.[15]

Fig:1.3 Design proposed by Tabsafe [15]

1.1.4 Research on CompuMed Medication Dispenser [14]

The CompuMed Medication Dispenser was assigned to Analogic Corporation and got patented in 2010. Its application was granted in 2013 and was published the same year. It will be expired in 2031. The device's basic structure contains a secure box in which a relatively orthodox pill box tray is inserted. The machine's mechanism takes the pills from the specific compartments of the pill tray and moves it into the pill dispenser tray at the appropriate time. Each pill tray contains 28 compartments, and it is a manual task for the filler to get the right pills in the right compartments. Then the user is required to use the keyboard to program and set up to four alarms at which the user wants the pills to be dispensed.[14]

Problem statement: This device offers only four doses a day and isn't expandable. The user has to unlock the system with a key and pull out a tray and then manually feed each pill which has to be dispensed by the device.[14]

Fig:1.4 Design proposed by CompuMed [14]

1.1.5 Research on Black and Decker, Pria Pill Despenser [14]

Black and Decker, Pria Pill Dispenser's application was filed by Lewis Kermit back in 1983 and wasassigned to the organization later the same year only. In 1986 its application was granted and was published. Later the design expired in 2003. This device comprises a photoelectric detector and a light source so that pill of any commercial size can be dispensed. The pill is received through a vertical through-hole of the diameter less than one-eighth of an inch. The Photoelectric detector and the light source are placed such that the light beam is passing through the cup where the pill is dispensed, when the cup is empty, the light beam directly strikes the photodetector but when the pill is dispensed, the light beam is blocked, and the dispenser generates a signal which sets off an alarm for the patient with an audible or visible signal that the pill is dispensed.[14]

Problem statement: The device works on a 24-hour rotating cycle and only has 12 compartments andcan server up to few days only, as per the doses prescribed to the patient. [14]

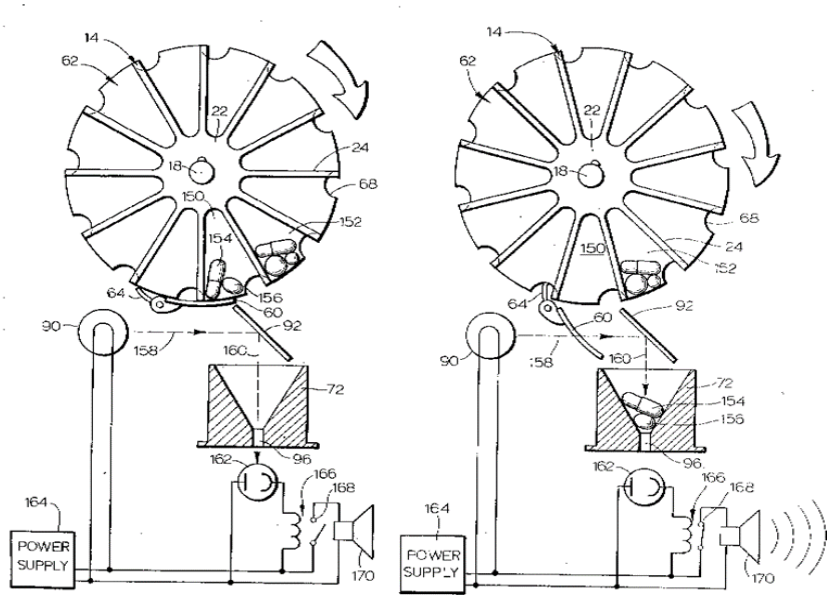


Fig:1.5 Pria Pill Despenser [14]

1.1.6 Research on Phillips Lifeline, Medication Dispenser [18]

Phillips Lifeline, Medication Dispenser was designed in 2006 and was published by Michael Cohen Alloro in 2007 but was abandoned later on in 2009. This device is a little old school as the user hasto call to the support center to set the dose timings and for whatever the use needs, after that people at the support center sets the dose timings for the user by programming the device. This device needsto be installed by a technician and is connected via a landline. This device does not have any limitations regarding the get capsules and the gummy medications as the most dispensers have. However, it does not handle any liquid medication or temperature dependent medication. The user has to pull out the pill tray which contains cylindrical containers each with the lid on it, then the user takes out each container and fill the pills according to the doses and is also feded to the machine using buttons. The user then puts the lid back on each of the cylindrical container then they must contact the support center to set the dose timings. This device can hold from 10 to 40 days of pills depending upon the number of doses the patient requires.[18]

Problem statement: This device requires monthly subscriptions for the service provided by the support center. The time required to load the pills in the machine is far greater than others as each of the cylindrical shaped containers must be filled separately. The device is only capable of doing six “Things” per day, these “Things” can be either dispensing one of those cylindrical shaped containersor can be a remainder such as “take your insulin”. However, the user can time the remainder with thedispensing of the container which will be counted as one ‘Thing” only.[18]

Fig:1.6 Deign proposed by Phillips [18]

1.1.7 Research on Hero Medication Dispenser [19]

Hero Medication Dispenser was designed in 2011 and its application was filed by Access Business Group International LLC in 2012 and assigned to the same organization that year itself. Its application was granted and was published in 2015 and currently has active production and has expected expiration year (2033). The primary interface of the user is using a set of buttons given on the device to move around the screen, but the device also comes with an application and can also be programmed using the web portal. The programming of the doses done using the app or the web portal is quite straightforward, when the name of the medicine is typed on the software, it recognizesthe medicine and also gives the alternatives of the medicine and if the name of the medicine is not found on the database, it allows you to create it and add into the database. Once the programming is done on the software, it communicates with the system of Hero and the device asks for the confirmation which is given by the user by pressing the button on the device. The pills are to be filled by the user by opening the door in front of the machine and filling the pills in the container andthen putting the container back, the process of filling the containers is quite simple in this device.[19]

Problem statement: Although the company claims that the Hero can take up to 10 different types of pills at a time and can dispense as many times as the costumer wants, there are some limitations to this model, such as:

1) If the container is refilled before it is completely empty, the device gets confused and loses the pill count which then must be fixed manually using the application.

2) The device is not capable of dispensing gummy medicines, chewy kid's vitamins, gel capsules, liquid medicines, and any kind of temperature dependent medicine.

Fig:1.7 Design proposed by Access Business Group International (Hero) [19]

1.1.8 Medication Dispenser Bracelet

The application for medication dispenser bracelet was filed back in 2016, however it was patented and published in 2017. This device was invented by Malena Danielle Ohl, Wesley Victor Wilson, Margaret Davis Schoening, Andreas Loeve Selvik, Seunghyuk Noh. The device offers quite a unique conveniency, the user must wear it as a bracelet which is loaded with the pills. Now, the device indicates the user by vibrating alarm at the preregistered time which is entered via another electronic device such as mobile phone using Bluetooth wireless communication. It consists of a sliding door which allows the patient to take out one pill at a time. The inner part of the pill bracelet consists of multiple curved chambers whose capacity is sufficient for various different size of pills. It also consists of a microcontroller, real time clock, clock battery, Bluetooth transmitter and receiver, primary battery, interior data storage and a vibration machine.

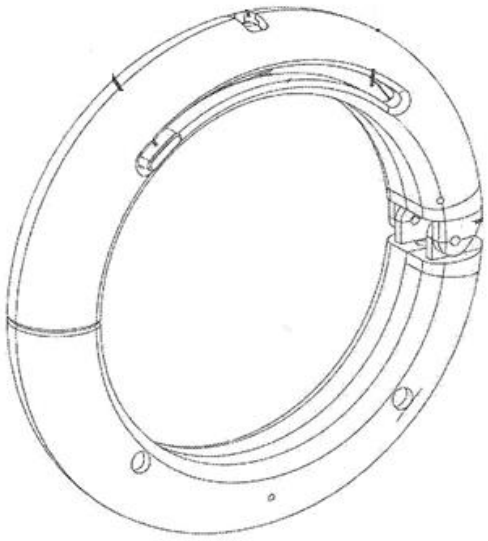


Fig:1.8 Medication Dispenser Bracelet [15]

1.1.9 Digital Dispenser System

The application of this device was filed back in 2011 by Nathaniel Gerald Portney. however, it's application was granted and was published in 2018. This device consists of a cartridge for storing the pills, and a communication system to maintain coordination between the dispenser and the cartridge for depending on information about the dispensing time of the medication. the device comprises a rotating cartridge, a housing which supports the cartridge, in which the housing consists of a mechanical system which helps with the dispensing of the pills and a button which is to be manually pressed by the user to take the pill out of the dispenser. The mechanism works as the cartridge rotates to a point where a single transmission takes place where the pill is dispensed, and the user has to push the button manually to take the pill out of the machine. An electromagnetic communication system is also installed in the device which helps in coordinating the balance between the dispenser and the cartridge and it also controls the command on the button which is to be released at the time of dispensing only and will be pulled down automatically otherwise.

