SMART MEDICINE BOX

Dissertation submitted in partial fulfilment of the requirement for the degree

BACHELOR OF TECHNOLOGY
IN

ELECTRONICS AND COMMUNICATION ENGINEERING

By

KESHIKA GUPTA (131074)

ANUBHA SOOD (131088)

UNDER THE GUIDANCE OF
Prof. (Dr.) S.V. Bhooshan

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

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DECLARATION BY THE SCHOLAR

We hereby declare that the work completed and the observations recorded in the B.tech project : **"SMART MEDICINE BOX"** submitted at the **Jaypee University of Information Technology, Waknaghat, India**, is an original record of our work done under the guidance of **PROF. (DR.) S.V. BHOOSHAN**. We have not submitted this work elsewhere for any other degree or diploma.

Keshika Gupta (131074):

Anubha Sood (131088):

Electronics and Communication

J.U.I.T, Waknaghat, India

May, 2017

CERTIFICATE FROM THE SUPERVISIOR

This is to state that the work recorded in the B-Tech final year project : "**SMART MEDICINE BOX**", submitted by **KESHIKA GUPTA (131074)** and **ANUBHA SOOD (131088)** at **J.U.I.T, Waknaghat, India,** is an authentic record of their original work carried out under my guidance. This work has not been submitted elsewhere.

Prof. (Dr.) S.V. Bhooshan:

HOD (ECE Department)

Department of Electronics and Communication

Jaypee University of Information Technology, Waknaghat, India

May, 2017

ACKNOWLEDGEMENT

A Project or task cannot be successfully completed without the guidance of those people who act as a guiding light and provide inspiration when you feel you have reached the spot you cannot seem to get out of. We are extremely grateful to **Prof. (Dr.) S.V. Bhooshan**, who has been one such mentor to us. Our respected teacher has been a source of guidance and motivation from time to time. His thinking and straightforward attitude have inspired us to work harder each day.

We are highly indebted to him for his initiative, encouragement, constructive criticism and familiarizing us with all the technical aspects of this project over and above.

Keshika Gupta (131074):

Anubha Sood (131088):

OBJECTIVE OF THIS THESIS

Our final year project is to make smart medicine box that is the application of microcontrollers. The device is made for the people who frequently intake drugs or medicines. This box can be programmed by which patients get to know about the no. of pills and frequency per day. This device consists of 14 different small boxes. As a result, the users can fix data for 14 different pills or medicines. When the frequency of pills and time has is fixed, the box will remind users to take any vitamin supplement using light and high frequency sound. The number of pills that are required to be used will be reflected by a seven segment led display placed on the each box. This device would extremely reduce doctor's burden on the users who take medicines frequently.

ABSTRACT

Medication noncompliance problem has caused a serious threat to human health as well as financial waste worldwide. The emerging need for healthcare offers a promising solution. In order to avoid delays and emitting the execution from doctor's side, this project puts forward the scheme of "SMART MEDICINE BOX". This project has the functions of time to remind and manage the doctor's advice to ensure that doctor's prescription can be implemented accurately and timely. This project not only contributes to rapid recovery of sufferers but also decreases the chances of medical accidents and disputes which will in turn have a good prospect of this application.

CHAPTER 1

INTRODUCTION

With the tremendous growth in medical technology, there is a cure for many dreadful diseases through the intake of several new medicines. The number of medicines to be taken by each person has increased. It has become hard focus to remind ourselves to take the medicines at a particular time. This Smart Medicine Box helps us in reminding us of the medicine that we should take at that particular time.

1.1 PURPOSE OF THIS PROJECT

Proper Medication is necessary to become a healthy but failure of that can create big trouble for a patient. This is extremely problematic for the elderly patient who had problem in keeping track of their medicine. So to overcome this we made this Smart Medicine Box which keep tracks of the dosage and duration between each consumption. Poor eyesight as one of the contributors for medicine consumption errors such as mis dosage since the elderly finds it troublesome to read the instruction on the medicine case and identifying the right dosage of the medicine along with that Memory loss is common in old age due to that decrease in speed of information being retrieved. Hence, this Smart Medicine Box will track their medication and inform patient to take right dosage of right medicine at the right time.

1.2 EXISTING MEDICINE TRACKING & DISPENCING SYSTEM

We found several different pillbox products available in the market. The cheapest one was the traditional pillbox, which contained seven boxes for seven different days of a week. Such pillbox normally cost around 200 INR. However, the user had to load the pills to the boxes every week. Mixing different pills in the same box would increase the risks of failures. There are also some other type of devices that had same functionality of reminding the user to take the medicine. The patients still need to upload different types of pills in the same box. It will also alert the user to take pills once a day. The minimal cost of this type of device was around 1000 INR. Hence, we thought of building a cheaper and functional. Smart Medicine Box that could bring more advantage to the user. We have specified the functionality of our device based on the user requirement. From the literature cited, the research proposed an idea of Smart Medicine Box that will conform the functions like time tracking and alarm triggering.

Additionally, it will also call up the user to take medicine not for on time a day but twice/three a day along with that user does not need to refill the box every week.

1.3 SYSTEM ANALYSIS

By this device we are basically trying to conquer the problem faced by the senior citizens or the old aged people that are unable to help themselves. This device in a way can promote them to be medically stable and remain healthy.

1.3.1 PROBLEM DEFINED

In developed and metro cities several trends suggest that incidence of oral medication non-compliance and its attendant consequences have increased. Hence in order to improve medication compliance, we decided to work on a project which will be very helpful to older and geriatric people. The main the objective of this research is to

design and implement a medicine box using embedded platform which is capable of controlling the proper medication facilities.

1.3.2 PROPOSED SYSTEM FEATURE

The proposed system is a programmable device that will remind the user about the medicine or pill to be taken at specific day and time. When the pill quantity and time have been set, the medicine box will remind users or patients to take pills using sound and light. The LED's on the sub boxes are used for indication purposes.

1.4 DESIGN OF THE SYSTEM

There are 7 major components in our project that are: Microcontroller (8051), transformer, LCD screen(16*2), LED's ,voice recorder 33A3 module and the medicine box consists of 14 sub boxes. It consists of two different sections microcontroller LCD and indication section and the other one is power section as shown in figure (1.1) below.

