Temperature Based Fan Speed Control and Monitoring System

A Project and Thesis Submitted for Electrical and Electronic Engineering to Fulfillment of Degree of EEE.

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Certification

I hereby declare that project entitled “temperature based fan speed control and monitoring system” Submitted for the Electrical and Electronics engineering in Daffodil International University for fulfillment of EEE Degree & it’s not Copy of any work or project.

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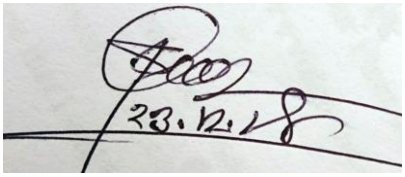

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Dedicated to

Our Parents

Acknowledgement

First of all, we are grateful to the almighty God. On the eve of the happy moment, we would like to express our deep gratitude and thanks to the people and personalities who had helped us during the preparation of our project.

We respect and thank to Professor Dr. M. Shamsul Alam Dean sir and Sanwar Hussain sir, help us do this project and support us to make this a reality.

We are also very grateful to our family to giving us motivation and inspiration during our work time.

Finally, we would like to thank all friends, who by means of their constructive comment, suggestion, criticism and valuable advice contributed for the successful completion of our project.

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Abstract

In this present of time, there are many types of smart systems are Founded in the growing world of technology.

Technology is getting more easy and Flexible to work. The more time goes the more demand of new technology increase. To make ensure that demand we have to make a smart and easy to use technology. For this reason we create this project.

In this world, the more time pass the more global temperatures increase, in that conclusion this project “temperature based fan speed control and monitoring system” is very useful at this time.

The study was conducted with the design and manufacture of Automatic Fan Control System using microcontroller and temperatures sensor.

CONTENTS

Section 1:

INTRODUCTION

1.1 Introduction

Electric fun is called poor people air conditioner; it has been most used electronic device all over the world. Almost every person in this world once use fan because of its low power use, easy to obtain, low cost, minimum maintenance.

In this present time when world getting more & more hot due of climate changes this is the perfect time to implement this project.

1.2 Objective

The desired of this application is to observe and watch over temperature and control a fun using heat energy. Automatic temperature control fan is very useful for Smart way to live in our live. Over the year technology has been growing fast. The Live Smart solution is the easiest way to control your life; this is the objective of this project.

1.3 Application of this Project

In our normal everyday life we often use somewhat an easy to use, low power electro appliance. For this mindset we create this project. Let see some application of this level.

- Personal computers
- Exhaust fans in large hotels
- Washing machines
- CD and DVD players
- This application can use home electro appliance
- Small enterprise can get great benefit from this application
- This application save lots of consumer power
- The circuit can be used for Car Engine to reduce the heat

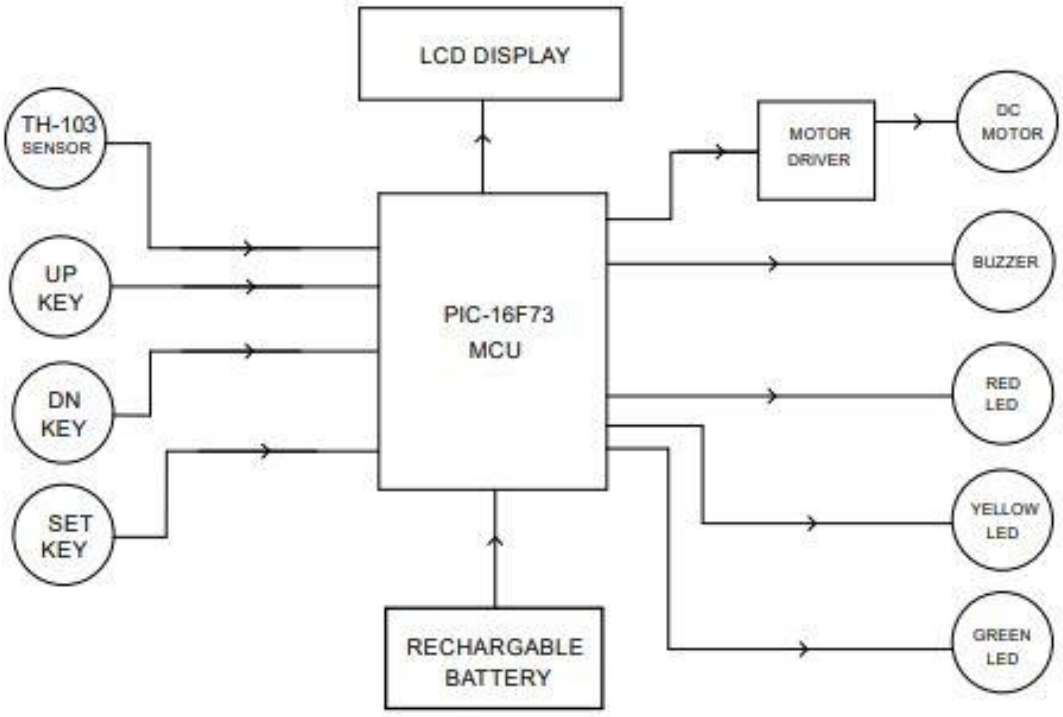
Section 2:

DIAGRAM COMPOSITION

2.1 Introduction

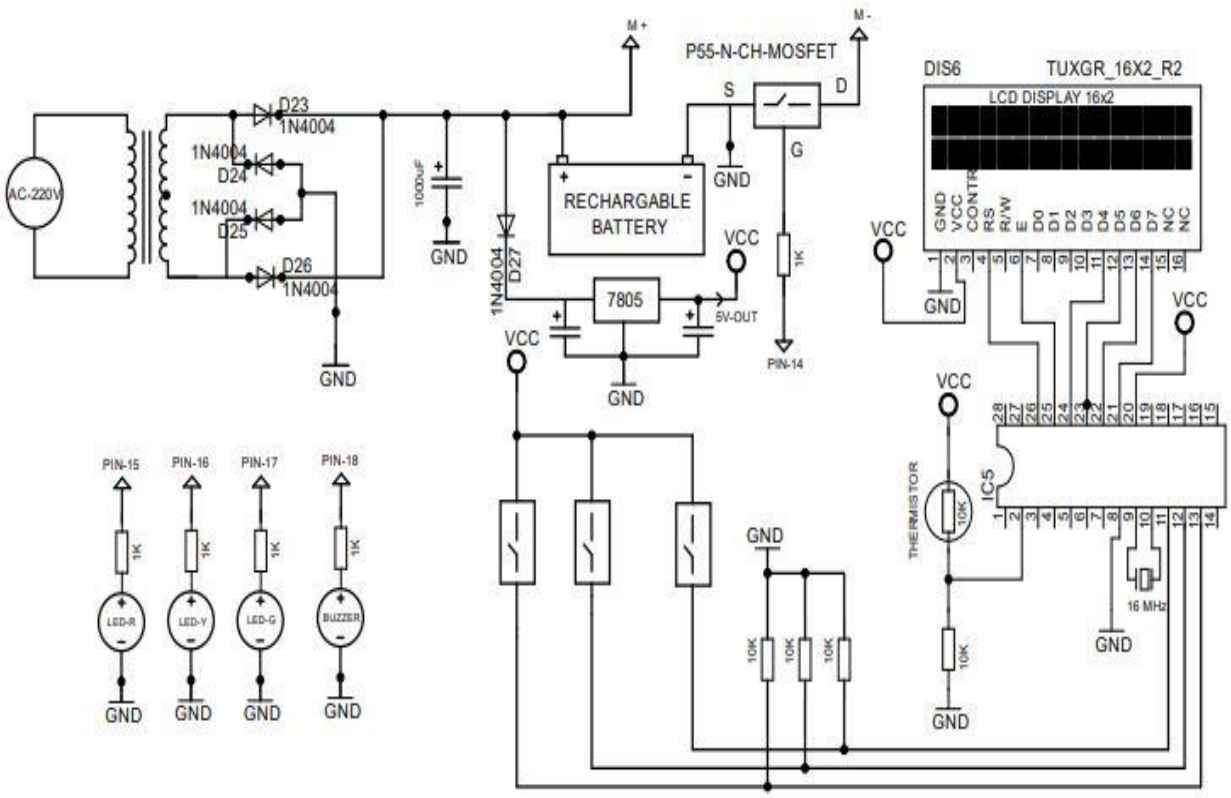
In this section we discuss about the heat based fan control system block diagram, circuit diagram and hardware requirements.

2.2 Block Diagram



BLOCK DIAGRAM : TEMPERATURE BASED FAN SPEED CONTROL AND MONITORING SYSTEM

2.3 Circuit Diagram



2.4 Hardware Requirements

This section we discuss about the heat based fan control system hardware requirements.