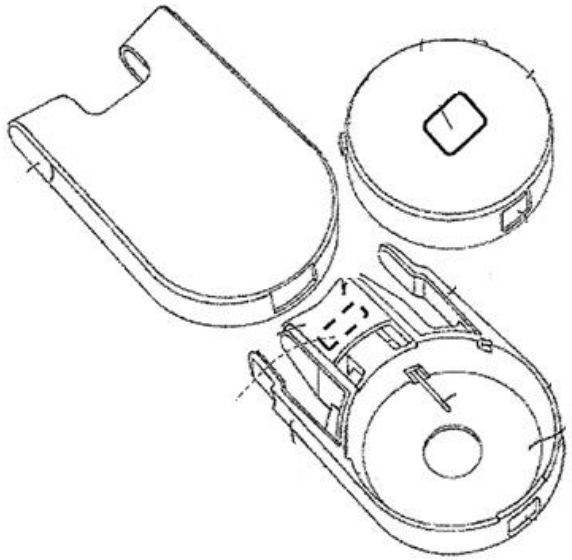


Fig:1.9 Digital Dispenser System [19]

1.1.10 Korean Pill Dispenser

This device's application was filed back in 2012 but the application was filed in 2019 and was granted for publication in 2019 only. The korean pill dispenser comprises of a pill package which can be used manually or can be integrated by installing a dispensing system which is automated. this pill package can only comprise pill pallets which is quite easy to be filled as the user doesn't have to take each pill out to fill the container which reduces the workload of the user. the amart pill dispenser can read the information given on the pill pallets and can automatically sense the information needed regarding the content of pallets as what is inside the pallet, when it must be dispensed and can also keep a track of the inventory. The dispenser also comprises of a remainding system which tells the user when to take the medication, and the device can also be connected to an external electronic device such as a mobile phone which inprovises the ease of using the device, the user can easily modify the timings according to their desire. The devise can comrise multiple pill pallets which can be dispensed at a time with ease. These pill pallets are stacked one on another and are also accessible mannually without the automatic pill dispenser and can also be used in automatic pill dispenser. The dispenser also consists of a visual imdicator for directing the dispensing process.

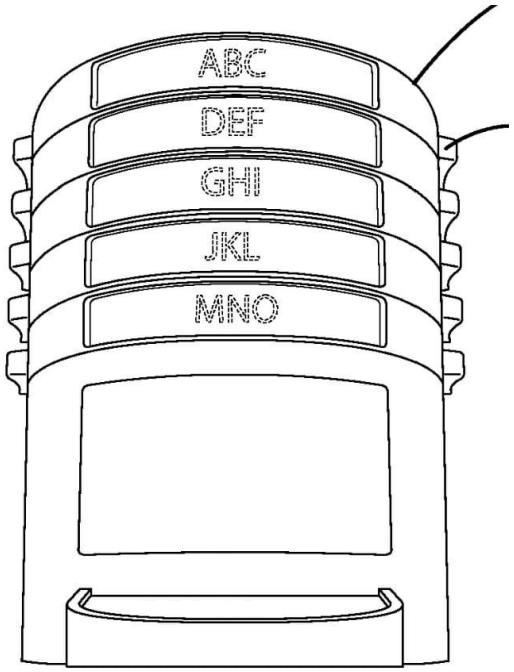


Fig:1.10 Korean Pill Dispenser [20]

1.2 MOTIVATION

The increasing old age population is one of the key factors driving the automatic pill dispenser. According to WHO, it is estimated that the world's population aged 60 years and older are likely to double from 12% to 22% by 2050.

Unaffordability of a nurse / helping hand.

While initially the product was designed with thinking the target audience as the main buyer of the product, it was later changed to make hospitals and retirement homes the main clients of the product.

On the technical basis was an IOT based project using Arduino UNO. Considering this technical subject, we thought that making this project will really brush up our theoretical knowledge of Arduino UNO and will help us to get this subject more in a practical way.

1.3 PROBLEM STATEMENT

In the making of this automated pill dispenser a lot of problems were faced, time to time. At first there was a dilemma while deciding the final model design of the dispenser, as the pill dispensers were already there in the market, hence we wanted to present a unique model.
While going through the earlier models made on this topic it was brought under notice that there can be improvement done on the designing and fabrication so that the reach of the project can increase.
Earlier models were tough to fabricate and their working principle behind them was complicated which in return increased the overall cost of the product.

1.4 OBJECTIVE

Advancements in pill dispensers: Pill dispensers have already made their place in the technological market. We are making this automated pill dispenser so that the machine gets a bit modified. It is ourhard attempt to design it in such a way that the marketing cost of the machine decreases and becomes easier to use by the customer. Raising awareness regarding adherence to medications: The problem of not following the medication properly is one of the biggest mistake people do while recovering from a disease let it be a chronic or for a short period, due to which they are not able get the desired result. The objective of our model is that needs to be attended to solve above mentioned problem is to design a self-dispensing device which needs no human intervention. This project makes use of the concept of circular step wise motion of the compartment which is meant to store the pills. Step wise motion of the compartment is achieved using stepper motor. There is a provision for alarming system built in with the device which consists of a buzzer and LED to indicate the time of medication.

1.5 ORGANIZATION OF REPORT

This project report presented is organized into three chapters.

- Chapter 1-This chapter introduces the concept of the project made and contains the information on about the previous work done on this topic. It contains all the problem statements, explains all the motivation behind taking up this project, etc.
- Chapter 2-Chapter2 describe the project technical working introduction, variety of different design already available to use, novelty, block diagram, technical bock diagram, algorithm, circuit diagram, hardware description, software description, simulations, and methodologies.
- Chapter 3-Whereas chapter 3 summarizes the conclusion, the future scope and application.

CHAPTER 2
DESIGN AND IMPLEMENTATION

This chapter in detail explains the designing, algorithm and the implementation of the automated pill dispenser made. It even contains the flow chart, circuit diagram and the block diagram of the project made with the final picture of the pill dispenser which help to understand the making and working of the project in a more effective manner. This chapter contains the elaborated information of every hardware used in making this model. It also contains the information about the software with which the code has been written, compiled as well as uploaded the code on Arduino.

2.1 INTRODUCTION

This is an Arduino NANO based model which has 30 input/output male headers. A 16x2 LCD screen which displays the time at which the pill is dispensed is also installed. The device contains a Remote Time Clock (RTC) which helps keeping a track on the time according to the time zone in order to program actions at a certain time. Two servomotors are there, one to rotate the part where the pill is dispensed and the other to rotate the output shaft which dispenses the pills in two different containers D/N. It also contains a powerhouse which works as an extension board for the connections in order to make it simple, the powerhouse have a potentiometer at the center of it which is used to calibrate the opacity of the output written on the LCD. A 7085 module is installed which contains voltage regulator whose main purpose is to make the power supply to 5V from the 12V power supplied to it by the batteries, this module consists of two capacitors (1000mF and 100mF) and a resistor of 1 kilo ohm. All of these components are connected via female connecting wires and works according to the program uploaded to the NANO chip.