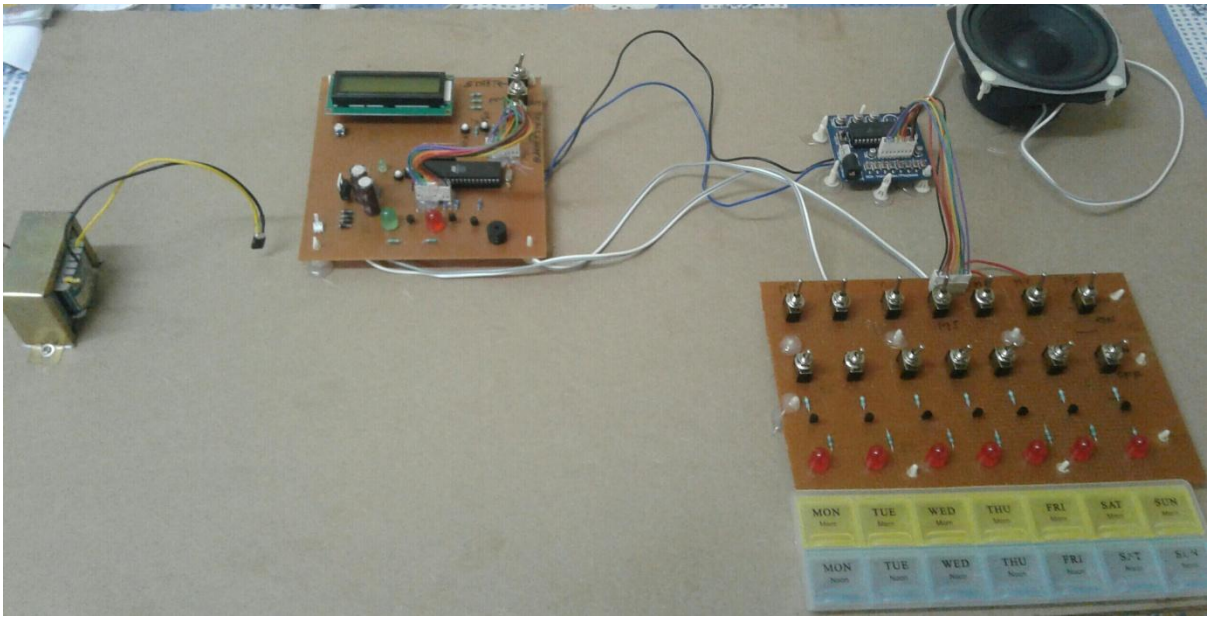

Figure 1.1 Project Model

1.5 DESIGN: LOGICAL

To provide real-time functionality this box uses real-time clock and state machine. To provide debounce functionality this state machine determines which key has been pressed/selected by the keypad. An external oscillator of 16MHz is used to build a real time clock. Due to high accuracy of the external crystal oscillator high preciseness of that external oscillator the delay over a week can at max be few minutes. Such a deviation is acceptable since we are not necessarily using the Real Time Clock as an alarm clock.

This box's logic design consists of 3 primary stages:

1. User load stage

In the user load stage, the user first has to enter the present time, i.e. the alert time and the clock time. Further is user is required to select the day on which the medicine has to

be taken following up with toggle switches provided on the board. After the user finishing entering all the information, the device will enter into the estimation stage.

2. Estimation stage

During the estimation stage, the pill information is compared for each of the sub-box with the time counted by Real Time Clock by the system. When patient enters the information matches the RTC time, the system will come out of the segregation stage and will enter the next stage.

.

3. Reminder stage

In the reminder stage, the device will progressively produce the recorded sound (8 different recorded voices), and the LED will glow for the particular sub box from which the medicine has to be taken.

CHAPTER 2

HARDWARE DESCRIPTION

2.1 8051 MICROCONTROLLER

A microcontroller is a cost-effective device which is a computer-on-chip used for coping with specific tasks, like displaying or receiving info through LEDs or remote controlled devices. Most of the devices use a set of microcontrollers belongs to 8051 Family (as shown in figure 2.1).8051 Microcontrollers stay a most well-liked selection for a massive community of hobbyists and professionals. Through 8051, the globe became witness to the foremost revolutionary set of microcontrollers.

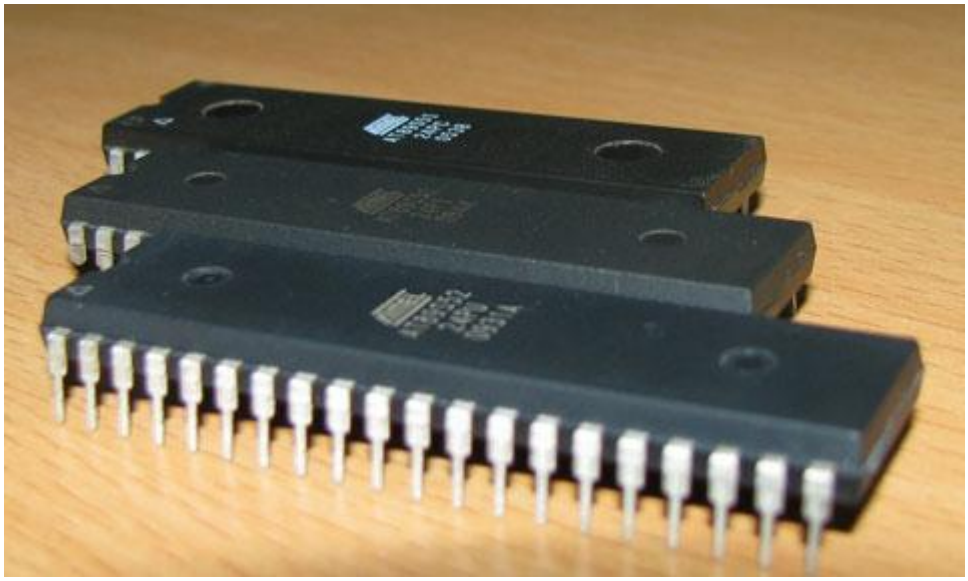

Figure 2.1 8051 Family

2.1.1 FEATURES OF 8051

• It has 16-bit address bus that can access 216 memory locations - 64 kB each of RAM and ROM

• It has 8-bit ALU, Accumulator, and Registers; therefore it is an 8-bit microcontroller

•In a single package it provides many functions (CPU, RAM, ROM, I/O, interrupt logic, timer, etc.).

•It has 8-bit data bus which can access 8 bits of data in one operation

•Data Memory- On-chip RAM (128 bytes)

•Program Memory- On-chip ROM (4 kB)

•It also has four-byte bi-directional input/output port

• UART (serial port)

• 2-level interrupts priority.

• Two 16-bit Counter/timers.

2.1.2 MEMBERS OF 8051 FAMILY

There are two other members of the 8051 families of microcontrollers. They are 8052 and 8031.

- 8052 Microcontroller

The 8052 is one of the members of 8051 families. The 8052 has all the features of 8051 also an extra 128 bytes of RAM with an extra timer. We can also say that, the 8052 has 256 bytes of RAM and three timers. It also has 8K bytes of on-chip program ROM.

- 8031 Microcontroller

8031 is an another member of 8051 families. This chip is generally called ROM-less 8051 considering it has zero kilo bytes of ROM on the chip. This chip can be used an external ROM is added to it. The ROM containing the program that is attached to the

8031 can be of 64K bytes. In this process of adding an external ROM which contains the program attached to the 8031, we can often lose two ports. This leaves only two ports for Input/output operations. To solve this problem, an external I/O device can be added to the 8031 by interfacing it with the memory and Input/output ports like 8255 microcontroller.