- pic16F72 MICROCONTROLLER
- TH 104
- CRYSTAL 16MHz
- LCD DISPLAY 2*16
- CAPACITORS
- SOME RESISTOR
- DIODE
- DC MOTOR
- PROJECT SWITCH
- BATTERY
- SOME WIRES
- STEP DOWN TRANSFORMER
- PROJECT MODEL BOARD
- LED

Section 3:

HARDWARE DEFINITION

3.1 Introduction

This section we discuss about the heat based fan control system hardware requirements and definition.

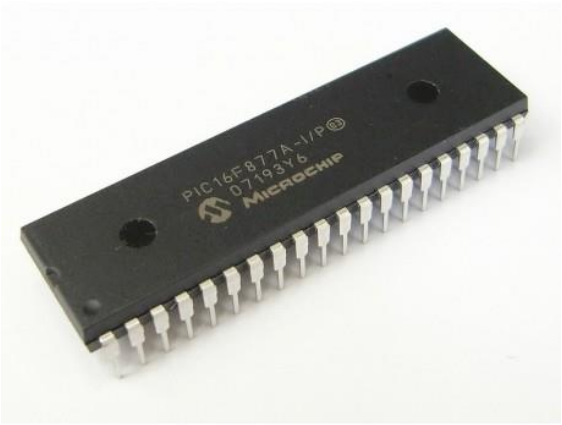
3.2 pic16F72 microcontroller

The PIC16F72 belongs to the Mid-Range family of the PIC devices. The program memory contains 2K words, which translate to 2048 instructions, since each 14-bit program memory word is the same width as each device instruction. The data memory (RAM) contains 128 bytes. There are 22 I/O pins that are user configurable on a pin-to-pin basis. Some pins are multiplexed with other device functions.

- External interrupt
- Change on PORTB interrupt
- Timer0 clock input
- Timer1 clock/oscillator
- Capture/Compare/PWM
- A/D converter
- SPI/I2C

SPECIFICATIONS:

- Maximum CPU Frequency: 20 MHz
- Architecture: 8 bit
- Program Memory (Flash): 3.5 kB
- RAM: 128 byte
- Internal Oscillator: No
- ADC: 1 (5 channels)
- No. of Pins: 28
- Voltage: 2V - 5.5V

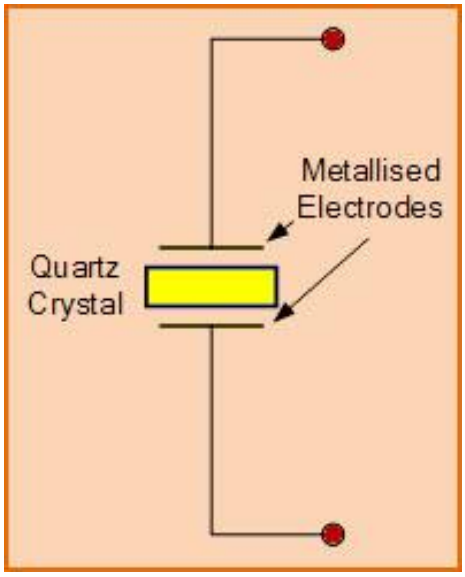


3.3 TH 104 Sensors / LM 35 Sensors

The th104 sensors are a heat detector base design application. The main objective of this sensor is to observe and give data to the desire circuit about heat data. This sensor gives data starting at 0 degree to all the way to 150 degree.TH150 sensor use operating voltage of 10 volt.

3.4 Crystal Units

The name crystal unit or other name crystal oscillator is a product that uses the power of mechanical echo or pulse to convert into electrical signal. Crystal is very useful in this application for converging heat into electrical data.

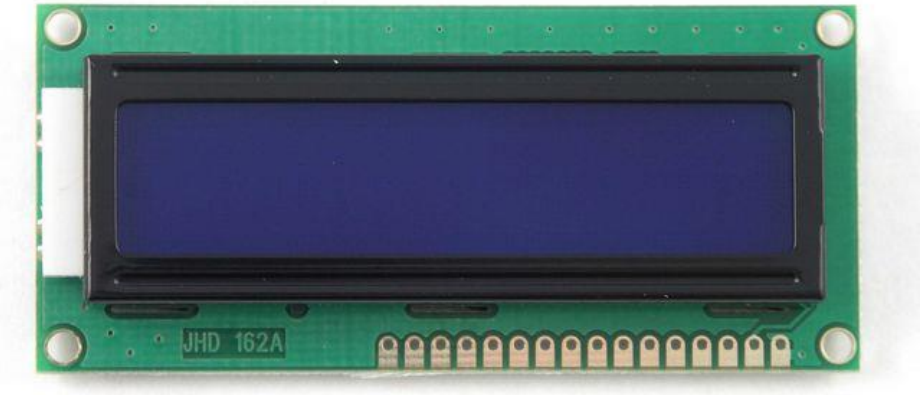


3.5 Liquid Crystal Display

In almost every project there is require a data viewing display, that is the LCD or full name liquid crystal display. This panel is a flat display that's use light wave to make monochrome.

