

ELP305: DESIGN AND SYSTEM LABORATORY

EXPERIMENT 1: INTERFACING WITH ARDUINO

GROUP NUMBER: 21

SUBMITTED BY:

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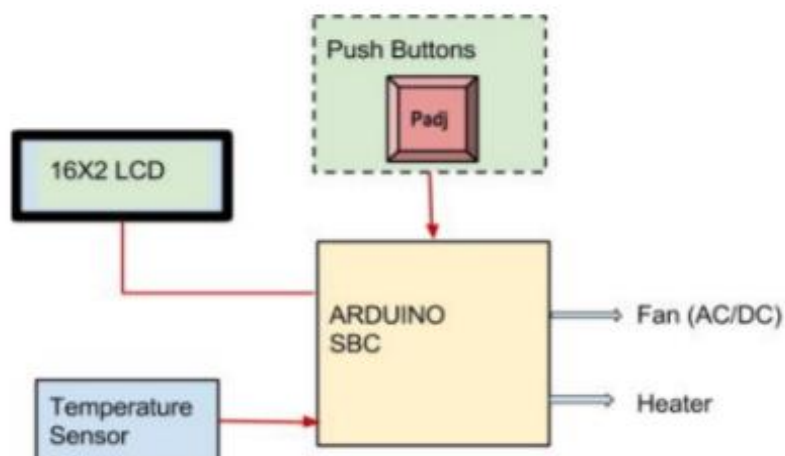
Objective: Read ADC input from a temperature sensor and display output on LCD (Digital Thermometer), then if the temp exceeds a certain point turn on a LED/turn on a DC fan. If the temp falls below a certain point, turn on a heater (resistor).

Apparatus Required: Arduino uno board, LED, breadboard, resistor, jumper wires, push button, potentiometer, temperature sensor, DC fan

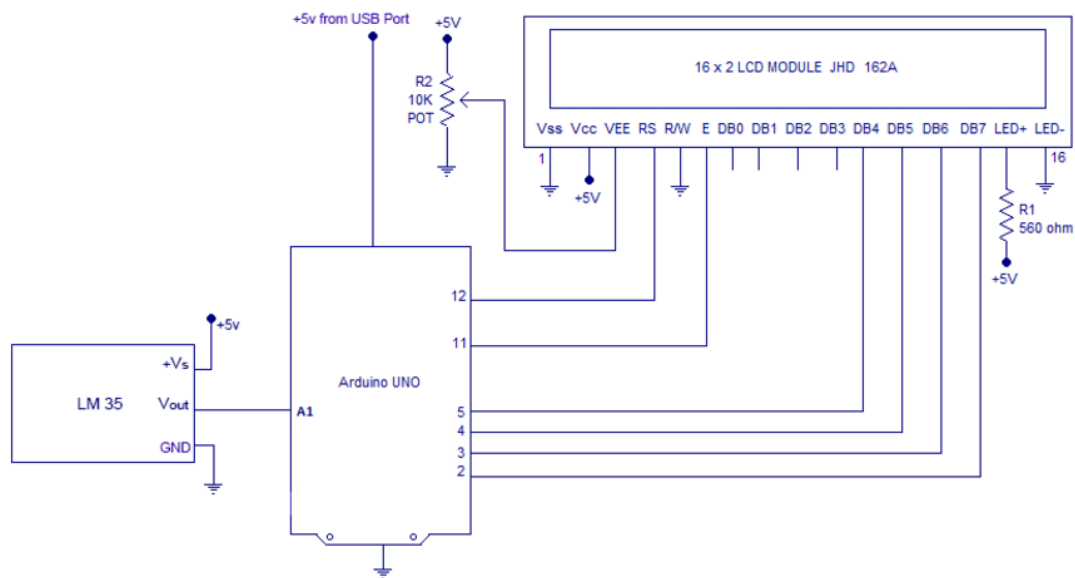
Challenges Faced:

- The LCD did not display the temperature until the potentiometer was set to a particular resistance,i.e. If we changed the resistance of the potentiometer,there was no display.
- Tinkercad did not have DC fan/AC fan/heater components.