2.1.3 COMPARING THE MEMBERS OF 8051 FAMILY

Features	8051	8052	8031
RAM(bytes)	128	256	128
ROM	4K	8K	0K
Timers	2	3	2
Serial port	1	1	1
I/O pins	32	32	32
Interrupt sources	6	8	6

Table 2.1 Comparison Table of 8051 Family Members

This table compares the different features of the 8051 Family, including RAM, ROM, Timers, Serial port, Input and Output pins and also the Interrupt sources.

2.1.4 BLOCK DIAGRAM

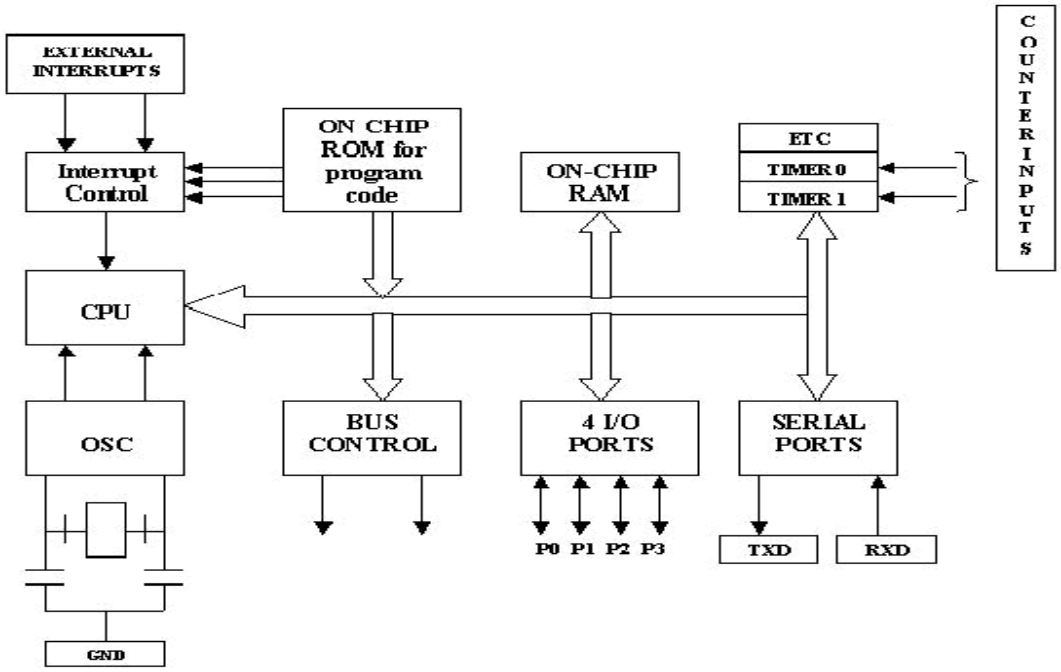

Figure 2.2 8051 Block Diagram

Figure(2.2) depicts the schematics of a typical MC. The design integrates all the features found in a general Microprocessor CPU: 1) ALU, 2) PC, 3) SP, 4) registers. It also adds some other features which are required to make a complete computer: ROM, RAM, parallel Input/output, Serial Input/output, counters, and clock circuit.

2.1.5 ALLOCATING MEMORY SPACE

1. ROM(Internal)

There are 4K bytes of on-chip memory (ROM). It has addresses starting from 0000 and lasting upto 0FFFh. Addresses higher than this exceeds the internal ROM capacity, hence cause the microcontroller to fetch code bytes from external memory automatically. These can

also be obtained when the external access pin is connected to the ground. The designer decides the origin of the code: internal ROM external ROM or in a combination of both.

2. RAM

There are 128 bytes of memory on board 8051 and the addresses of 128 bytes that can be divided into three categories :

• 32 bytes from 00 to 1Fh for register banks and the stack.

• 16 bytes from 20h to 2Fh for bit addressable read/write memory & instructions.

• 80 bytes from 30h to 7Fh , used for read & write storage. The 80 locations in RAM are majorly used for storing data and parameters by 8051 programmers.

2.2 LIQUID CRYSTAL DISPLAY

Liquid Crystal Display screen is an electronic display module which is used in a wide variety of applications. It is the 16x2 display as shown in figure 2.3 is a very primitive module and is commonly used in different devices & circuits. This module is preferred over 7 segment displays and other multi-segment LEDs. This is due to simple reason b : LCDs are cost efficient; can be easily programmable; have no limitations on displaying special & even custom characters (unlike in seven segments), animations and so on.

The 16x2 LCD displays 16 characters per line and there are two such lines. Each character is displayed in the 5x7 pixel matrix. There are 2 registers in the module- Command, and Data register.

The command register has the function of storing the command directions given to the alphanumeric display. A command is an instructions sent to the alphanumeric display to try and do a predefined task like initializing it, clearing its screen, setting the indicator position, dominant show etc. the info register stores the info to be displayed on the alphanumeric

display. the info is that the ASCII price of the character to be displayed on the alphanumeric display.

Figure 2.3 LCD Display

This figure displays the "Set Alert Time" as it points on the information that has the be given by the user for the proceeding of the device.

2.2.1 PIN DIAGRAM

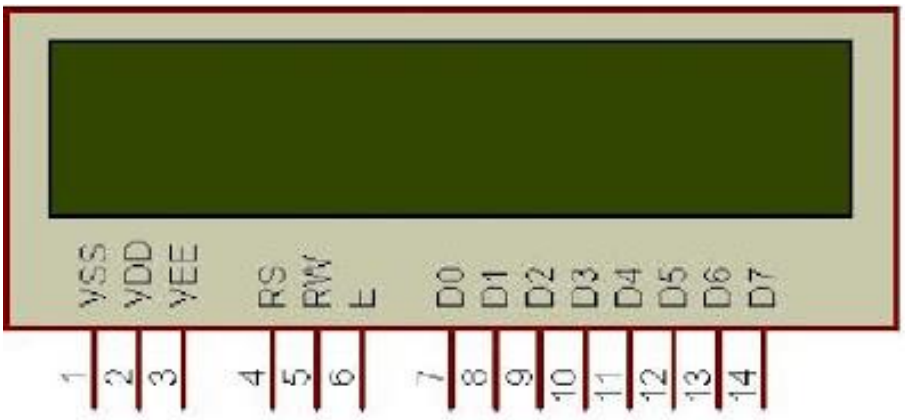

Figure 2.4 Pin Diagram of Liquid Crystal Display

Vss, V_{dd}, and Vee

The first Pin 1 (Vss) acts as a ground pin and it is definitely required that this pin should be grounded for LCD to operate efficiently. Vee and V_{dd} square measure gave +5 volts usually but Vee generally has variable resistance to induce the distinction adjusted. However, Vdd is usually kept at +5V.

Reset, Read/Write, and Enable

Reset (RS)-pin 4 is employed to create the choice between the 2 registers. For Reset=0, command register is selected and for Reset=1 data register is chosen. If set Read/Write=1 reading is enabled otherwise writing function is enabled.