The liquid crystal display is made of seven segments that use to display required characteristic. It uses the same rules as seven segments so we can use LCD anywhere.

16x2 is the rules set of LCD. 16 line element to trademark this application for controlling LCD.



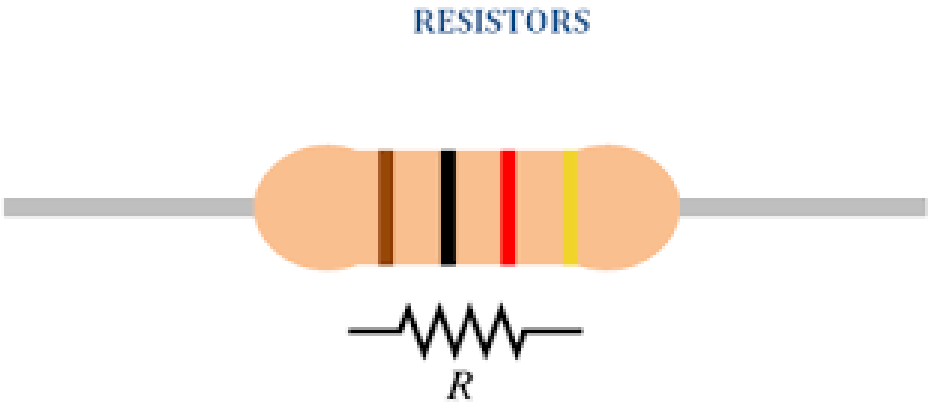
A specified signal given to the microcontroller then the microcontroller gives the signal to LCD and then light monochrome display the given data. This is how LCD displays works.

3.6 Capacitor

A capacitor is a device that gathers and stock electric charge. It's made of a type of component that store data inside. Capacitor is an electrical component made of two terminals. Capacitor long side of inductors and resistors are most used application in electrical system.

3.7 Resistor

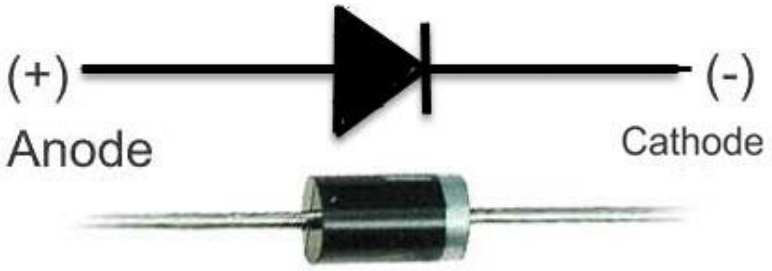
Resistor is type of component that gives an interruption to the circuit. Its nature is to define signal flow.



3.8 Diode

Diode is a kind of application that use rules set of one directional current flow system. Diode is a semiconductor device. It's made of two side one is anode other is cathode.

The most knowing type of diode is p-n junction type diode. P side of junction use positive charge and N side of junction use negative charge.



3.9 Motor

This is a product that use electrical signal to convert mechanical energy. Motor is a rotating device that rotates when it gets certain amount of electrical signal.

Motor operate a application that using a magmatic field to rotate, magmatic winding spin the rotating field.

Given are parts of a Dc motor.

- Stator that start the motor
- Rotor that rotated the motor
- Air gap use air
- Winding is the field of coil
- Commentator is to keep motor for reversing.