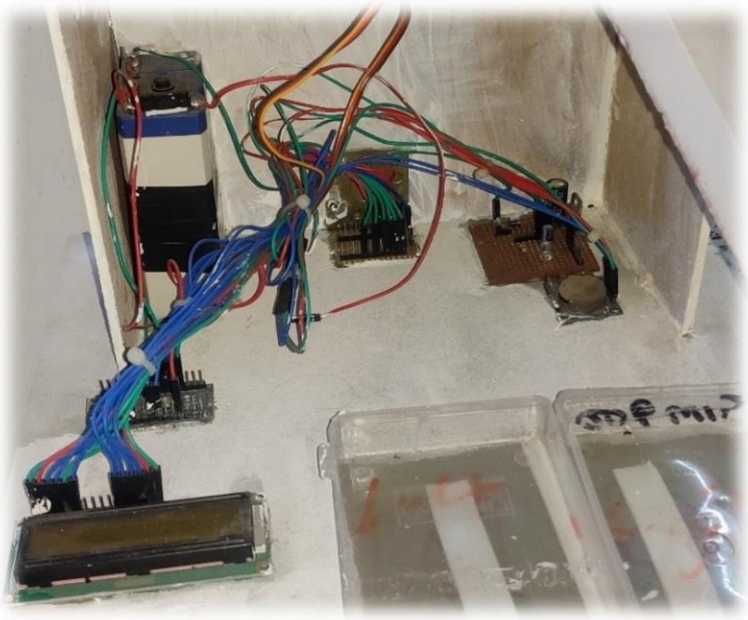


Fig:2.1 Model 1

Fig:2.2 Model 2

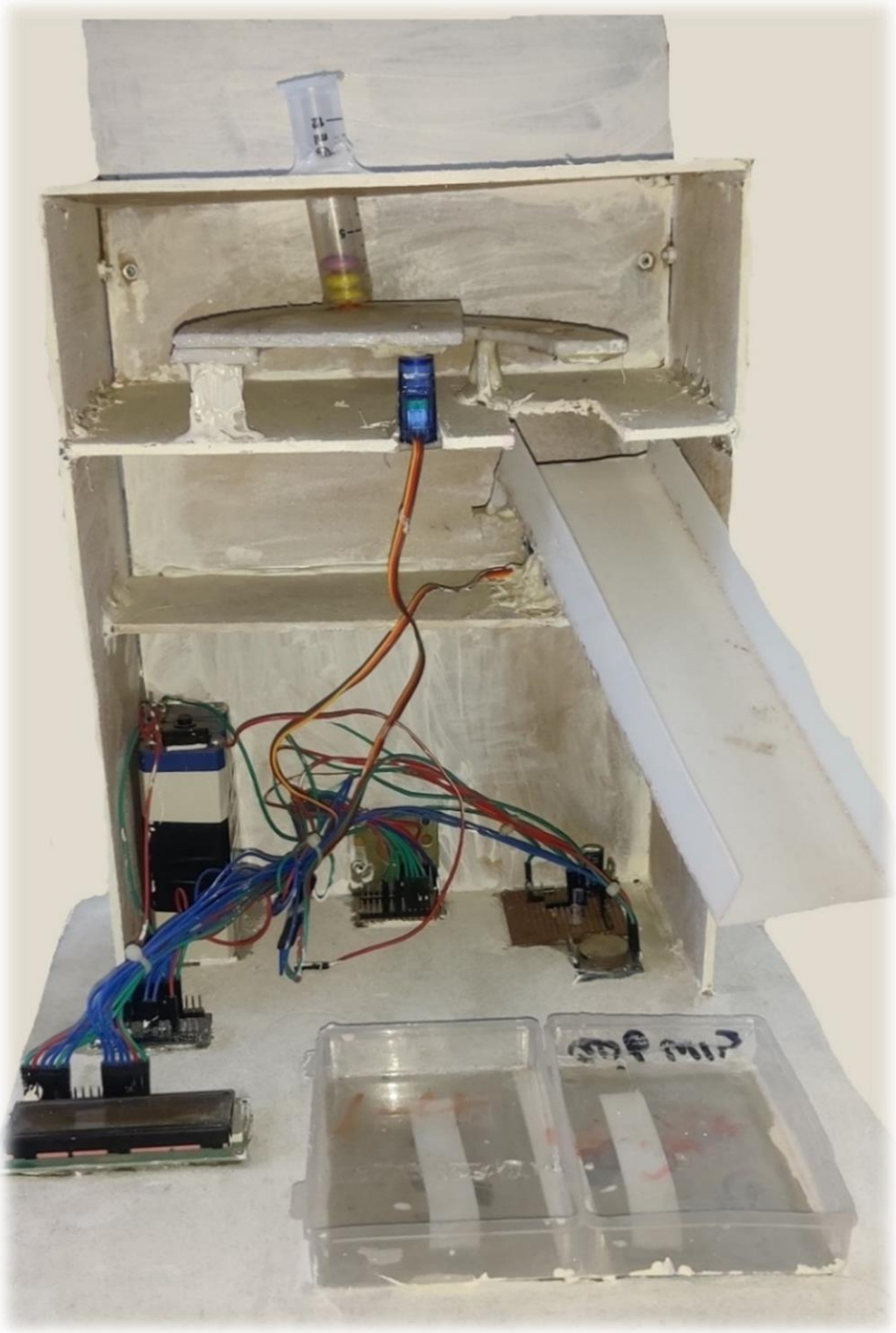


Fig:2.3 Model 3

2.2 DIFFERENT DESIGN OPTION

There are N numbers of other pill dispensers, each with a unique novelty for example, some with inbuilt Alexa in it, there's one with inbuilt water dispenser as well and there's one device which has its own app to set the time and date according to the prescription. Nevertheless, all these devices serve the same purpose but have different features according to which their prices vary.

Another idea of a device was that it had its own landline services, where the user simply had to use the landline and call at the call center, where the helper will set the doses and their timing on their end according to the prescription, then the user simply has to fill the containers of the dispenser with the pills.

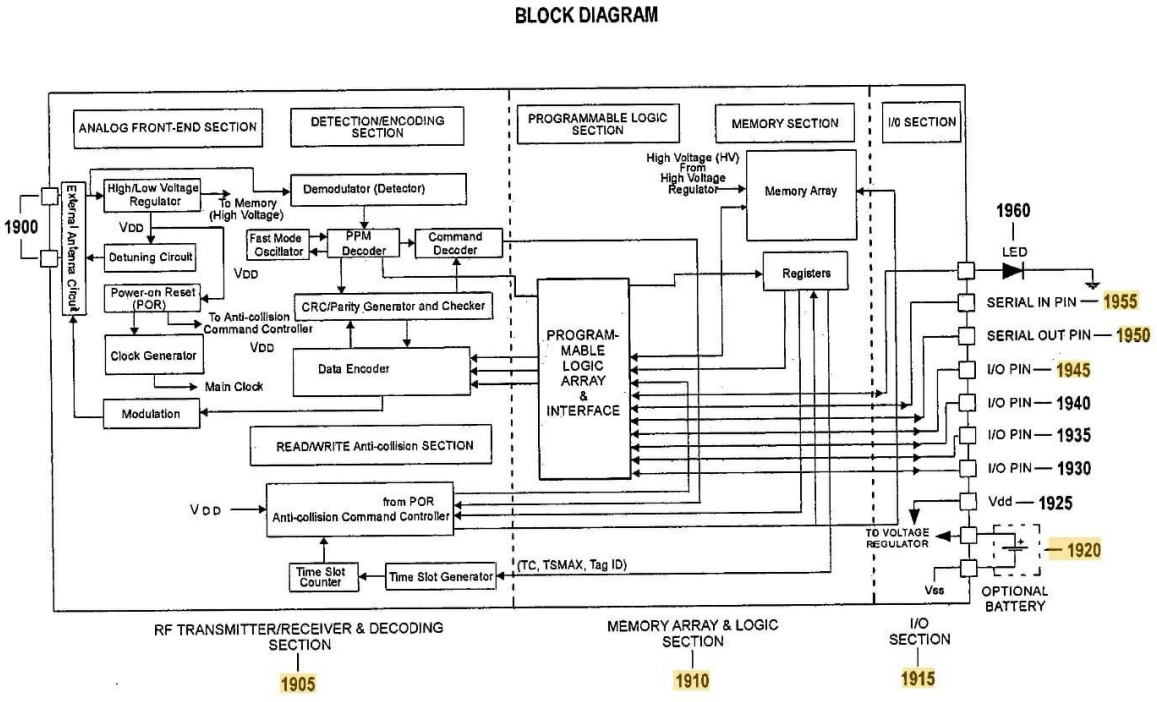


Fig: 2.4 Medicament inventory system [24]

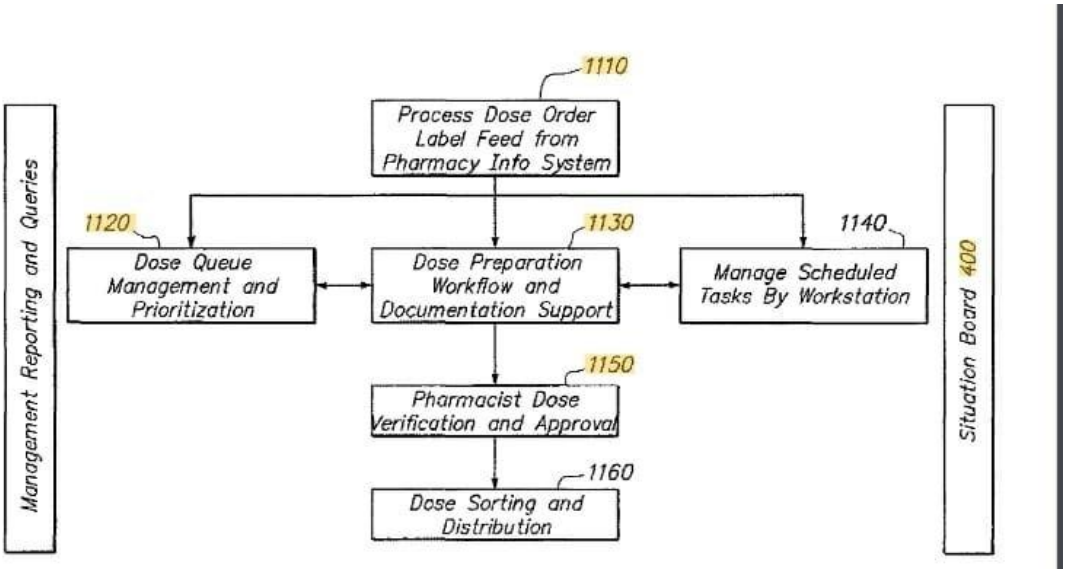


Fig:2.5 Medication preparation system [23]

2.3 BLOCK DIAGRAM

- Arduino nano has been used.
- A led (16x2) has been to digital pins of the Arduino nano.
- There are 2 servo motors being used, which are connected to the analog pins of the Arduinonano.
- Fist servo motor is connected to A0 analog pin of Arduino
- Second servo motor is connected to A1 analog pin of Arduino
- A RTC is also being used where the SDA is connected to A4 analog pin and SCL isconnected to A5 analog pin of Arduino nano.