E(Enable pin) is employed by the digital display to process information conferred to the data pins. When data is available on data pins, a high to low pulse is applied to the current pin in order to display and match the data.

Data pins(0-7)

The data pins are used to send information to the display module or read the contents of internal register.

Table 2.2.2 PIN OUT OF LCD

Pin Number	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	Vss
3	Contrast adjustment; through a variable resistor	V_{EE}
4	Selects command register when low; and data register when high	Register Select
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given	Enable
7	8-bit data pins	D0
8		D1
9		D2
10		D3
11		D4
12		D5
13		D6
14		D7
15	Backlight V_{CC} (5V)	Led+
16	Backlight Ground (0V)	Led-

2.3 LIGHT EMITTING DIODE

LEDs as shown in figure 2.5 are light sources based on semiconductor. The spectrum range of LEDs varies from visible to infrared and uv regions. They are low voltage, power devices. they are one of the most common and basic electronic components that are used as indicators. They are used as luminance and optoelectronic devices.

On forward biasing led emit photons. The two terminals: anode (+) and cathode (-).

The operating voltage (1.7V-2.2V) should be lower than the supplied voltage (5V) for it to operate in a circuit. Directly using LED would any protection circuit would destroy its p-n gate. Hence in series a current limiting resistor is used.

Figure 2.5 LED

2.4 VOICE RECORDER 33A3 MODULE

It offers storage capability and require minimal support. Recording and playback of audio for 11 minutes with an 8 kilo Hz of sampling rate and resolution size of 16-bit. When onboard jumpers are used, total duration is divided in individual triggers of 1, 2, 4 & 8 segments that can be triggered by switches that are onboard.

2.4.1BASIC FEATURES

• It is user-friendly and easy to use operation

• It has high-quality voice recording, single chip and playback solution

• It has recording duration of 11 minutes that can be selected in total 1,2,4,8 segments

• Non - Volatile - flash memory technology and does not require battery backup

•It can drive a speaker or audio out for public address system with the help of audio

•The voice can be recorded with the help of onboard microphone or via any audio input like PC

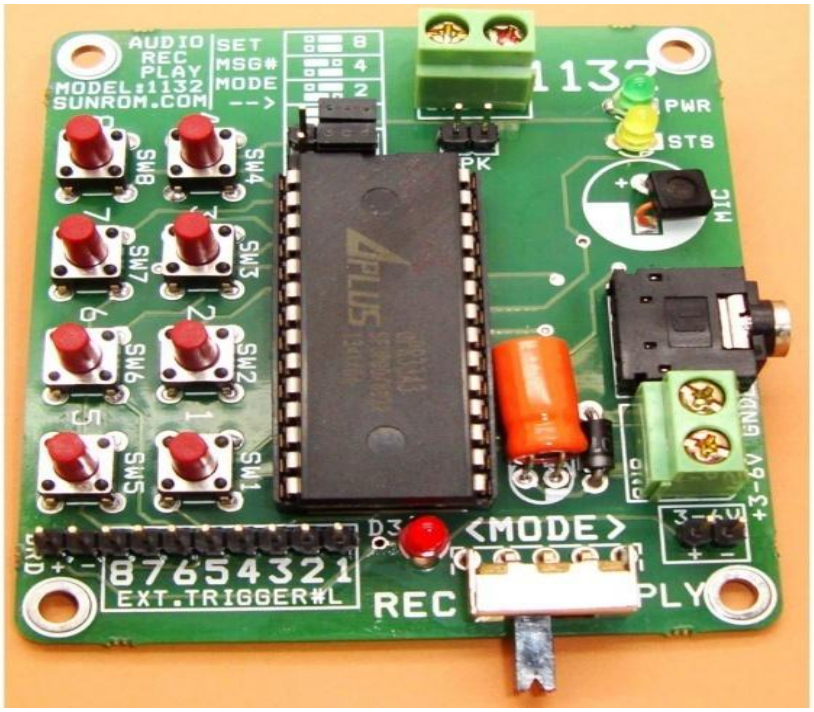

Figure 2.6 Voice Recorder Module

2.4.2 BROAD DETAILS

• To start using the board, operating voltage of applied to the board can be 3 to 5V and speaker must be connected to the board. Practically, voltage that is appropriate in practice is 5 volts.

• A message mode needs to be selected before turning the setup on .

4 types of message modes.

There are 8 messages of duration 1.3 min each.

MIC will automatically start recording in case of no external audio. •

Turn on the board.

• Next step is putting the SW to Record Mode, which is indicated by a RED LED right next to the switch. The board can go into the play mode if the LED is off and switching between the LED states , the board oscillates between Play & record mode.

• The RED LED glowing indicated that the switch is in record move.

• Pressing SW1-SW8 while in the record mode helps record a message via a MIC that is indicated by an independent LED. Release the SW1-SW8 when the segment is full. The segment can remain empty if the switch is released before the entire duration of the segment

• Putting the switch back into play mode will let us check the recorded message

• Similar process can followed for recording in mode 2, mode 4 & mode 1.

• In the case of mode 1, 2, 4, only that switches as per mode will be used and rest will be not used.

2.4.3 MESSAGE MODE SETUP

• 11 minutes of chip duration is segregated into 8 messages of 1.3 minutes each.

• 11 minutes of chip duration is divided into 4 messages of 2.75 minutes each.

• 11 minutes of duration of chip is divided into 2 messages of 5.5 minutes each.

• 11 minutes of chip duration amounts to only 1 message.

2.4.4 STATIC MESSAGE MODES

• Switch SW1 is used for recording or streaming in case of mode 1.

• Switches SW1 and SW2 are used for recording or streaming in case of mode 2.

• Switches SW1 to SW4 are used for recording or streaming for mode 4.

• Switches SW1 to SW8 are used for recording or streaming for mode 8.

2.4.5 MICROCONTROLLER'S TRIGGER

For the header to allow us to use it as a trigger we have basically brought all the 8 switch connections from external MC instead of using the onboard switch to play the message.

IC gets a trigger when you make that pin LOW which means the switches are in active low mode.

The idle condition is to keep the switch in high level. Also make sure that the ground is kept with the microcontroller and audio board common.

2.5 SPEAKER

A loudspeaker system (or "speaker") as shown in figure 2.7 is one form of a transducer converting electrical energy into acoustic energy. Sound waves are generated once electrical signal is applied to one of the input pins . Other terminal of the speaker is connected to the ground. Speaker are primarily used to produce sound. One of the examples being, an intruder alarm, that goes off whenever an intruder breaks in .

