

Muhammad Somaan

2528404

Aim: To measure the light intensity using a sensor and display it on an LCD.

Equipment: Breadboard, Arduino Uno, LCD display (16x2), 2x 10 kΩ potentiometer, Connecting wires

Schematic:

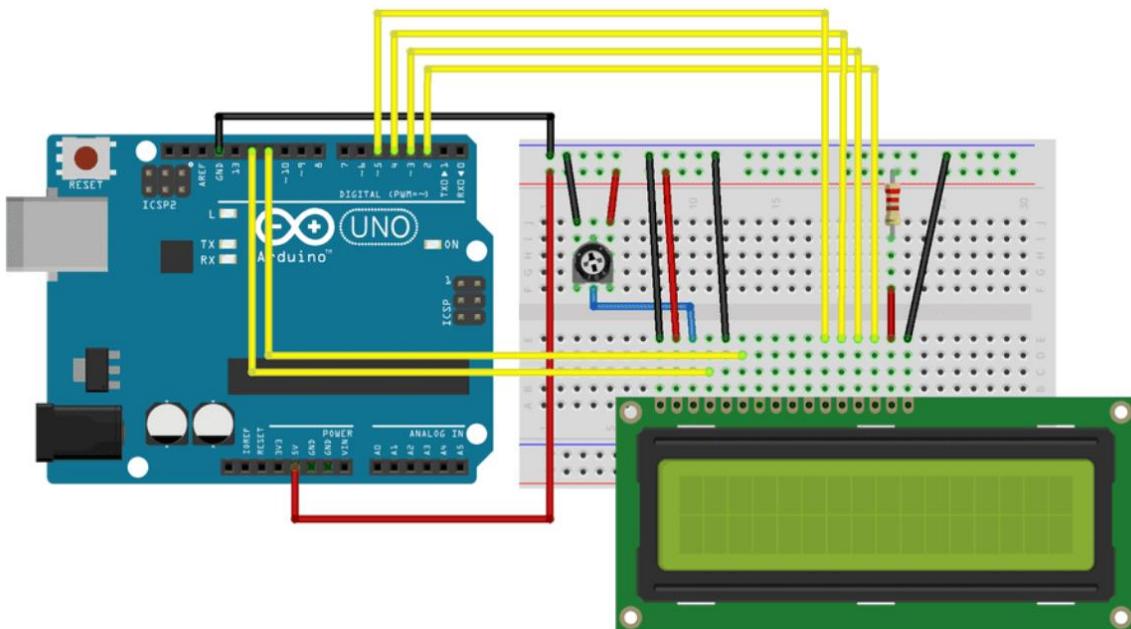


Figure 1

Setup:

The circuit is set up according to the schematic in figure 1. The LCD data pins are connected to the arduino, power pins to the voltage supply from the arduino and the LED+ and LED- pins are connected through the 10kΩ potentiometer to control the brightness of the LCD. My LDR is connected with a 330Ω resistor in a voltage divider configuration. A wire is used to connect the arduino data pin to a point in between LDR and the resistor to take input of the voltage values LDR is using.

Working:

The arduino code is written to perform simple functionality. I'm using an external library for controlling the lcd. On the start-up of the arduino board, the LCD is initialized, after which it starts to display the temperature from the LM35 temperature sensor and the voltage used up by the LDR. It continues to display the values in realtime and changes according to what the sensor is detecting.

To display the voltage used up by the LDR or the temperature in degree Celsius, the analogue input from the sensors are first normalized from 0-1023 range to 0-5V. Following this, if the value is for temperature then I use a scale of 10mV/Celsius to calculate the value of temperature. The voltage used up by the LDR is calculated by inverting the value of voltage that I normalized to, since the LDR is connected in voltage divider circuit.

Code:

```
#include <LiquidCrystal.h>

#define MAX_RES_VAL 1023
#define MIN_RES_VAL 0
#define MAX_VOLT_VAL 5
#define MIN_VOLT_VAL 0

// initialize the library by associating any needed LCD interface pin
// with the arduino pin number it is connected to
const int rs = 12, en = 11, d4 = 5, d5 = 4, d6 = 3, d7 = 2;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);

const int ldrPin = A5;
const int tempPin = A4;
int val = 0;

void setup() {
    // set up the LCD's number of columns and rows:
    lcd.begin(16, 2);
}

void loop()
{
    int ldrInput = analogRead(ldrPin);
    ldrInput = analogRead(ldrPin);
    int tempInput = analogRead(tempPin);
    tempInput = analogRead(tempPin);

    lcd.clear();
    lcd.setCursor(0, 0);
    printLightVoltage(ldrInput);
    lcd.setCursor(0, 1);
```

```

printTemperature(tempInput);

delay(250);

}

void printLightVoltage(int ldrInput)
{
    //int ldrInput = analogRead(ldrPin);

    float ldrNormalized = normalize(ldrInput);

    float ldrVoltValue = MAX_VOLT_VAL-ldrNormalized;

    lcd.print("Light: ");

    lcd.print(ldrVoltValue);

    lcd.print("V");

}

void printTemperature(int tempInput)
{
    //int tempInput = analogRead(tempPin);

    float tempNormalized = normalize(tempInput);

    float tempCentigrade = (tempNormalized*1000)/10;

    lcd.print("Temp: ");

    lcd.print(tempCentigrade);

    lcd.print("\337C");

}

float normalize(float input)
{
    return (((float)(input)/(float)(MAX_RES_VAL-
MIN_RES_VAL))*MAX_VOLT_VAL)+MIN_VOLT_VAL;
}

```