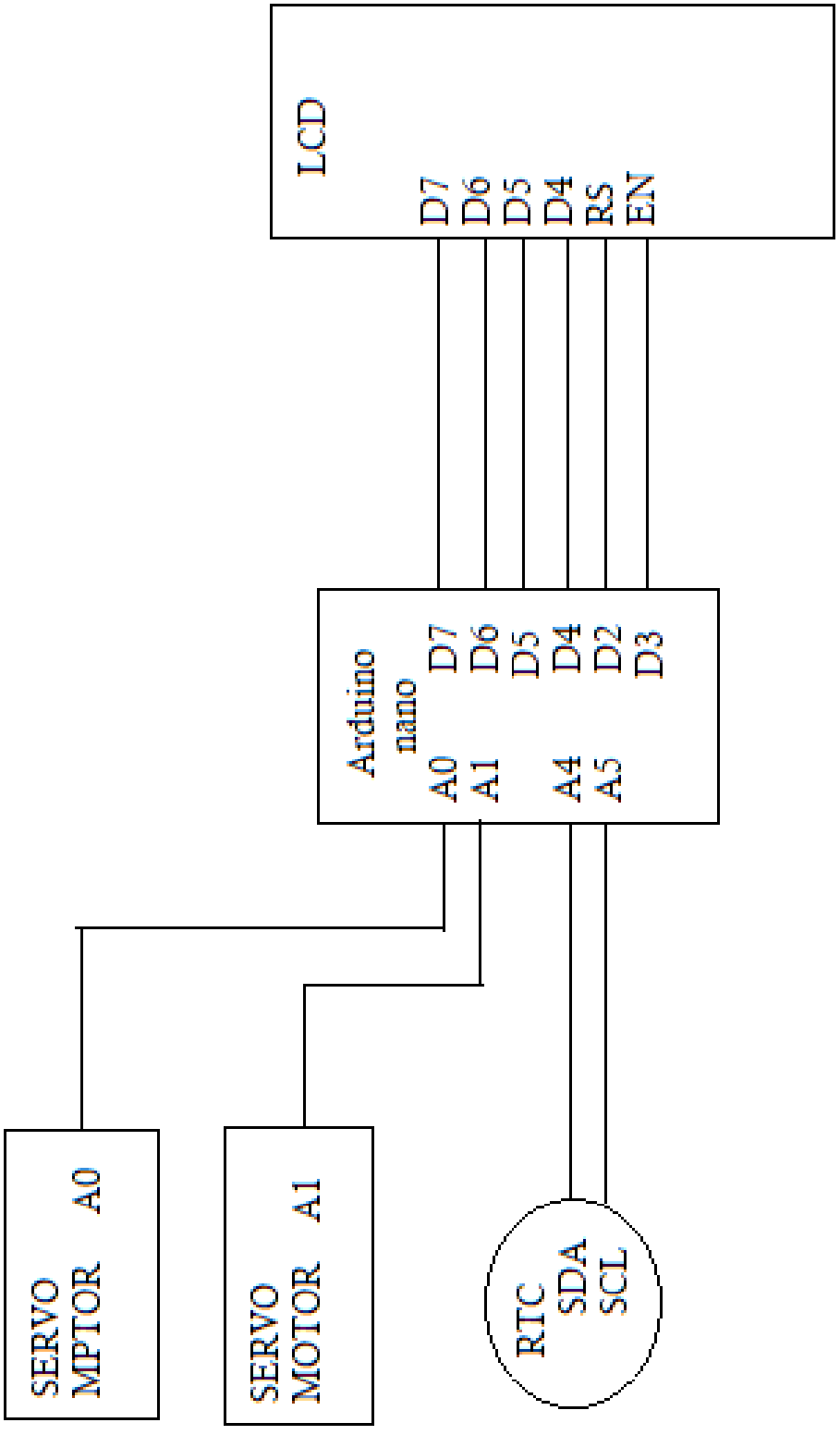


Fig:2.6 Block Diagram

2.4 CIRCUIT DIAGRAM

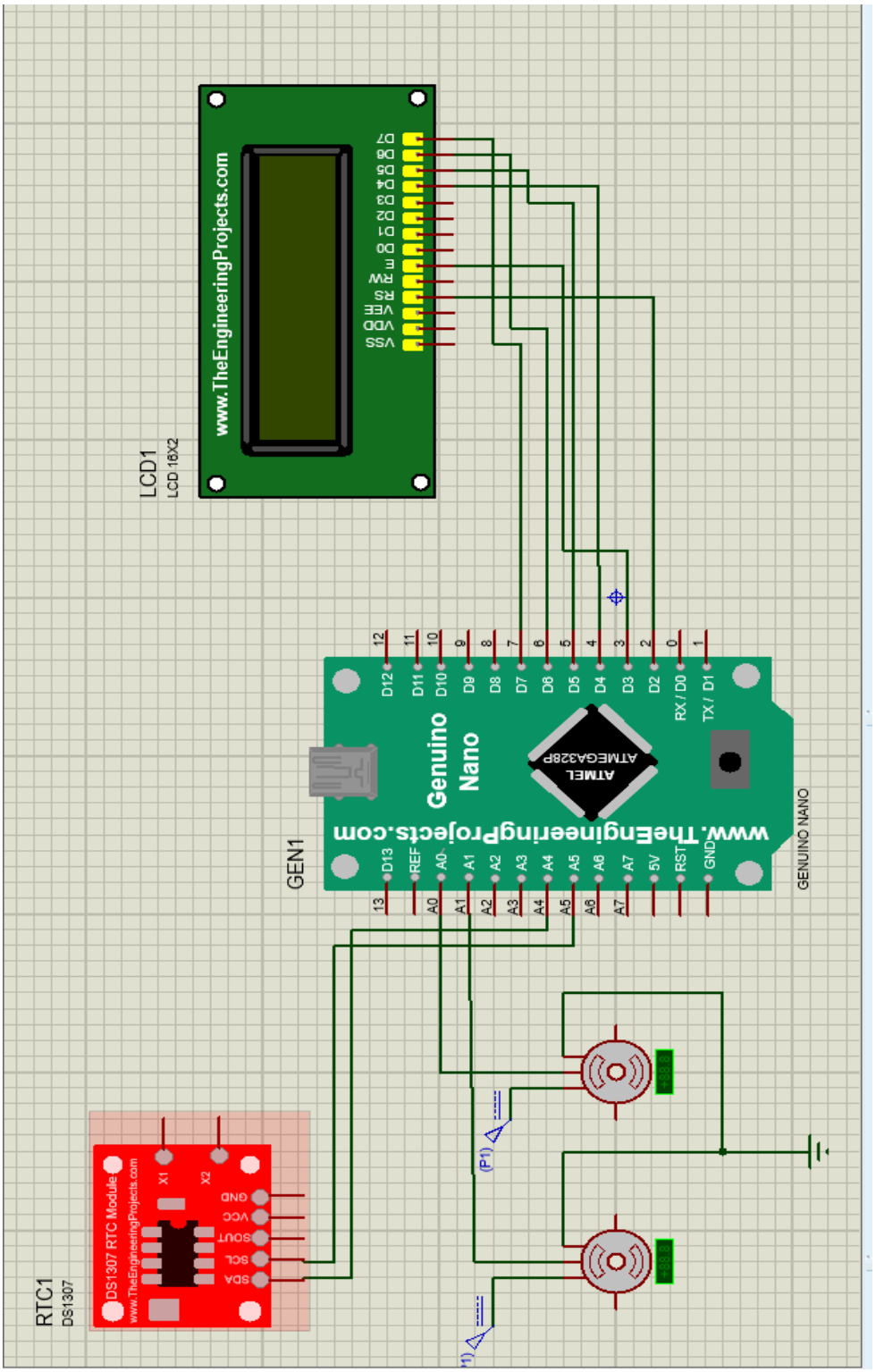


Fig:2.7 Circuit Diagram

The above given circuit is the circuit diagram of our project. This circuit diagram was designed by using a software called Proteus. Proteus is a software used to design automated electronic circuits. It is a paid software

In this project the main part is Arduino nano. The LCD is connected to the digital pins of the Arduino.
As soon as the project is started the LCD will display the name of the project. And then it will further convey the information as per the code.

The first servo motor is connected to analog pin A0 if the Arduino. The second servo motor is connected to analog pin A1. They rotate as per the angular degree given in the program code. And every moment takes place according to the RTC whose SCL is connect to analog pin A5 of the Arduino board, and the SDA is connected to the analog pin A4 of the Arduino board. RTC takes the timing itself from the system timings.

2.5 ASSEMBLY OF HARDWARE AND COMPONENTS

Following are the hardware used in the making of this project:

2.5.1 Arduino Nano

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P released in 2008. It offers the same connectivity and specs of the Arduino Uno board in a smaller form factor.

The Arduino Nano is equipped with 30 male I/O headers, in a DIP30-like configuration, which can be programmed using the Arduino Software integrated development environment (IDE), which is common to all Arduino boards and running both online and offline. The board can be powered through a type-B micro-USB cable or from a 9 V battery.