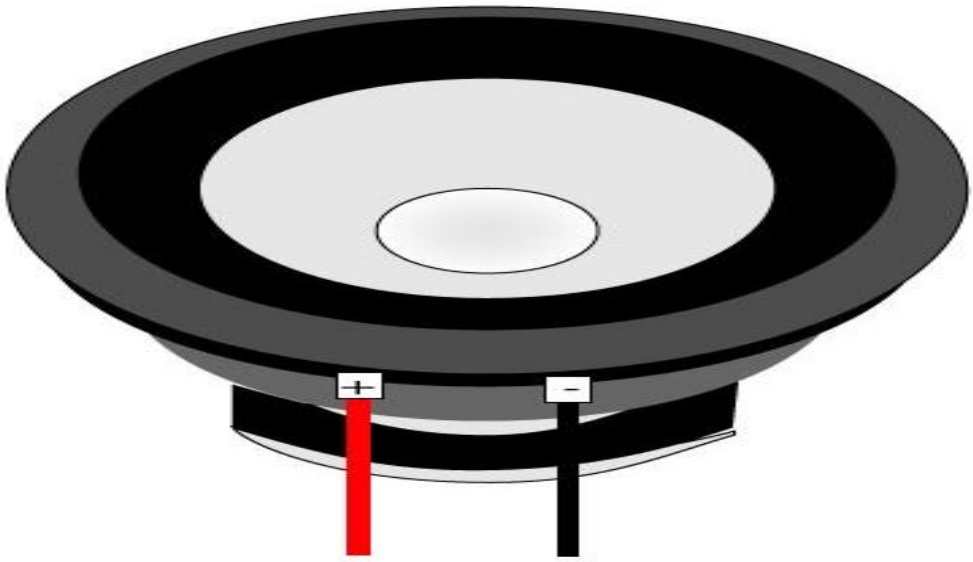

Figure 2.7 Pin Diagram Of Speaker

2.6 TRANSFORMER

2.6.1 INTRODUCTION

By the help of inductively coupled conductors, transformers transfers current from one circuit to a different circuit—the transformer's coils. A varied current within the first or primary winding creates a varied magnetic flux within the transformer's core and therefore a varied magnetic field through the secondary winding. Electromagnetic force (EMF) is

induced by this varied magnetic field .Voltage in the secondary winding. Mutual induction is the name given to this effect.

Faraday's law is used by a transformer and therefore the magnetism properties of the associated iron core to expeditiously raise or lower AC voltages. If the voltage level is raised if obviously cannot increase the power . Proportionally the current is lowered and the other way around.

2.6.2 PRINCIPLES OF A TRANSFORMER

It depends on two principles: initially, an electrical current will turn outfield of force (electromagnetism), and, second that a changing field of force within a coil of wire will induce a voltage across the ends of the coil (electromagnetic induction). Changing the current in the primary coil changes the magnetic flux that's developed. The changing magnetic flux induces a voltage in the secondary coil.

2.6.3 TYPES OF TRANSFORMER

There are basically two types of Transformers:

1) Step up Transformer
2) Step down Transformer

2.6.3.1 TRANSFORMER-STEP UP

One of the extremely common and important electrical devices are step-up transformers that are employed in power transmission and modification. In transmission system these are one of the most important transformers that are used in many forms in the entire system.

In this the secondary voltage is greater than the primary voltage. They "steps up" the voltage that is applied at their winding.

2.6.3.2 TRANSFORMER-STEP DOWN

Step-Down Transformers are most widely used transforms in which the primary winding is greater than the secondary winding. Any type of these two transformers could be present in the system to achieve counter application. It is required to confirm that the resultant voltage is equivalent to what is needed as it can result in an abrupt output that depends on the frequency of primary and secondary windings. For the reliability of the system, the output must be within a few percent of required voltage.

2.6.4 FUNCTIONING OF A TRANSFORMER

The Faraday's law of electromagnetic induction is the basic principle of the transformer. The mutual induction between two or more windings results in transformation action of the transformer.

2.6.512-0-12 TRANSFORMER SPECIFICATION

Volt-ampere (VA) or Kilo Volt Amperes (kvA) are the basic unit of transformer rating. The transformer as shown in figure 2.8 depicts that the voltage or the potential difference between each end terminal of the secondary winding and the mid-point of the secondary winding of is

12V. Between the two ends of the secondary winding, it is 24V (12 + 12 = 24V. The current carrying capacity of the secondary winding is 500mA that is equal to 12V (A 25 x 0.5 = 12VA).

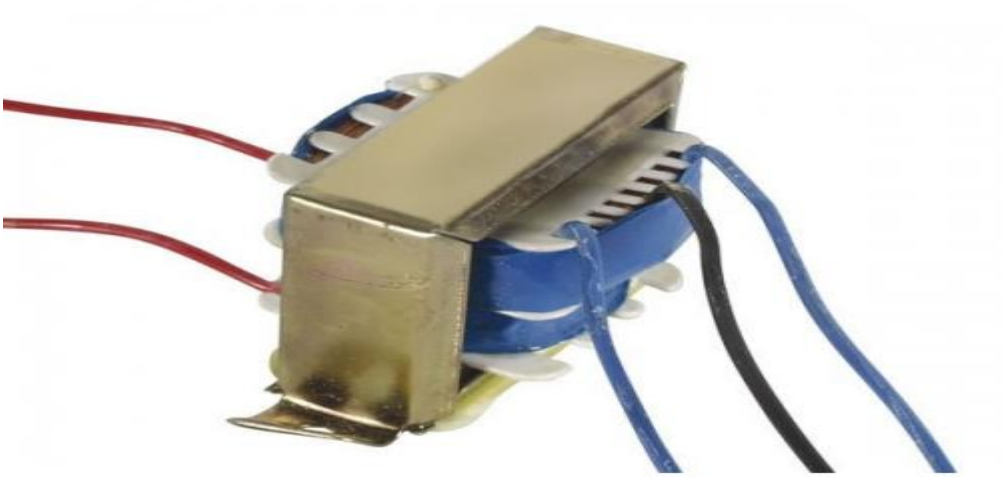

Figure 2.8 12-0-12 Transformer

2.7 RELAY SWITCH

A relay switch as shown in figure 2.9 is used to separate electrically two circuits and magnetically connects them. These can connect one circuit another circuit even if they are totally separated from each other. They interface a low voltage electronic circuit to a very high voltage electrical circuit. An example of which can be switching of a 230V AC mains circuit using 5V DC battery using relay switch.

Input and output are two important parts of it. A coil in the input side produces a magnetic field on applying a small voltage from an electronic circuit that is the operating voltage. The

relays are present in a various configuration are 1) 6Volts, 2) 9Volts, 3) 12Volts, 4) 24Volts etc. The connectors on the output side are mechanically disconnected by the contractor. There are three basic contactors: a) normally open (NO), b) normally closed (NC) and c) common (COM). On applying the operating voltage coil gets excited and the Common changes contact to Normally Open. Variety of configurations available is SPST, SPDT, and DPDT etc, having different number of contacts.

Figure 2.9 Relay Switch

2.8 PIEZO BUZZER

The piezo buzzer as shown in figure 2.10 on the counter of the piezoelectric effect produces sound. The basic principle is the pressure variation or strain produced on the application of potential difference around its material. Such device can be used to alert a user of an event related to a switching action, counter signal or it can be a sensor input. One of their applications can be alarm circuits.

