Temperature Sensor Using Arduino UNO and LM35

Project Report

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Slot: D1

Submitted for J – Projects (CAL) in partial fulfillment of the requirements for the course in

Microprocessor and Interfacing (CSE2006)

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Winter 2018-19

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Acknowledgement

It is our privilege to express our sincerest regards to our project coordinator, Prof. Sasipriya P, Professor, School of Electronics Engineering, for their valuable inputs, able guidance, encouragement, whole-hearted cooperation and constructive criticism throughout the duration of our project.

We also take this opportunity to thank all the faculty of the School for their support and their wisdom imparted to us throughout the course.

We take this opportunity to thank all our lecturers who have directly or indirectly helped our project. We pay our respects and love to our parents and all other family members and friends for their love and encouragement throughout our career. Last but not the least we express our thanks to our friends for their cooperation and support.

Introduction

Thermometers are valuable mechanical assembly being utilized since long time for temperature estimation. In this task we have made an Arduino based computerized thermometer to show the current surrounding temperature and temperature changes on a LCD unit progressively. It very well may be conveyed in houses, workplaces, enterprises and so on to gauge the temperature. This venture depends on Arduino which imparts here with LM35 temperature sensor and a 16x2 LCD presentation unit. We can separate this arduino based thermometer into three segments - The primary detects the temperature by utilizing temperature sensor LM 35, second segment changes over the temperature esteem into an appropriate numbers in Celsius scale which is finished by Arduino, and last piece of framework shows temperature on LCD.

In this Arduino LM35 temperature sensor interfacing, Arduino Uno is utilized to control the entire procedure. A LM35 temperature sensor is utilized for detecting condition temperature which gives 1 degree temperature on each 10mV change at its yield stick. You can without much of a stretch check it with voltmeter by associating Vcc at stick 1 and Ground at stick 3 and yield voltage at stick 2 of LM35 sensor. For a model if the yield voltage of LM35 sensor is 250m volt that implies the temperature is around 25 degree Celsius.

Arduino peruses yield voltage of temperature sensor by utilizing Analog stick A0 and plays out the figuring to change over this Analog incentive to an advanced estimation of current temperature. After counts arduino sends these figurings or temperature to 16x2 LCD by utilizing proper directions of LCD.

Block Diagram of the Circuit

LM35 → Arduino UNO → Liquid Crystal Display
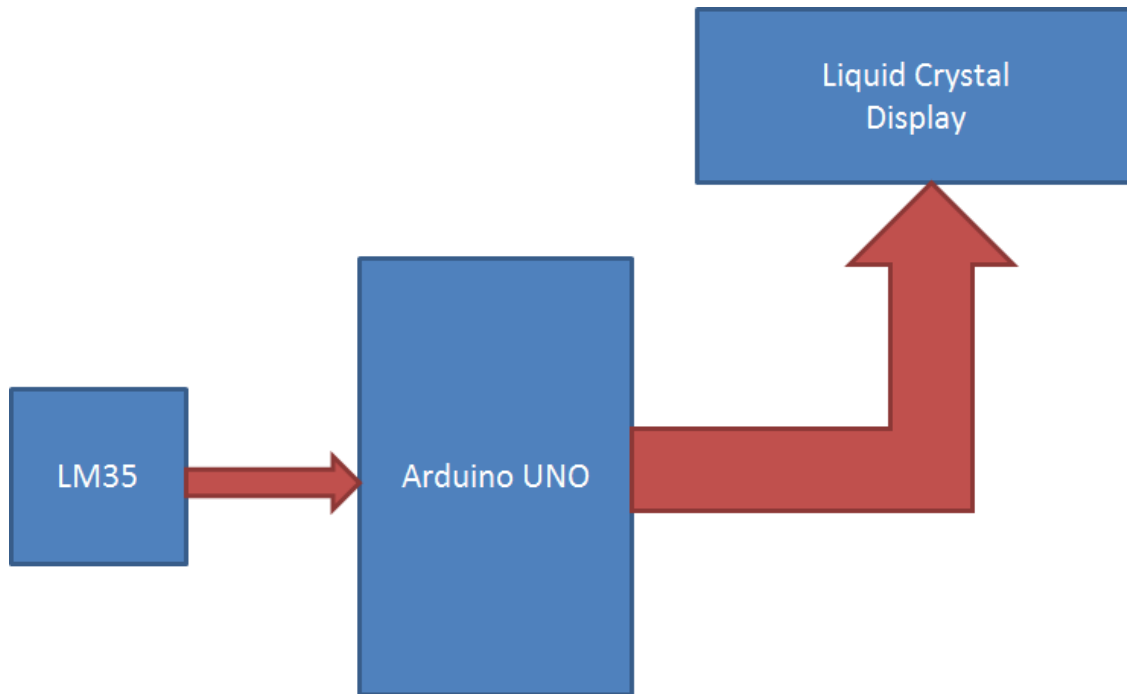
Circuit Components