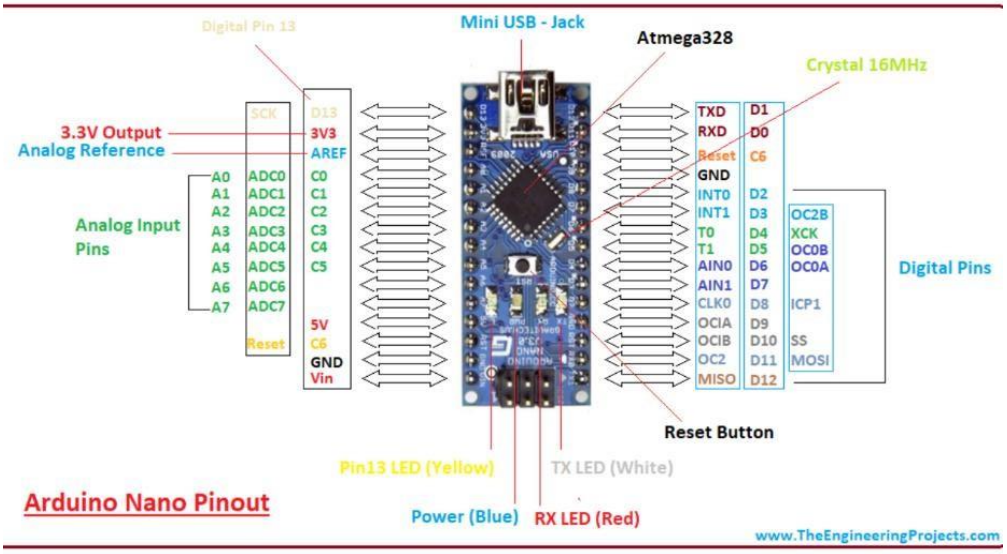


Fig:2.8 Arduino Nano

2.5.2 Servo Motor

A Servo Motor is a small device that has an output shaft. This shaft can be positioned to specific angular positions by sending the servo a coded signal. This project uses two servo motors that move at their own respective angular position as per the code written.

Fig:2.9 Servo Motor

2.5.3 RTC

A real-time clock is a clock that keeps track of the current time and that can be used to program actions at a certain time. Most RTCs use a crystal oscillator (like in the Arduino Zero) whose frequency is 32.768 kHz (same frequency used in quartz clocks and watches). This project uses a RTC to decide at whet time the pills will be dispensed.

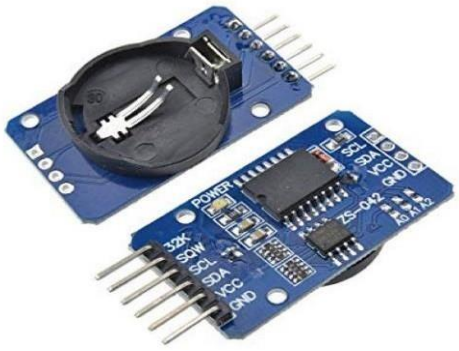


Fig:2.10 RTC

2.5.4 Female Connecting Wire

A female connector is a type of connector that consists of a jack into which a male connector can be inserted.In this project female connecting wires have been used for doing the connections.

Fig:2.11 Female Connecting Wires

2.5.5 LCD (16*2)

LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. The LCD used in this project is of 16x2 configuration, which means that the LCD consists of 16 columns and 2 rows.

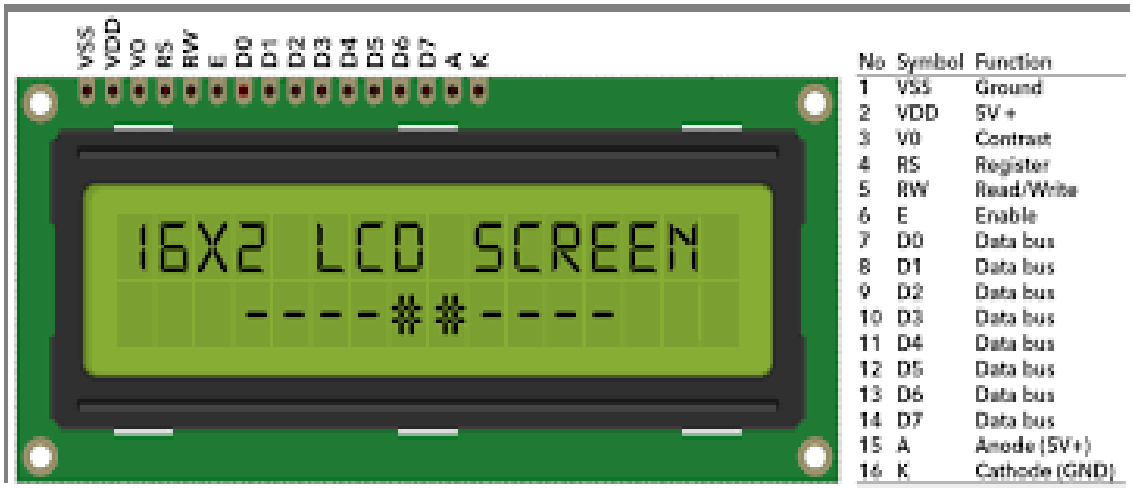


Fig:2.12 LCD

2.5.6 Electrolyte Capacitors

A type of capacitor in which one plate is coated through electrolysis with an oxide to serve as the dielectric, while the other plate is replaced by an electrolyte. Electrolytic capacitors can achieve veryhigh capacitance with very small sizes, but only act as capacitors as long as the current flows in one direction. This project uses 2 capacitors of different configuration. It has a capacitor of 25V &100mF and the other one is of configuration 25V & 1000mF.

Fig:2.13 Capacitor

2.5.7 7085 MODULES

The role of this module is to make the power supply to 5 volts from the 12 volts battery attached tothe project.

It has following components:

Capacitor (25V, 1000mF)

Capacitor (25V, 100mF)

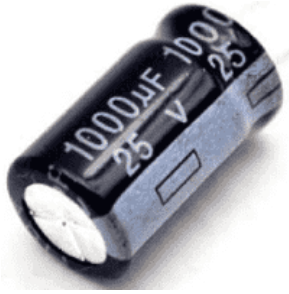


Fig:2.14 Capacitor(25v,100mF)

Capacitor: It is a device which stores electrical energy within an electrical field.

In 7085 module the above two capacitors have been used.

Resistor (1 kilo ohm)

Resistor: It is an electrical component which has two terminals through which electrical resistanceis implemented. They are primarily used to reduce the flow of current.

Fig:2.15 Resistor (1 kilo Ohm)

Voltage regulator.

Fig:2.16 Voltage Regulator

2.5.8 PROTEUS

Proteus is a software that is used to design electronic circuits that are mostly automated. Proteus consists of schematic capture, simulation, and PCB (Printed Circuit Board) Layout modules. This was used to build and to check the working of our circuits if the connection is connected rightly. Before making actual real-life circuits with the components this software is used to see the working of the demo that have to be made, this is helpful in a major way that rather than connecting the components and making mistakes and damaging the components. Using this software making mistakes in connection will not be a loss of component. It consists of many types of arduino boards (for example Arduino UNO, Arduino NANO). It has all the required components which are required to make an electric circuit. This software is a good alternative to making electrical circuits physically.

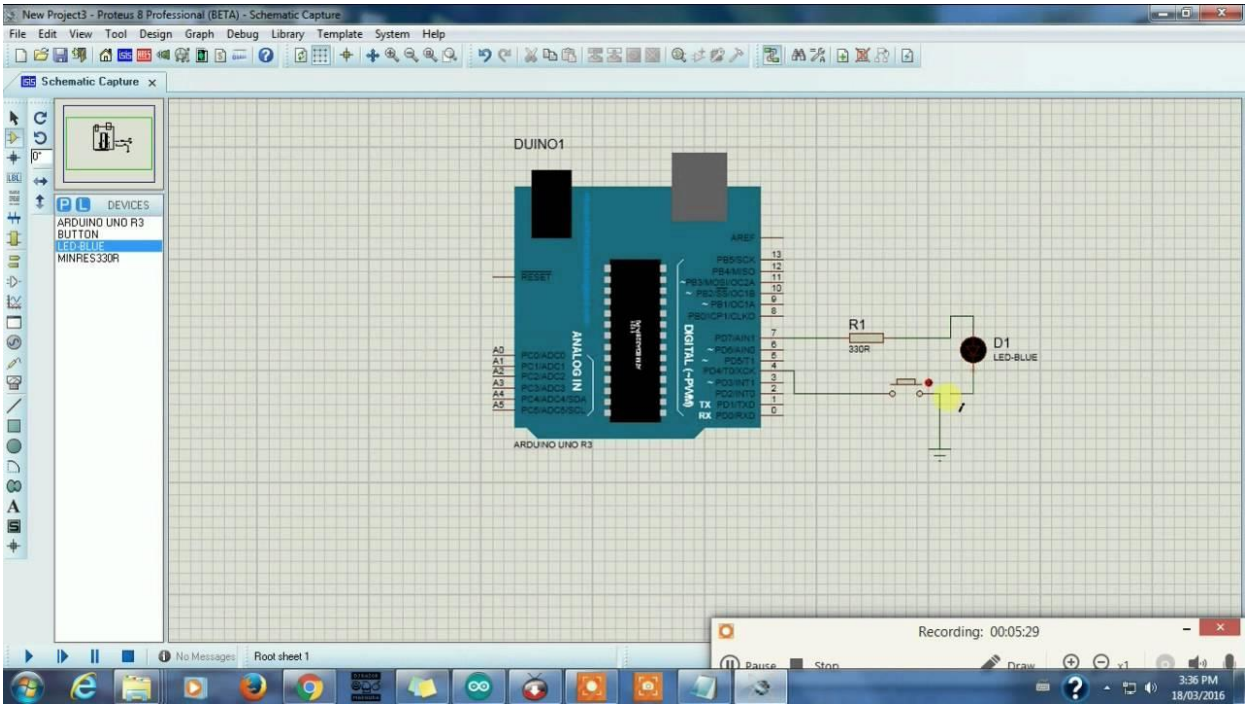


Fig:2.15 Proteus

2.5.9 Arduino IDE

It is a software for Arduino, it stands for Arduino integrated development environment. Using this we can write code; we can compile the code to check if any error is present and even upload the desired code on Arduino. The software has a free license. The software is very simple and easy to use. It has different option to choose whatever Arduino board is to used (i.e. Arduino UNO, Arduino NANO etc) , but for the proper compilation of the desired code the libraries need to be extracted properly.