The device produces a high intensity sound even if there is voltage variation. Piezo crystals are present between two conductors. When a potential is generated a push action must be

applied on one conductor and pull on the other that produces the sound wave. Range being : 2 - 4 kHz.

Connect the Red lead to the Input and the Black one to the Ground.

Figure 2.10 Piezo Buzzer

2.9 VOLTAGE REGULATOR (7805 IC)

IC 7805 is a device that regulates voltage as shown in figure 2.11. The voltage supply in a circuit can have variations and will not offer the highlighted voltage output. The constant output voltage is maintained by the IC.. Capacitors of proper values can be connected to input and output pins depends on the individual voltage levels.

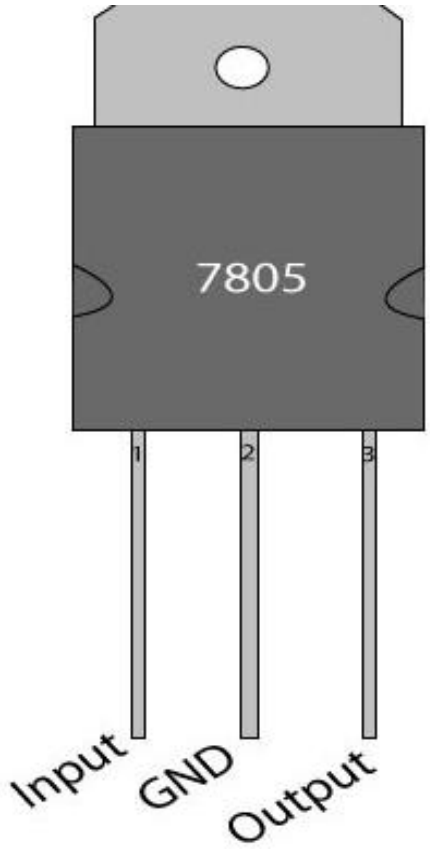

Figure 2.11 IC 7805

2.9.1 PIN OUT DESCRIPTION

Table 2.2 Pin Out Description of IC 7805

Pin No	Function	Name
1	Input voltage (5V-18V)	Input
2	Ground (0V)	Ground
3	Regulated output; 5V (4.8V-5.2V)	Output

CHAPTER 3

DESIGNING

3.1 SOFTWARE DESIGN

This project is an integrated software system running in the MCU. This device is programmed on AVRStudio4.0, and the programming language used is standard C and WINAVR/GCC compiler. Software system is divided into four parts, 1) real-time clock, 2) user interface, 3) LED control, 4) sound generation. The information stored in each medicine box is input by the user and the information is stored in structure variables. Once the user finishes initialization the real time clock keeps running. The system would enter the segregation status, after all the information has been entered. The comparison function would check if there are any medicines that should be taken at that time. Once the comparison function is done with the detection part, the recorded sound will broadcast to indicate it to the user.

3.2 CIRCUIT DIAGRAM

3.2.1 MICROCONTROLLER SECTION

(i) Vcc

Supply voltage is +5V which is provided by the pin no.40 to the chip.

(ii) GROUND

Ground is at pin no.20.

(iii)PIN 19- XTAL1 and PIN 18- XTAL2

The microcontroller has an on-chip oscillator but also requires an external clock to run it. Most often a quartz crystal oscillator is connected to inputs XTAL1 (pin 19) and XTAL2 (pin 18).The quartz crystal oscillator connected to pin number 19 and pin number 20 also needs two capacitors of value 30pF. One side of each capacitor is connected to the ground. There are various speeds of 8051 families. Maximum oscillator frequency is referred to speed.

(iv) RESET

RESET pin is pin no. 9. It is an input and is active high and, the microcontroller will reset and terminate all activities on applying a high pulse to this pin. This is often referred to as a power-on reset.

For reset input to be effective, it must have a minimum duration of two machine cycles. In other words, for a minimum of two machine cycles before to go low the high pulse must be high.

(iv) EXTERNAL ACCESS

The family members of the 8051 are 8751/52, 89C51/52 all come with on-chip ROM to store programs. This pin is connected to Vcc in such cases. There is no on-chip ROM for members of the family such as 8031 & 8052, the code is stored in an external ROM and further fetched by the 8051/52.

The EA pin must be connected to GND to indicate that the code is stored externally. Pin number 31 is EA which stands for “external access” in the DIP packages. It must be connected to either Vcc or GND. This pin can't be left unconnected.

(v) PROGRAM STORE ENABLE

PSEN stands for “program store enable”. This pin is an output pin. This pin is connected to the OE pin of the ROM in an 8051 based system in which an external ROM holds the program code

(vi) ADDRESS LATCH ENABLE

ALE (address latch enable) is an output pin and is active high. Port 0 provides both address and data when connecting an 8051 to external memory. Port 0 is used to save pins the 8051 multiplexes address and data. This pin is used for demultiplexing the address and data by connecting to the G pin of the 74LS373 chip.

.

(vii) Input/output PORT PINS

These 4 ports P0, P1, P2 & P3 each use 8 pins, making them 8-bit ports. All the ports upon RESET are configured as inputs, ready to be used as input ports. When the first 0 is written, it becomes an output. A 1 must be sent to the port to reconfigure it as an input. It should be programmed well.

(vii) PORT 0

A total of 8 pins (pins32-39) is occupied by Port 0. It can either be used as an input or output. Each pin must be connected externally to a 10K-ohm pull-up resistor to use the pins of port 0 as both input and output ports.

(viii) PORT 1

A total of 8 pins (pins 1 through 8) is occupied by Port 1. It can either be used as input or output. This port does not need any pull-up resistors since it already has pulled up resistors, in contrast to port 0. Port1 is configured as an input port.

(ix) PORT 2

A total of 8 pins (pins 21 through 28) is occupied by Port 2. It can either be used as an input or output. Just like P1,port 2 does not need any pull-up resistors since it already has pulled up resistors internally. Upon reset port 2 is configured as an input port. It must be programmed as such by writing 1 to all its bits , to make port 2 as an input,.

(x) Dual role of port 2

P2 is used as simple I/O, in many 8051 systems, But in 8051-based systems, port 2 must be used along with P0 to provide the 16-bit address for external memory. To indicate its dual functionality, Port 2 is also designated as A8-A15.