Arduino

In this project we have used a microcontroller to control whole the process of system that is ARDUINO board. Actually arduino is not a mere controller as it has an operating system or boot-loader which runs on AVR controllers. Arduino is an open source hardware platform and very useful for project development purpose. There are many types of arduino boards like Arduino UNO, arduino mega, arduino pro mini, Lilypad etc. are available in the market or you can also build one by yourself.

LM35 Temperature Sensor

LM35 is a 3 pin temperature sensor which gives 1 degree Celsius on every 10mVolt change. This sensor can sense up to 150 degree Celsius temperature. 1 number pin of lm35 sensor is Vcc, second is output and third one is Ground.
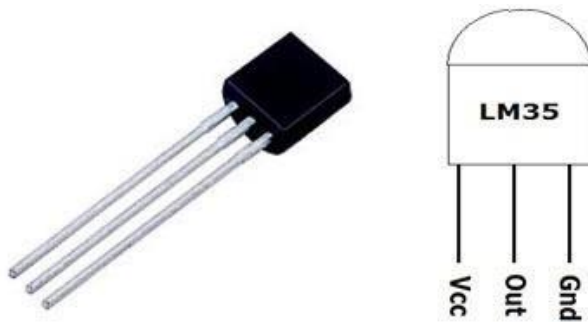
| Pin No	Function	Name
1	Supply voltage; 5V (+35V to -2V)	Vcc
2	Output voltage (+6V to -1V)	Output
3	Ground (0V)	Ground

LCD

16x2 LCD unit is widely using in embedded system projects because it is cheap, easily availablet, small in size and easy to interface. 16x2 have two rows and 16 columns, which means it consist 16 blocks of 5x8 dots. 16 pin for connections in which 8 data bits D0-D7 and 3 control bits namely RS, RW and EN. Rest of pins are used for supply, brightness control and for backlight.
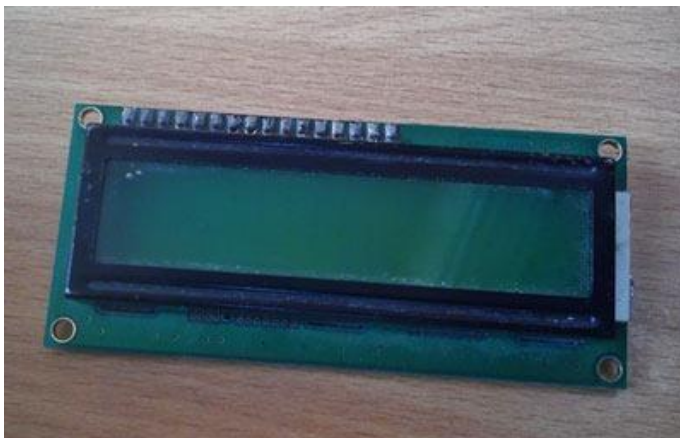
Power Supply

Arduino Board already has an inbuilt power supply section. Here we only need to connect a 9 volt or 12 volt adaptors with the board.