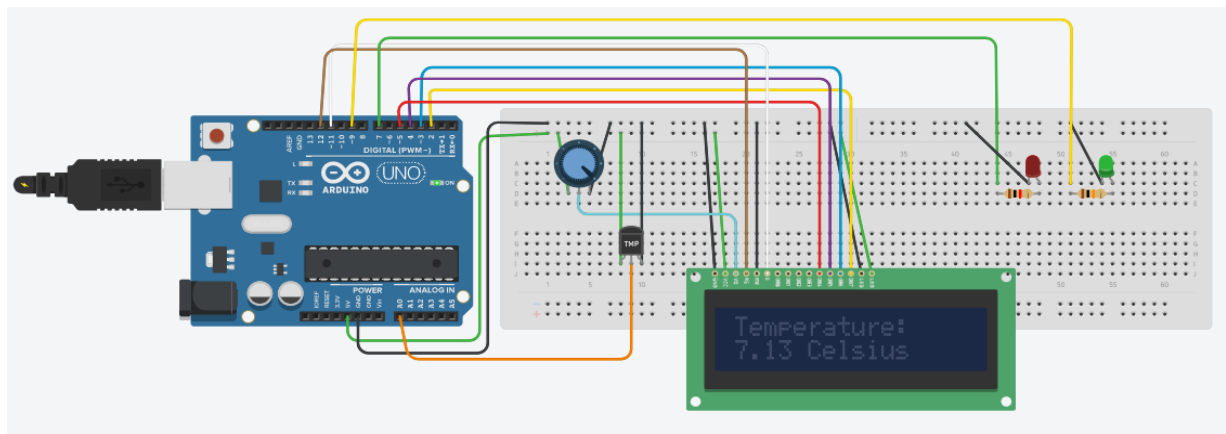
Block Diagram:



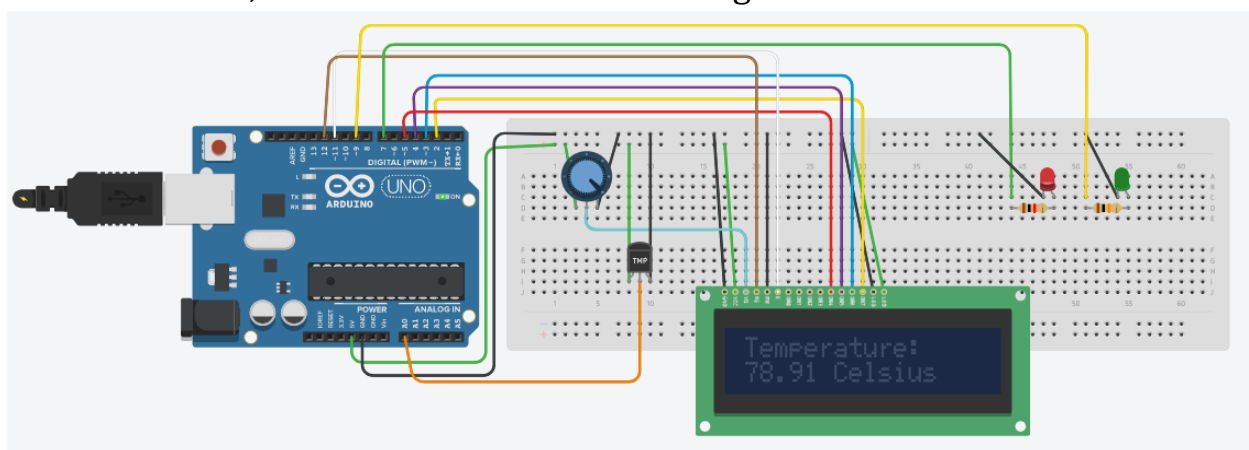
Circuit Diagram:



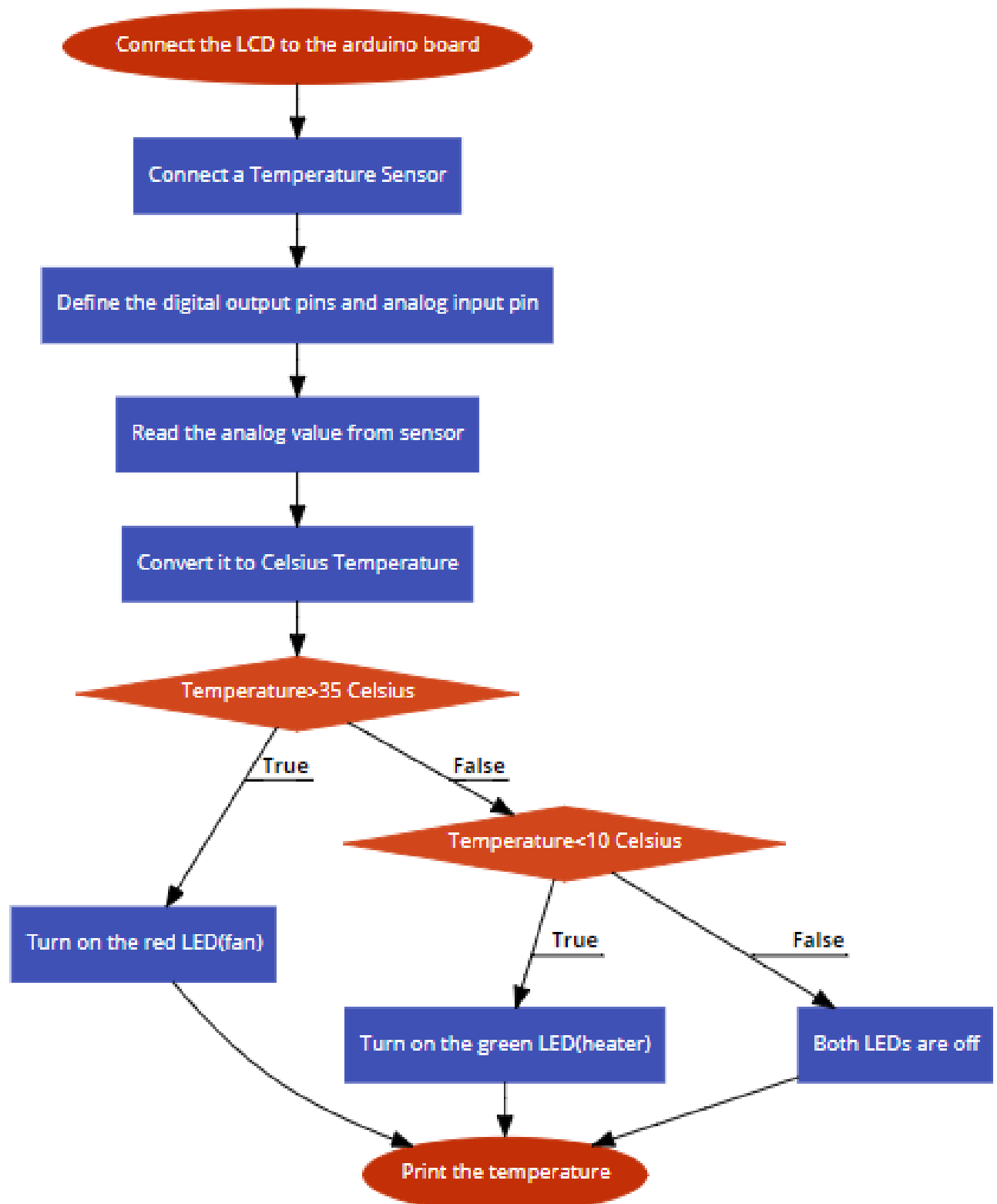
When the temperature measured by the temperature sensor was less than 10 Celsius, the green LED turns on and the red LED is off.



When the temperature measured by the temperature sensor was more than 35 Celsius, the red LED turns on and the green LED is off.



Flow-Chart for code:



Code:

```
#include <LiquidCrystal.h>
int reading = 0;
int sensorPin = A0;
int fan =7;
int heater=9;
|
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

void setup() {

    lcd.begin(16, 2);
    pinMode(fan,OUTPUT);
    pinMode(heater,OUTPUT);
}

void loop() {
    reading = analogRead(sensorPin);
    float celsius = (reading*5.0/1024-0.5)*100;
    lcd.setCursor(0, 0);
    lcd.print("Temperature: ");
    lcd.setCursor(0,1);
    lcd.print(celsius);

    lcd.print(" Celsius");
    if (celsius >35) {
        digitalWrite(7,HIGH);
    } else {
        digitalWrite(7,LOW);
    }
    if (celsius<10) {
        digitalWrite(9,HIGH);
    } else {
        digitalWrite(9,LOW);
    }
    delay(500);
    lcd.clear();
}
```

Conclusion: The above system can be used to monitor and then control the temperature of devices by turning on the cooling system if it goes above a certain threshold and turning on the heating system if it goes below a certain threshold.

Results: If the temperature exceeds 35 degree celsius,the fan(red LED) is turned on while if the temperature goes below 10 degree celsius,the heater(green LED) is turned on.

References:

- <https://www.arduino.cc/en/Tutorial/HelloWorld>
- <https://www.arduino.cc/en/Tutorial/LiquidCrystalDisplay>
- <http://www.ti.com/lit/ds/symlink/lm35.pdf>
- <http://www.electroschematics.com/8998/arduino-temperature-controlled-relay/>