(xi) PORT 3

A total of 8 pins, pins 10 through 17 is occupied by Port 3. It can either be used as input or output. Just like P1 and P2 did not, P3 does not need any pull-up resistors. Although port 3 is configured as an input port upon reset, this is not the way it is most commonly used. Some of the alternate functions of P3 are listed below:

P3.0 Serial input-RXD

P3.1 Serial output-TXD

P3.2 External interrupt 0-INT 0

P3.3 External interrupt 1-INT 1

P3.4 Timer 0 external input (T0)

P3.5 Timer 1 external input (T1)

P3.6 External memory write strobe (WR)

P3.7 External memory read strobe (RD)

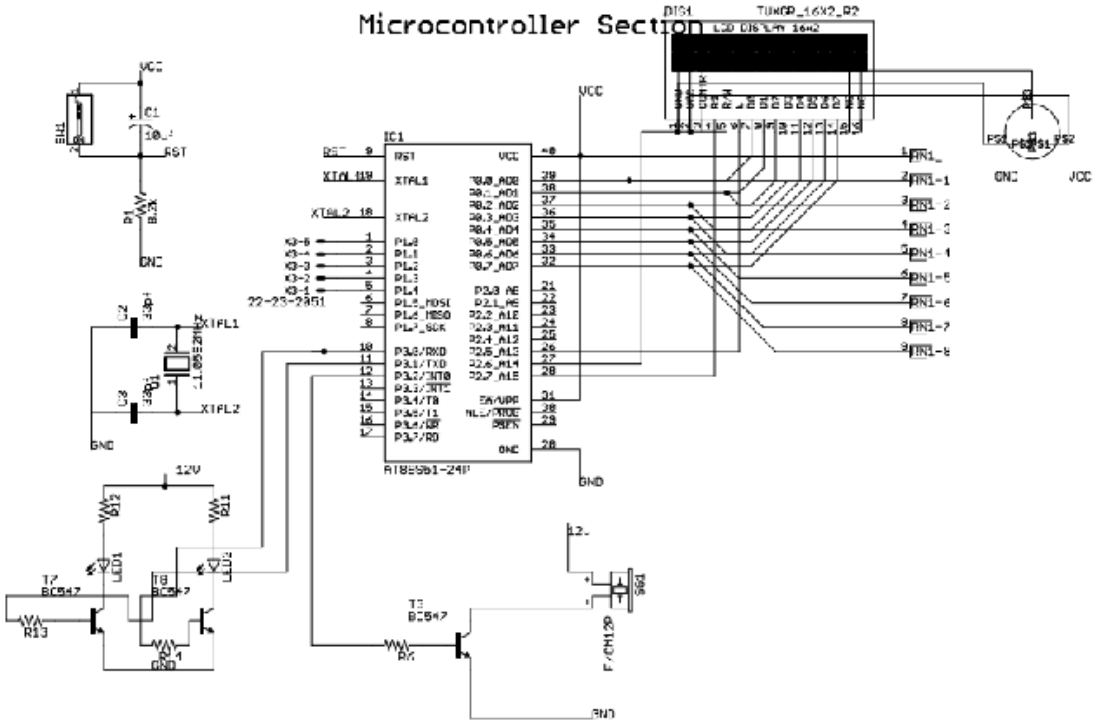

Figure 3.1 Circuit Diagram of Microcontroller Section

3.2.2 POWER SUPPLY SECTION

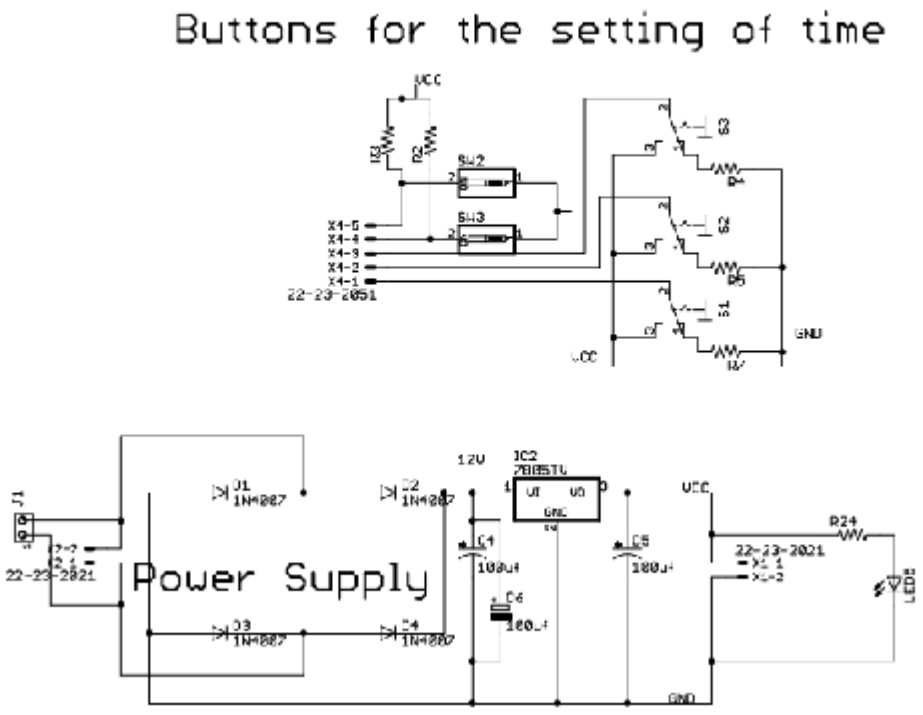

Figure 3.2 Circuit Diagram of Power Supply Section

3.3 PCB DESIGNING

We have used the software EAGLE (Easily Applicable Graphical Layout Editor) to design our board. It gives the complete layout of the different components that are connected in our

box how the different connection are made for the working of our smart medicine box as shown in figure 3.3.