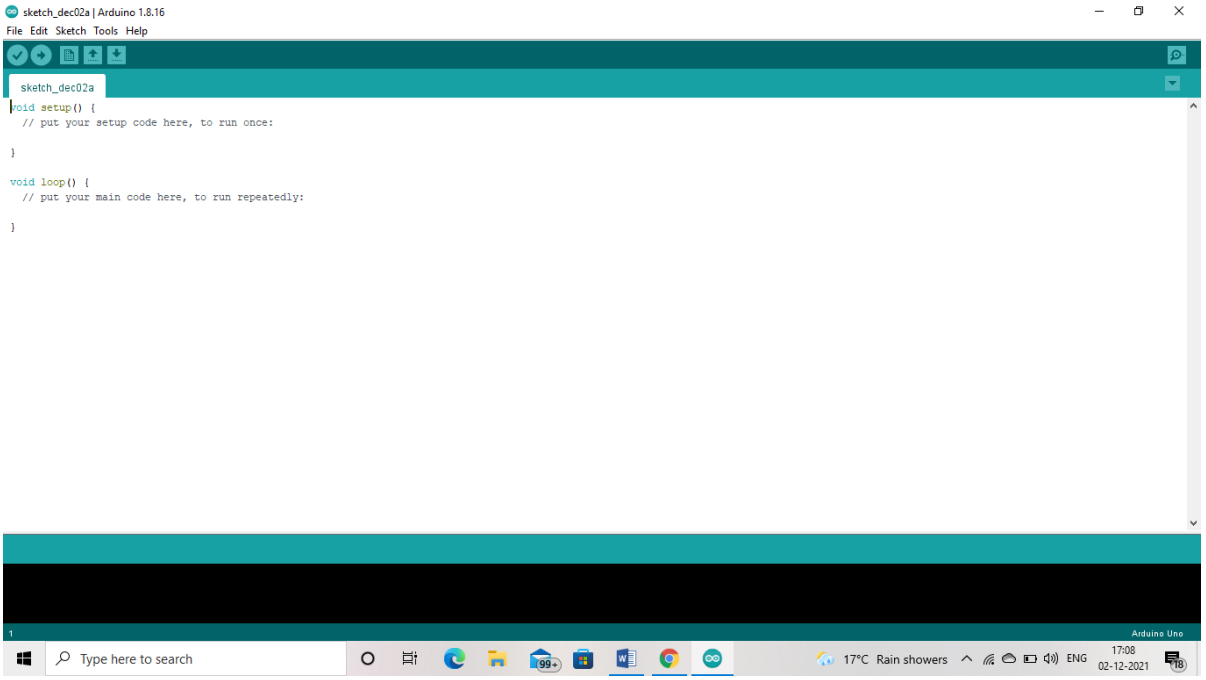
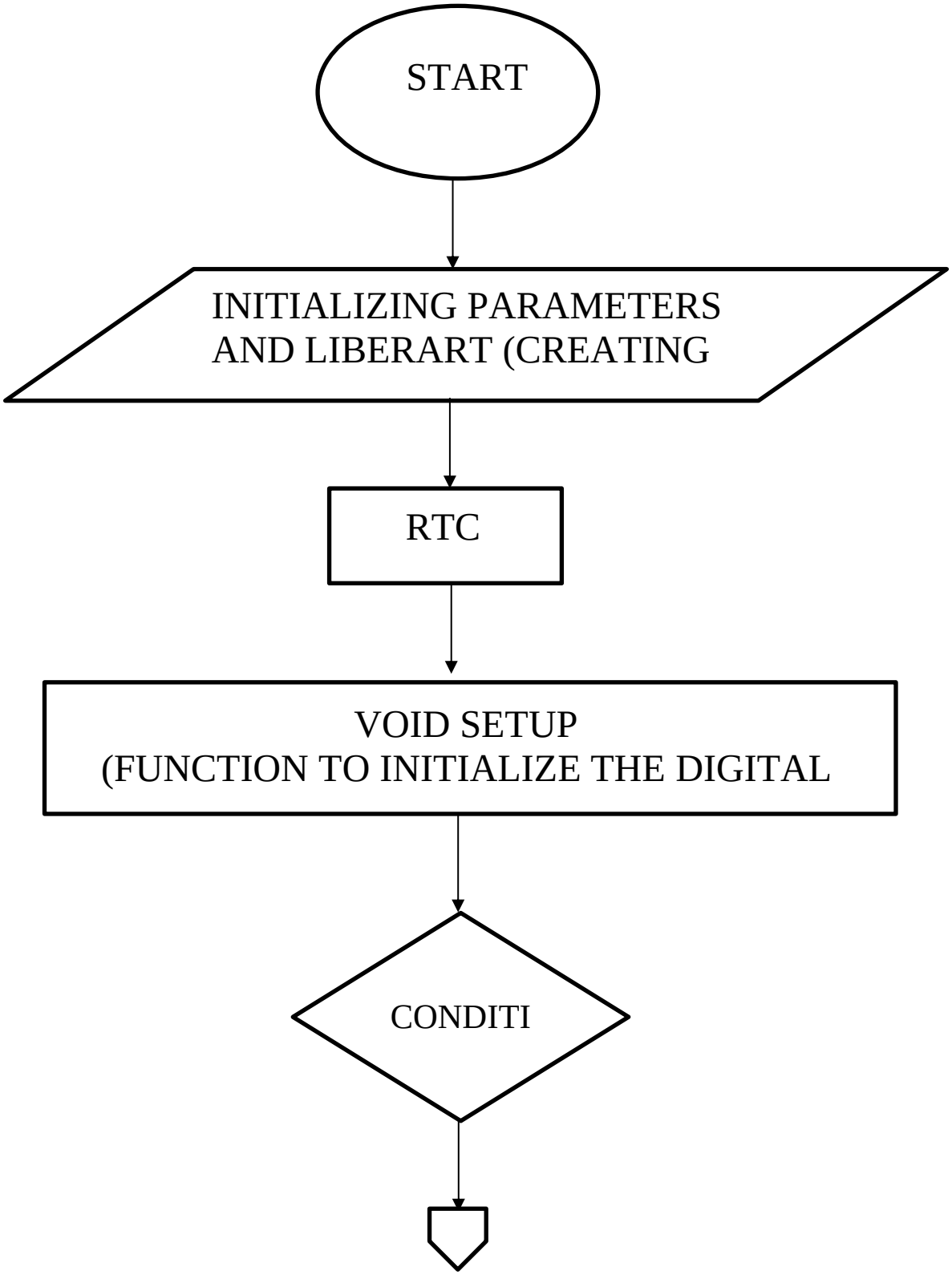
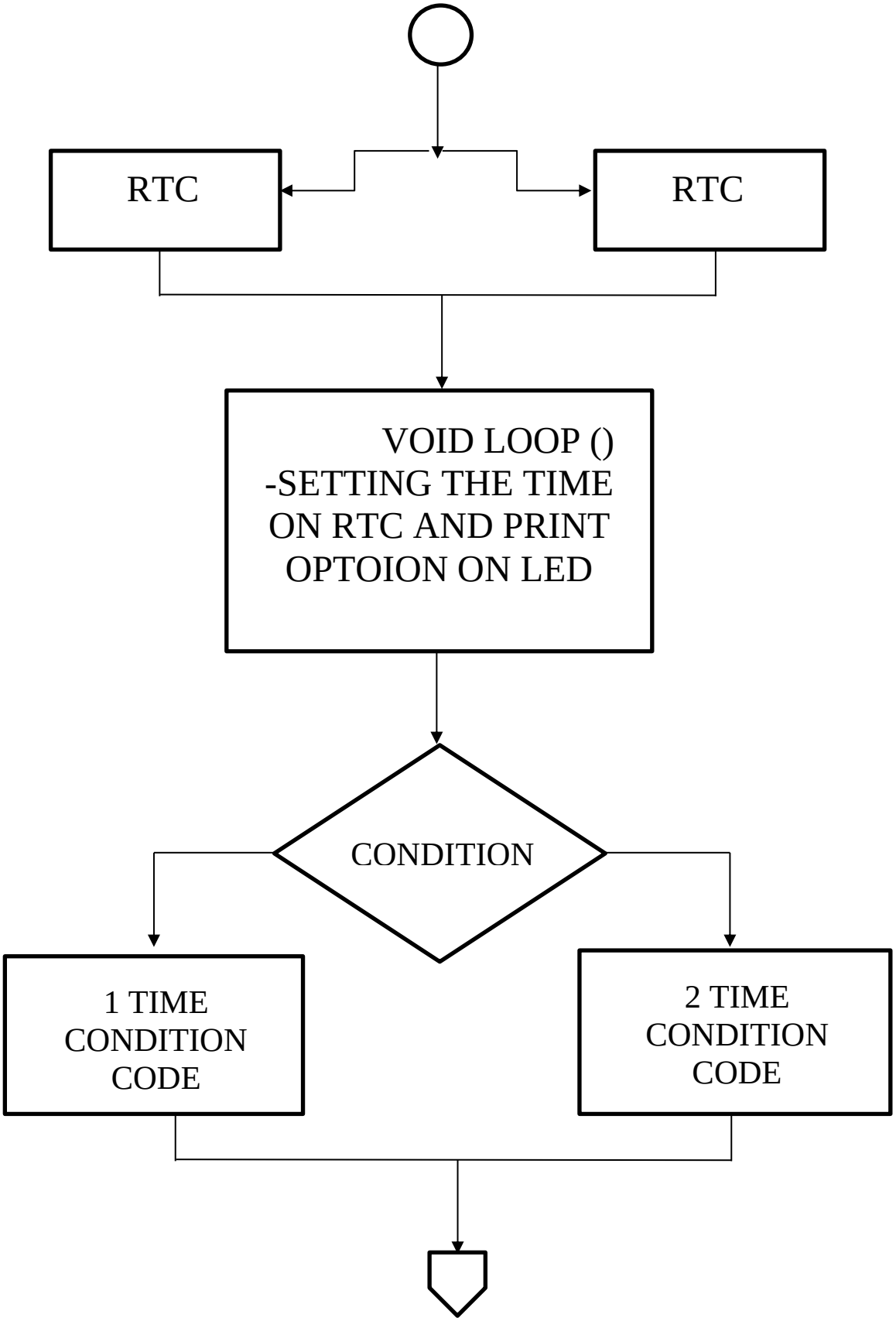