Types of DC motor

- Shunt DC motor
- Compound DC motor
- Series motor
- Permanent motor

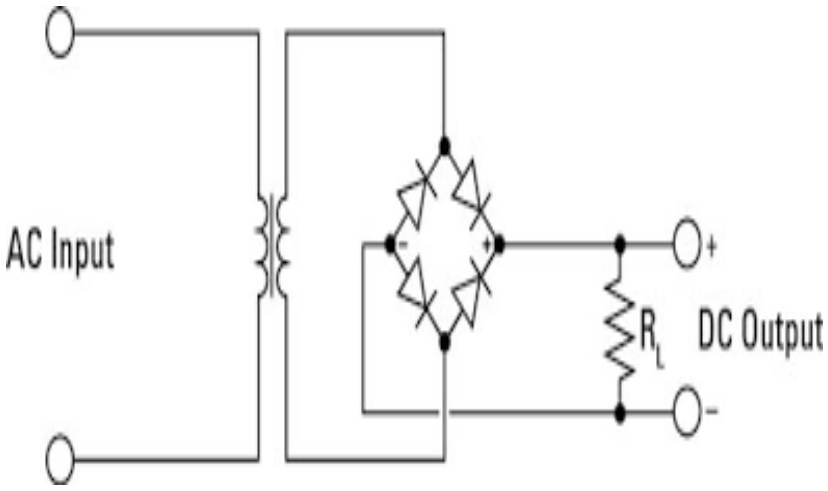
3.10 Wire

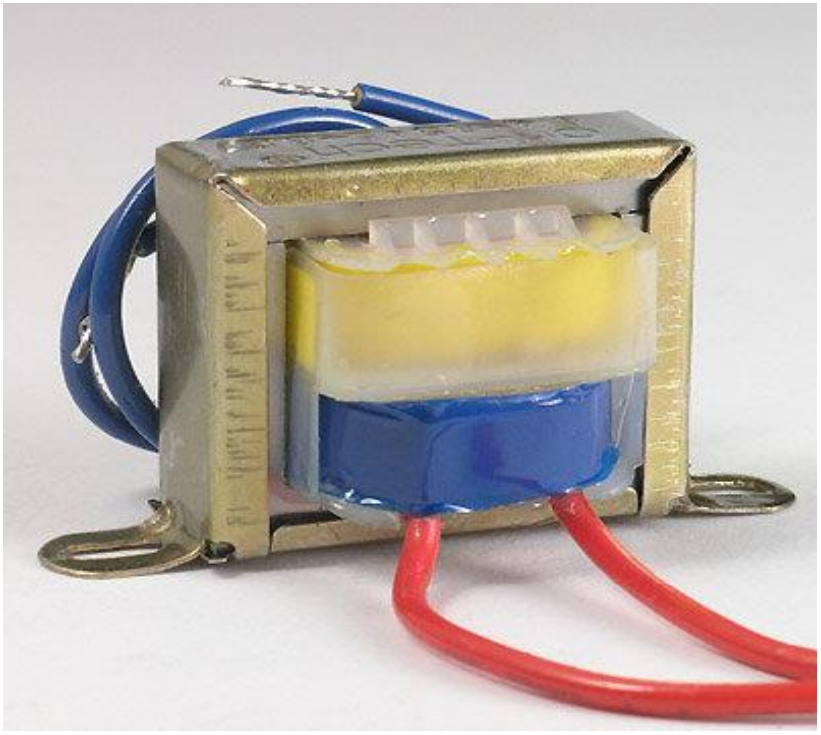
Electrical wire or Jump wire is commonly used in all types' electrical project and workshop. Its types of material that connect one end to another.

3.11 Project Switch

3.12 Transformer

An application of step down transformer use is primary side voltage high and secondary side voltage low. This is creating to reduce voltage one side to another.





3.13. Project broad

3.14 Battery

Battery is universally used as an energy storing device. It is store electrical energy in way to use this sometime later when we need the power.

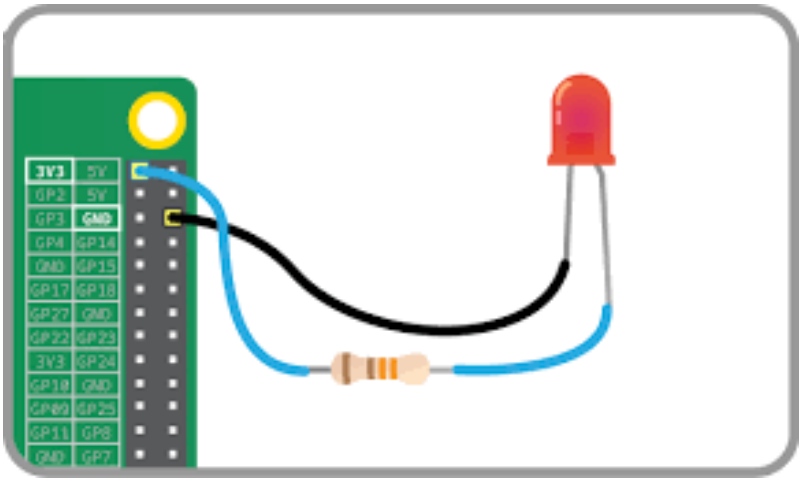
The battery is made of cell of electrochemical that use anode and cathode cell. The positive side is known as the cathode and the negative side known as anode.