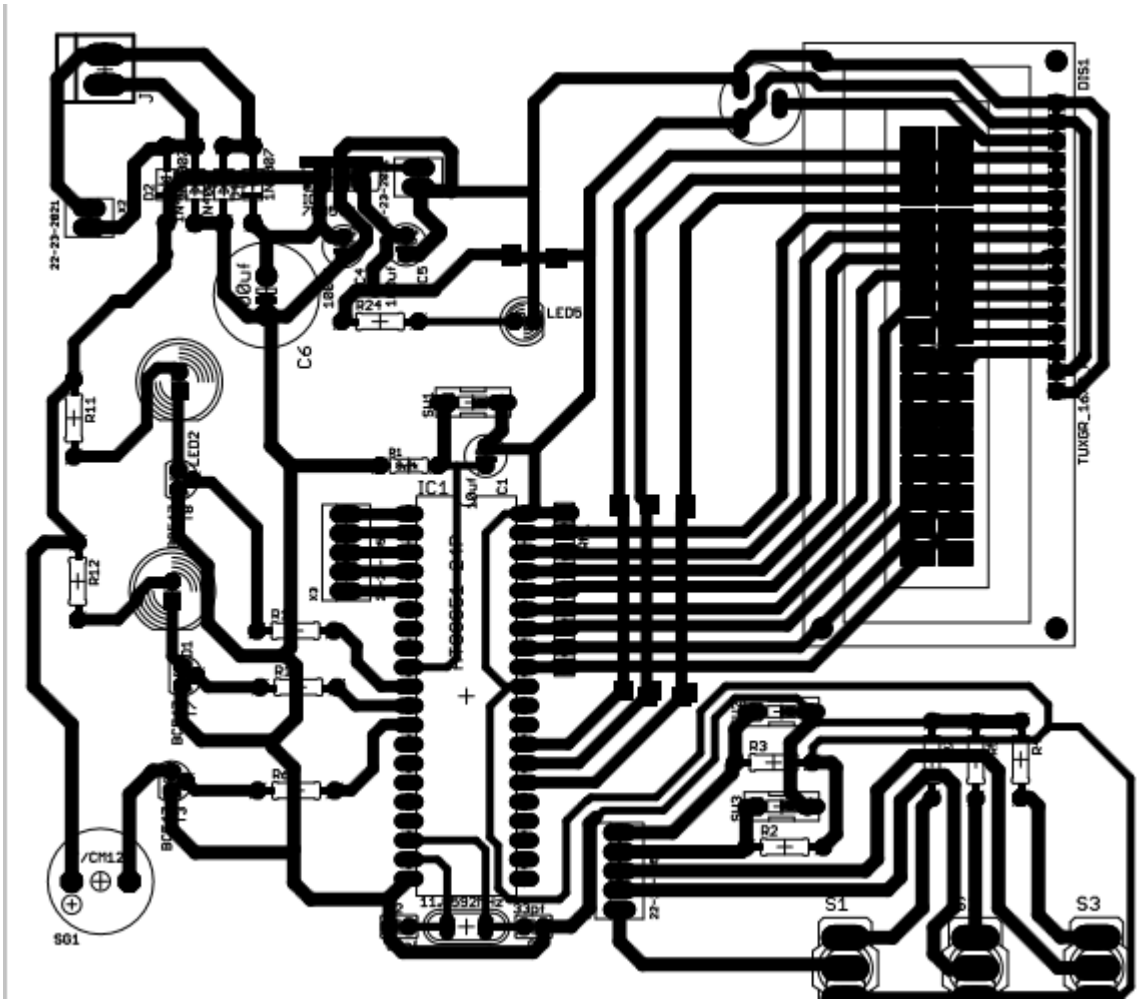

Figure 3.3 PCB Designing of the Project

CHAPTER 4

RESULTS AND OBSERVATIONS

The observations of our device were satisfactory. After all, we were able to manage all the long cable wires and electrical components used in this project. Hence the user will not face any distraction. Besides, the box also provides certain retreat ability to lessen the risks of electrical shock. The LCD module and the toggle buttons were placed on the surface of the board. When the power is on, the LCD would display characters with a gentle and vibrant backlight (yellow), which allows the user to identify the characters highlighted on the screen even in the dark surroundings. With the application of state machine, the push buttons responded instantly and correctly when the buttons were pushed. The light intensity of the led display was satisfactory, as the characters displayed can be easily identified by the users. While performing the test, we found that the light intensity for some led's was a bit different as compared to the others, but this in turn would not affect the users to recognise the characters displayed. The speaker module was also capable to create clear and loud recorded voices when the estimation state was triggered. In this project we have recorded various voices for the simplicity of the users for proper consumption of drugs prescribed by the doctors.

4.1 EFFECTIVE USABILITY

Since our project is proposed to be used by the users who do not have any prior technical background or is enable to operate a complicate d system. Therefore, the user evaluation is essential for our project in terms of future developments.

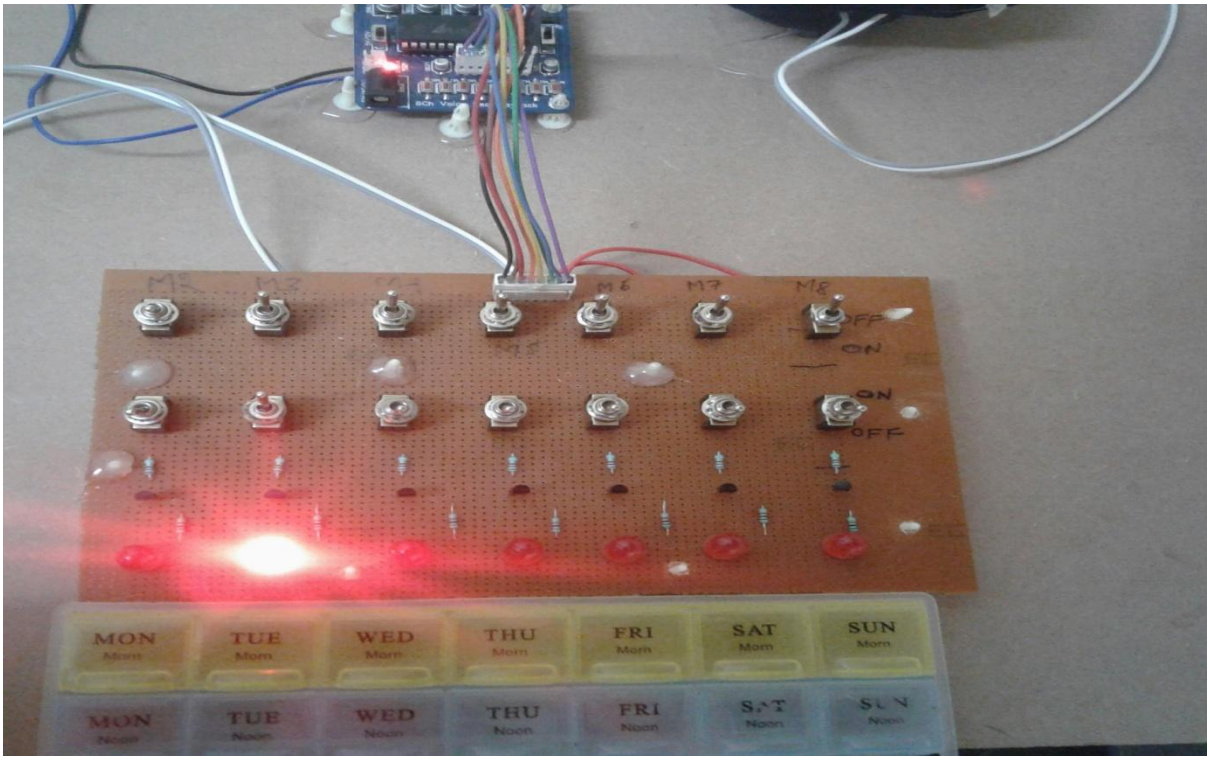

Figure 4.1 Observation

CONCLUSION

As there is a great need for timely consumption of medicines which is mostly skipped by many people. Our device helps to remind people to take medicines regularly and also indicates which medicine has to be taken. Thus this device can be a huge and useful step in the field of medicine industry. This project is mostly focused on the problems faced by aged and elderly people concerning loyalty to their prescribed medication. It not only aids the elderly people who live independently but also helps the caretakers of the elderly by reminding them about correct no. of pills to be taken at the right time. For the device to work satisfactorily we have chosen embed platform that has been experimentally proven .This device which is a sort of semi-automatic is not only useful for geriatrics but also useful as it is user friendly for all of us. Embed provides a greater efficiency to our project. It also makes it to be cost efficient. The other great advantage of this box is that it is very easy to use and less complicated as it does not require any prior technical knowledge.

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