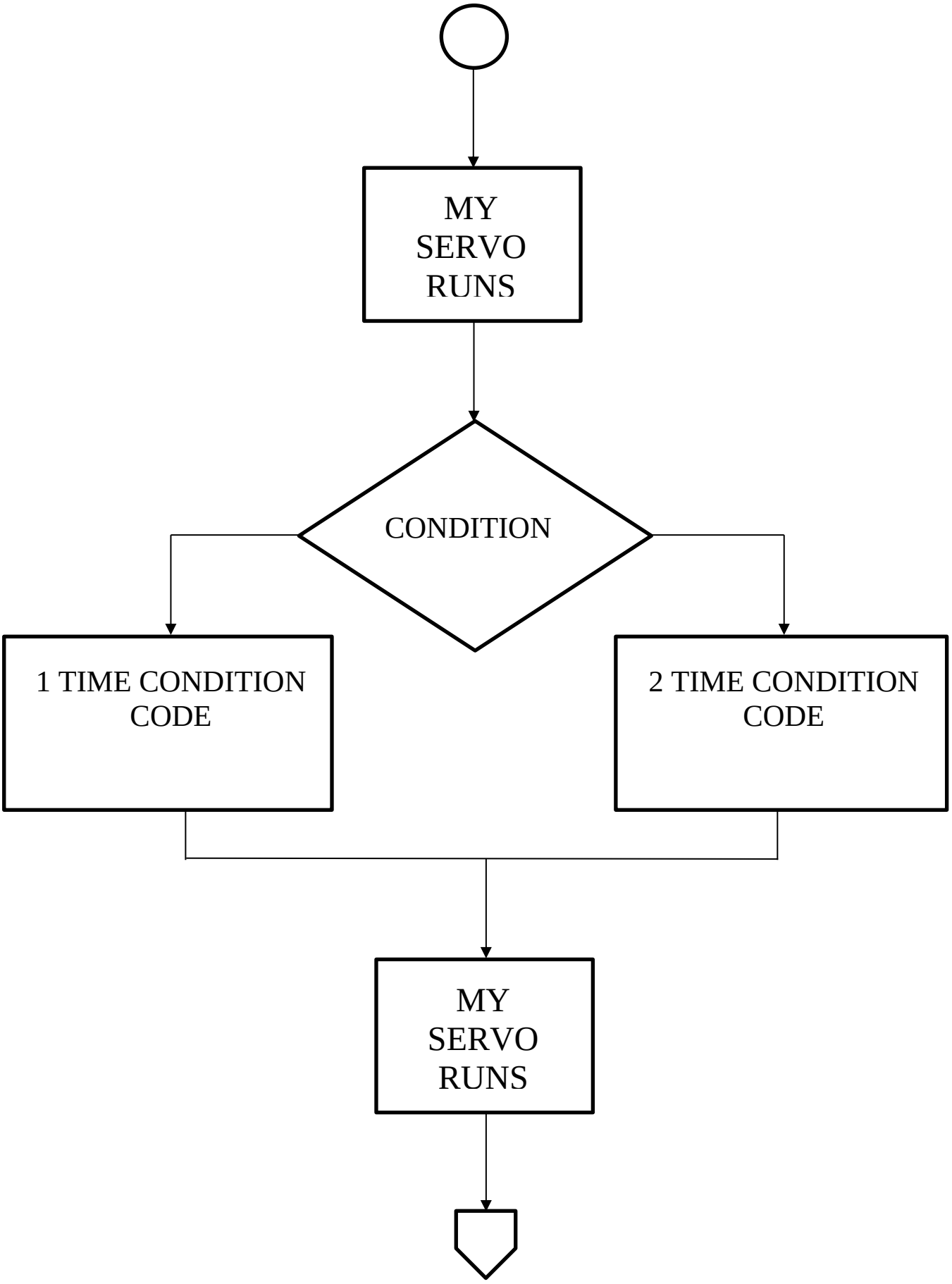
Fig:2.16 Arduino

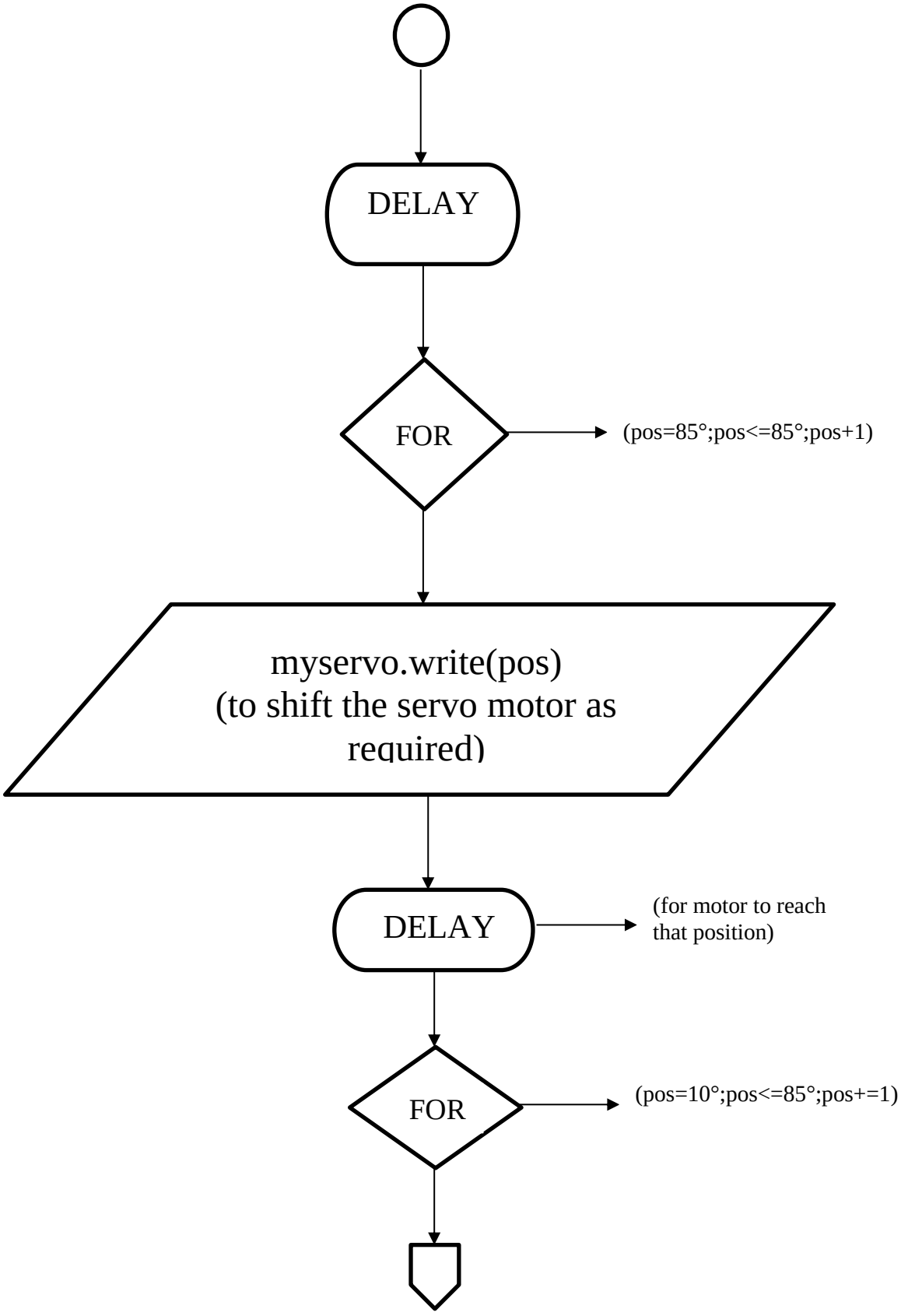
2.6 FLOW CHART

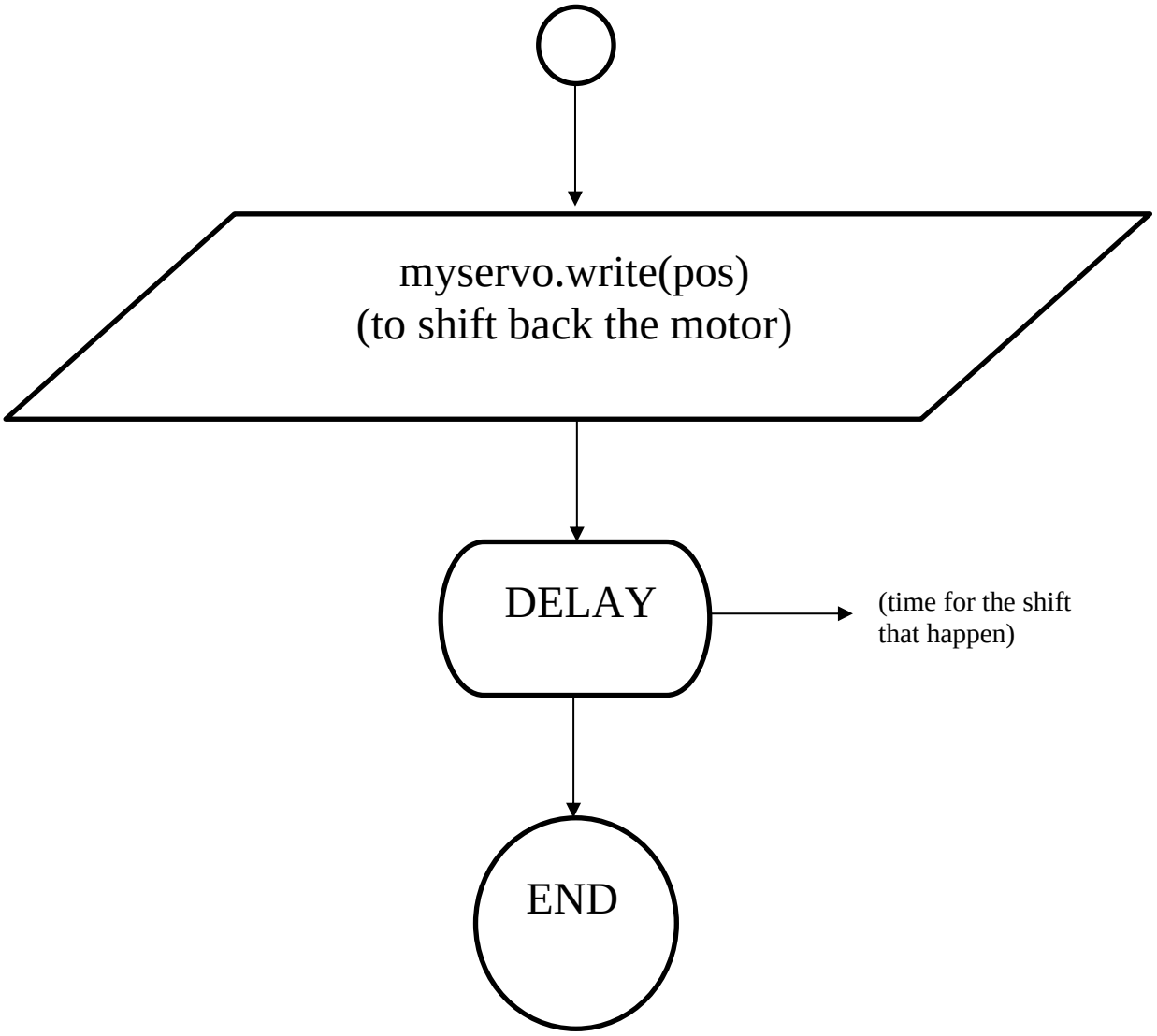
- Firstly, the libraries will be initialized i.e., < liquid crystal> for lcd, <servo.h> for using motors, <RTClib.h> etc.
- Will create all the objects of our need => create object to control servo motors.
- Then RTC will be set up.
- First function = void setup ()
- Here we will set up digital pins as output pins and set the text to be displayed on LCD.
- In this loop serial begin will be initiated.
    - Then comes the second function i.e., void loop
    - The RCT will be set according to the time of the system.
    - And if the time in the RCT matches the morning time the first servo moter moves to get the medicine and the second servo motor functions to make the pill fall in the morning block respectively.
    - Same process happens when the RCT matches the nighttime inserted and make the pill fall inthe night pill block accordingly.


START
INITIALIZING PARAMETERS
AND LIBERART (CREATING
RTC
VOID SETUP
(FUNCTION TO INITIALIZE THE DIGITAL
CONDITI


RTC
RTC
VOID LOOP ()
-SETTING THE TIME ON RTC AND PRINT OPTOION ON LED
CONDITION
1 TIME CONDITION CODE
2 TIME CONDITION CODE


MY
SERVO
RUNS
CONDITION
1 TIME CONDITION
CODE
2 TIME CONDITION
CODE
MY
SERVO
RUNS


DELAY
FOR
(pos=85°;pos<=85°;pos+1)
myservo.write(pos)
(to shift the servo motor as required)
DELAY
(for motor to reach that position)
FOR
(pos=10°;pos<=85°;pos+=1)


myservo.write(pos)
(to shift back the motor)
DELAY
(time for the shift that happen)
END

CHAPTER 3
CONCLUSION AND FUTURE ENGAGENMENT

This chapter basically concludes our whole project and the above written report. It even includes the basic applications of the automated pill dispenser made that is it highlights the uses of this pill dispenser made. At last it discusses the future scope if the pill dispenser made.

3.1 CONCLUSION

So far, the importance of correct medication and how at times underdosing/overdosing impacts individual's health has been discussed. Keeping all this is view, an attempt has been made to make this project a success so that pills can be dispensed on correct time, and we can eliminate the risk ofunderdosing and overdosing from an individual's life.