Battery types are

- Nickel cadmium type cell
- Nickel metal type cell
- Lithium ion cell
- Acid lead cell

3.15 LED

A light emitting diode is electrical device that light up when its two part of side get a certain amount of voltage.



3.16 speakers

This is application that produces sound by metal coli.

Section 4:

COMPUTER PROGRAMMING CODE

4.1 Introduction

This section is about computer programming code.

4.2 coding

```
#include <16F73.h>

#use delay(clock=16000000)


#define LOAD PIN_C3

#define BUZ PIN_C7

#define RLED PIN_C4

#define YLED PIN_C5

#define GLED PIN_C6


////////////////////////////////////////////////////////////////////////////


main()

{

 setup();


 while(1)
```

```
 {
  LOD_CTRL();
  SET = input(PIN_C2);
  IF(SET)
  SETTINGS();void LOD_CTRL(void)
{

  if( TP > ONTP )
  {
   output_high(LOAD);
   output_high(YLED);
   output_LOW(GLED);
   output_LOW(RLED);
  }
  if(TP < OFTP)
  {
   output_LOW(LOAD);
   output_high(GLED);
   output_LOW(YLED);
   output_LOW(RLED);
  }
  if( TP > HTP )
  {

      output_low(LOAD);
```

```
      output_LOW(GLED);
      output_low(YLED);

      output_LOW(RLED); output_HIGH(BUZ);
      delay_ms(100);
      output_HIGH(RLED);output_LOW(BUZ);
      delay_ms(100);
  }

}

  ////////////////////////////////
  COUNT++;
  if(COUNT > 200)
  {
    COUNT =0;TOG ^=1;
    adc_read();
    lcd_show();
   }

 }
}
void LOD_CTRL(void)
{
```

```
if( TP > ONTP )
{
 output_high(LOAD);
 output_high(YLED);
 output_LOW(GLED);
 output_LOW(RLED);
}
if(TP < OFTP)
{
 output_LOW(LOAD);
 output_high(GLED);
 output_LOW(YLED);
 output_LOW(RLED);
}
if( TP > HTP )
{

    output_low(LOAD);
    output_LOW(GLED);
    output_low(YLED);

    output_LOW(RLED); output_HIGH(BUZ);
    delay_ms(100);
    output_HIGH(RLED);output_LOW(BUZ);
    delay_ms(100);
```

```
  }

}

////////////////////////////////////////////////////////////////////////////
void setup()
{

   output_high(LOAD);

   output_HIGH(BUZ);delay_ms(70);output_LOW(BUZ);delay_ms(70);
   output_HIGH(BUZ);delay_ms(70);output_LOW(BUZ);delay_ms(70);
   output_HIGH(BUZ);delay_ms(70);output_LOW(BUZ);delay_ms(70);

   output_low(LOAD);

   lcd_gotoxy(1,1);
   printf(lcd_putc, "   WELCOME TO   ");
   lcd_gotoxy(1,2);
   printf(lcd_putc, "      DIU      ");
   delay_ms(1500);

}

////////////////////////////////////////////////////////////////////////////
```

```
void adc_read(void)
{
  set_ADC_channel(0);
  tp = read_adc();
  tp = tp * 0.2;
  TF=  1.8 * tp +32;

}
////////////////////////////////////////////////////////////////////////////
void LOD_CTRL(void)
{

 if( TP > ONTP )
 {
  output_high(LOAD);
  output_high(YLED);
  output_LOW(GLED);
  output_LOW(RLED);
 }
 if(TP < OFTP)
 {
  output_LOW(LOAD);
  output_high(GLED);
  output_LOW(YLED);
  output_LOW(RLED);
```

```
  }
  if( TP > HTP )
  {

      output_low(LOAD);
      output_LOW(GLED);
      output_low(YLED);

      output_LOW(RLED); output_HIGH(BUZ);
      delay_ms(100);
      output_HIGH(RLED);output_LOW(BUZ);
      delay_ms(100);
  }

}
////////////////////////////////////////////////////////////////////////////
void lcd_show(void)
{

  lcd_gotoxy(1,1);
  printf(lcd_putc, "T:%2.1f%cC           ",TP,223);

  lcd_gotoxy(1,2);
  printf(lcd_putc, "T:%2.1f%cF ",TF,223);
```

```
  lcd_gotoxy(11,2);
  printf(lcd_putc,"H:%02u%cC",HTP,223);

}
////////////////////////////////////////////////////////////////////////////

void SETTINGS(void)
{
  SETCNT=0;ONTP=30,OFTP=30,HTP=32;
  lcd_gotoxy(1,1);
  printf(lcd_putc, " SETTINGS       ");

  lcd_gotoxy(1,2);
  printf(lcd_putc, " PLEASE WAIT... ");
  delay_ms(1500);
  output_LOW(LOAD);

  WHILE( SETCNT < 3 )
  {
     IF(ONTP > 62) ONTP=62;IF(ONTP < 11) ONTP=11;
     IF(OFTP > 62) OFTP=62;IF(OFTP < 11) OFTP=11;
     IF(HTP > 99) HTP=99;IF(HTP < 11) HTP=11;

     UP = input(PIN_C0);
     DN = input(PIN_C1);
```

```
SET = input(PIN_C2);


 IF(UP)
 {
  IF(SETCNT==0)
  ONTP++;
  IF(SETCNT==1)
  OFTP++;
  IF(SETCNT==2)
  HTP++;
  delay_ms(200);
 }
 IF(DN)
 {
  IF(SETCNT==0)
  ONTP--;
  IF(SETCNT==1)
  OFTP--;
  IF(SETCNT==2)
  HTP--;
  delay_ms(200);
 }
 IF(SET)
 {
  lcd_gotoxy(1,2);
```

```
  printf(lcd_putc, " PLEASE WAIT...  ");
  delay_ms(900);
  SETCNT++;
}

IF(SETCNT==0)
{
  lcd_gotoxy(1,1);
  printf(lcd_putc, " SET ON TEMP:  ");
  lcd_gotoxy(1,2);
  printf(lcd_putc, " ON TEMP:%3u%cC  ",ONTP,223);
}
IF(SETCNT==1)
{
  lcd_gotoxy(1,1);
  printf(lcd_putc, " SET OFF TEMP:  ");
  lcd_gotoxy(1,2);
  printf(lcd_putc, " OFF TEMP:%3u%cC  ",OFTP,223);
}
IF(SETCNT==2)
{
  lcd_gotoxy(1,1);
  printf(lcd_putc, " SET HI TEMP:  ");
  lcd_gotoxy(1,2);
  printf(lcd_putc, " HI TEMP:%3u%cC  ",HTP,223);
```

```
    }

} //  WHILE( SETCNT < 3 )

lcd_gotoxy(1,1);
printf(lcd_putc, " SETTINGS      ");

lcd_gotoxy(1,2);
printf(lcd_putc, " COMPLETE...  ");
delay_ms(1500);
```