Circuit Diagram and Explanation
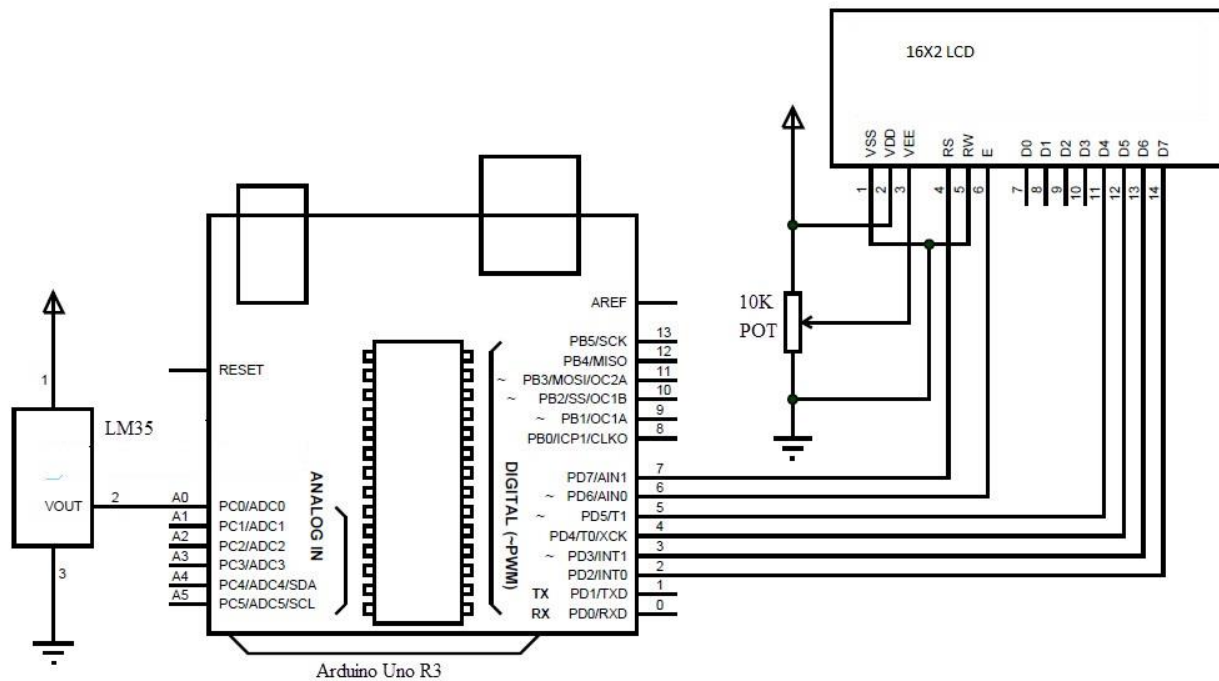
Circuit diagram for digital thermometer using Arduino LM35 temperature sensor, is shown in the above figure. Make the connections carefully as shown in the schematic. Here 16x2 LCD unit is directly connected to arduino in 4-bit mode. Data pins of LCD namely RS, EN, D4, D5, D6, D7 are connected to arduino digital pin number 7, 6, 5, 4, 3, 2. A temperature sensor LM35 is also connected to Analog pin A0 of arduino, which generates 1 degree Celsius temperature on every 10mV output change at its output pin.

Arduino LM35 Code & Explanation

To write the code for digital thermometer, we need to write the code for Arduino, LM35 Temperature Sensor, and 16x2 LCD module interfacing. First we include library for LCD unit and then we defines data and control pins for LCD and temperature sensor.