The project made is a whole attempt to abolish the errors an individual makes over a cycle of their medication as prescribed to them. The device excludes the need of a nurse or a helping hand and takes off the burden of remembering their medications from their shoulders. Till now, many unique designs of the device serving the same purpose has been made throughout the history, as the first pillbox was made back in 1964 which was not automated, it just allowed the pills to be filled in the box and from then, many integrations has been made to this concept. The integrations are quite appealing to look at, as there is "Hero" pill dispenser which is built with artificial intelligence which makes it more interactive, and italso has an inbuilt water dispenser as well. This device eliminates these unwanted features for the purpose of cost reduction and makes the automated pill dispenser affordable.

3.2 APPLICATIONS

The main purpose of this automated pill dispenser is to be useful for medical purposes and even to help the individuals. It can even be used in old age homes to decrease the load of taking medicines on time from the old people who require nurses or a helping hand to keep a track of their doses which is getting difficult day by day as the population in these old age homes is increasing rapidly. The individuals can be the elderly people or people having some chronic diseases. This device will help to take the prescribed medicines timely which many a time's people miss out because of their very busy lifestyle. This automated pill dispenser will make it easier to memorize the timings on which the pills need to be consumed and therefore will help simplify the complicated process of a prescribed medication. This dispenser can even help keep a track on the medications of children, as these days mostly both the parents are working hence at times fail to keep a good track on the child's prescribed medication.

3.3 FUTUR SCOPE

With time, as the life of every individual becomes busier day by day people find it hard to keep suchprecise track on the medication of the sick member of the family, this device hereby will play a verycrucial role in this way. As this automated pill dispenser is designed in such a way that it keeps a track of the medication of a particular person and dispenses the pill on time as per the given input tothe device. It even blinks and alerts the patient when the medication is coming. The easy designing of the device will lead to many different uses of it further.

The device has been designed in such way that on a bigger scope it can user to dispense much biggerand heavier objects as compared to a pill. If the design would be made on a larger side, it can be used to move many other different kinds of objects. For example, it can be used to dispense mid-daymeal packages in schools which can be a very useful product in such pandemic situation