Section 5:

LOGIC DEBATE

5.1 Introduction

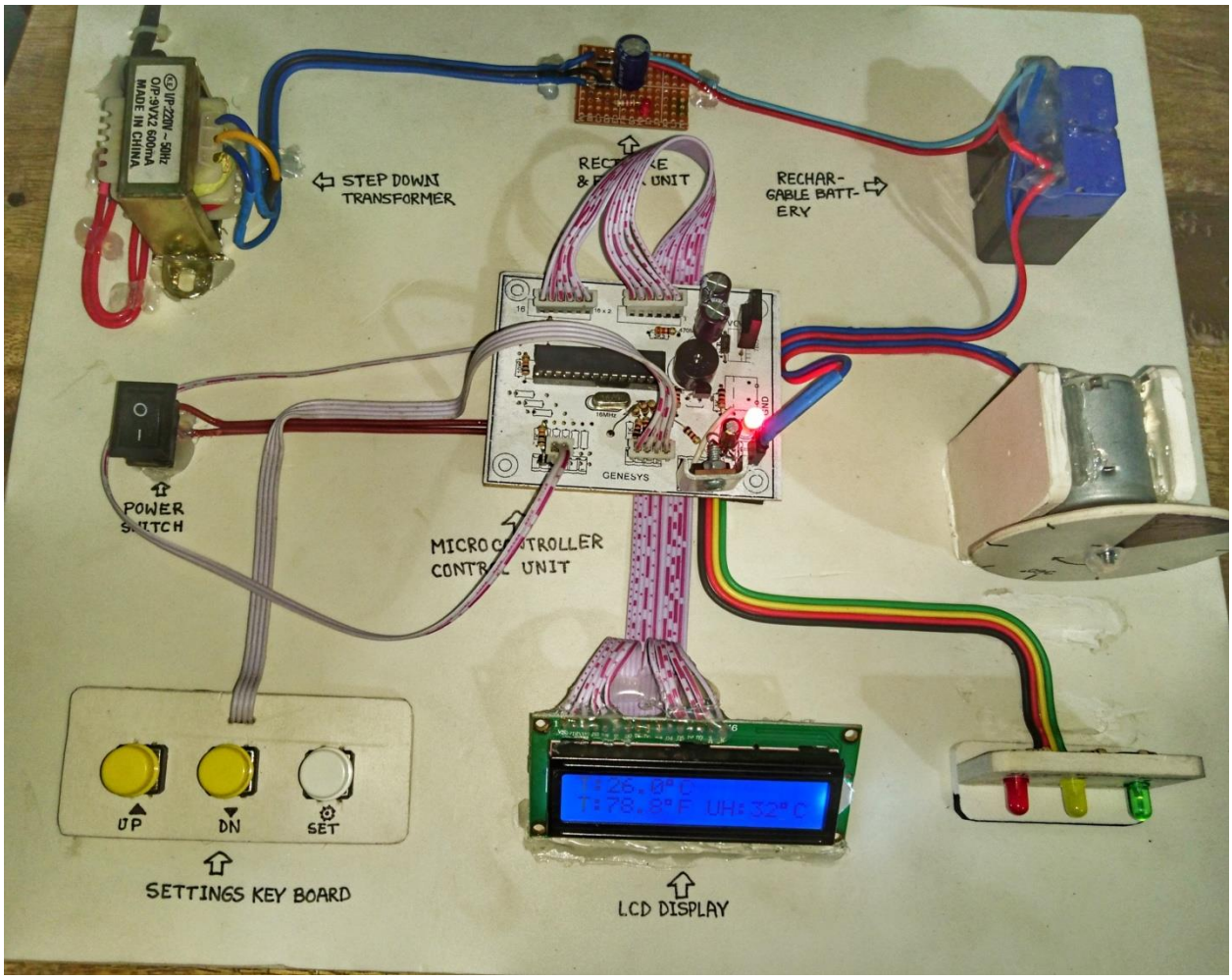
This section we learn about the heat based fan control system working procedure, Final Result, Cost Analysis.