After getting analog value at analog pin we reads that value using Analog read function and stores that value in a variable. And then by applying given formula converts it in temperature.

float analog_value=analogRead(analog_pin);

float Temperature=analog_value*factor*100

where

factor=5/1023

analog_value= output of temperature sensor

Source Code

```
#include<LiquidCrystal.h>

LiquidCrystal lcd(7,6,5,4,3,2);


const int Sensor = A0;

byte degree_symbol[8] =

        {

         0b00111,

         0b00101,

         0b00111,

         0b00000,

         0b00000,

         0b00000,

         0b00000,

         0b00000

        };

void setup()

{

 pinMode(Sensor, INPUT);

 lcd.begin(16,2);

 lcd.createChar(1, degree_symbol);

 lcd.setCursor(0,0);

 lcd.print("   Digital    ");

 lcd.setCursor(0,1);

 lcd.print(" Thermometer   ");
```
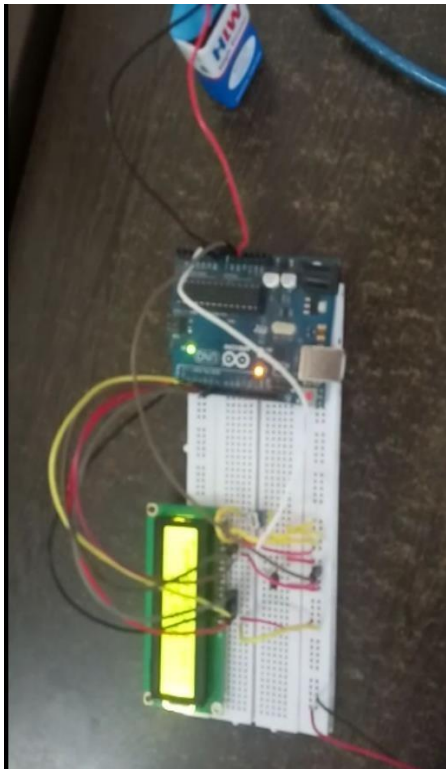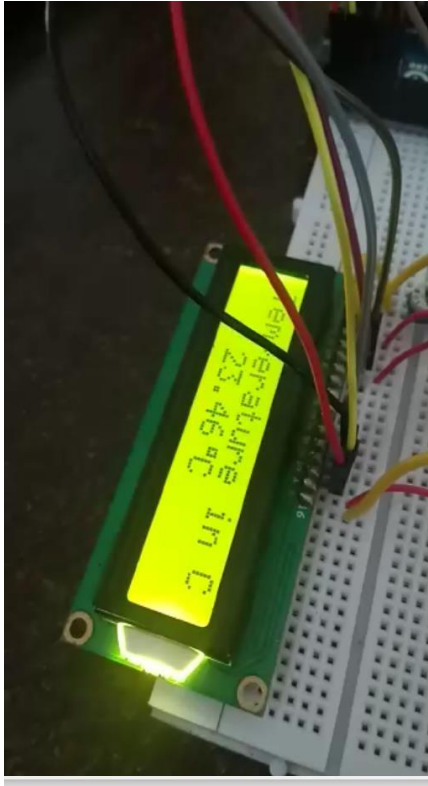
```
  delay(4000);

  lcd.clear();

}

void loop()

{

    float temp_reading=analogRead(Sensor);

    float temperature=temp_reading*(5.0/1023.0)*100;

    delay(10);


    lcd.clear();

    lcd.setCursor(0,0);

    lcd.print("Temperature in C");

    lcd.setCursor(4,1);

    lcd.print(temperature);

    lcd.write(1);

    lcd.print("C");

    delay(1000);

}
```

Output

Conclusion

We have successfully interfaced the Arduino Uno micro-controller based board with the 16*2 LCD presentation unit and the LM35 Temperature Sensor (by the National Semiconductors).The LM35 Temperature Sensor takes input in the form of Voltage Change and hence, converts it into Analog form of the Temperature.

This Analog Temperature is hence converted into digital using a simple ADC(Analog Digital Converter).Also, this temperature is in degree Celsius and it can be converted into degree Fahrenheit easily on an application of a Mathematical formula. On proper fetch of the Source Code mentioned above in the Arduino Uno Board, we can successfully retrieve the temperature of the surrounding using our project.