5.2 working approach

- There are three step of this project.
- First of all we need start the system by using the start button.
- Then we see the present temperature after that we set desire temperature in the application then we set high temperature and last we set the warning temperature.
- After setting the temperature now we can start the project
- When we set the starting temperature the heat detector sense starting temperature and start the fan.
- When heat increase the fun speed increase with it. When the temperature get at a certain point the speaker give us a signal that we have reach a critical moment
- After crossing the critical temperature the fun stop automatically and signal is stop.
- This all process shown in the LCD display and the temperature can be control easily.
- This is the working approach of this project.

5.3 Final Result

This section we learn about the heat based fan control system final result.



5.4 Cost Analysis

Product list	Price
❖ pic16F72 MICROCONTROLLER	190
❖ TH 104	350
❖ THERMISTOR(10K)	50
❖ CRYSTAL 16MHz	50
❖ LCD DISPLAY 2*16	200
❖ CAPACITORS	50
❖ SOME RESISTOR	50
❖ DIODE	100
❖ DC MOTOR	50
❖ PROJECT SWITCH	90
❖ BATTERY	120
❖ SOME WIRES	100
❖ LED	60
❖ STEP DOWN TRANSFORMER	120
❖ PROJECT MODEL BOARD	500
❖ Other	500

Total cost =2580 taka only

Section 6:

CONCLUSIONS

6.1 Introduction

This section we learn about the heat based fan control system application, advantages, Conclusion, Future Improvements & Future Scope work.

6.2 Application

In our normal everyday life we often use somewhat an easy to use, low power electro appliance. For this mindset we create this project. Let see some application of this level.

- Personal computers
- Exhaust fans in large hotels
- Washing machines
- CD and DVD players
- The circuit can be used for Car Engine to reduce the heat
- This application can use home electro appliance
- Small enterprise can get great benefit from this application
- This application save lots of consumer power.

6.3 Advantages

Advantages of Temperature Controlled Fan.

- It is very economical and easy to handle by the user
- Speed varies automatically, so that it controls the speed without using it manually
- This application is benefit for disabled people
- it's easy to install into a office or workshop
- This application helps to save electrical energy.

6.4 Closing Arrangement

In this application we learn about the heat based fan control system and uses of this project. For Smart way to live in our live this project help us to exactly that. So this project is very time efficient and useful.

6.5 Future Improvements

The focus of this research will be on the implementation of sensor that controls the speed of the fan. Scopes of this research are:

- The project will concentrate on electric standing fan rather than other type of fan such as ceiling fan
- We can improve by adding sensor like humidity, light etc
- We can watch and monitor data using app or over the internet.
- It can show a graphs of temperature up down data
- When temperature go a off the limit we can receive a call or massage by a mobile.
- Etc

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