# SOLAR INDUCTION (DATA LOGGER)

A temperature data logger is an electronic device used to record temperature over a set period. It typically consists of a sensor to measure the temperature, a microprocessor to convert the sensor data into digital form, and a storage medium to save the data. These devices are commonly used in various industries to monitor and record temperature data for quality control, compliance, and process monitoring.
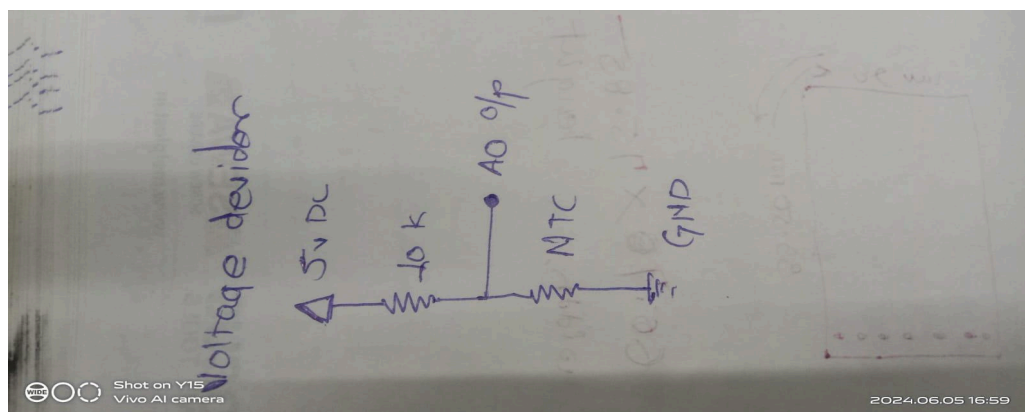
◆ COMPONENT :-

1) MT3608 module.
2) TP4056 module.
3) Arduino nano.
4) RTC (real time clock).
5) NTC 100K B3950 bit value=3950 (temperature sensor).
6) SD card module.
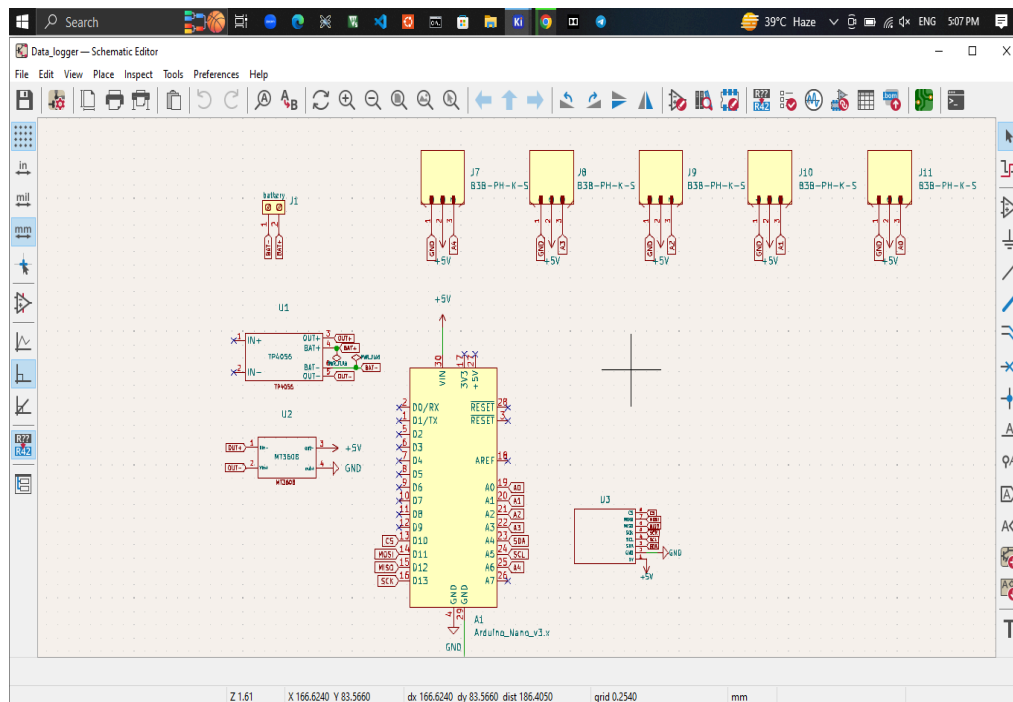7) 2 pin screw terminal.
8) 3 pin JTAG.
9) 8 pin female connector.

◆ BLOCK DIAGRAM :-
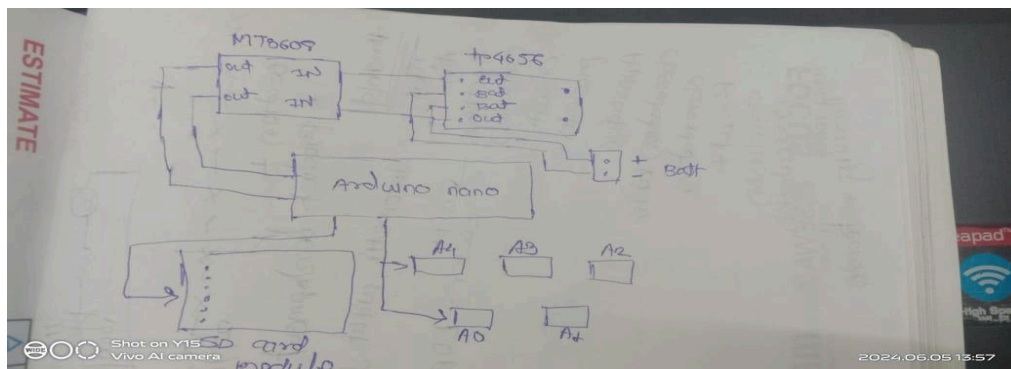
◆ NTC voltage divider :-

Schematic :-

◆ **connection :-**

1) Battery connected to TP4056 module (BAT + and BAT-).
2) Charging module (TP4056) connected to Vin DC-DC converter module (MT3608).
3) After, the Vout DC-DC converter connected to Arduino nano (power supply) 5V and GND.
4) SD card and RTC module 8 pin connected to Arduino nano.
   a) 5v   ->   5v.
   b) GND   ->   GND.
   c) SDA   ->   A4
   d) SCL   ->   A5
   e) SCK   ->   D13
   f) MISO ->   D12
   g) MOSI ->   D11
   h) CS   ->   D10

5) Thermistor connected to pin number A0 (analog read).

6) And, A1, A2, A3, A4 are optional analog pins.

● SPI communication protocol using SD card module.
● I2C communication protocol using RTC.

Reading :-
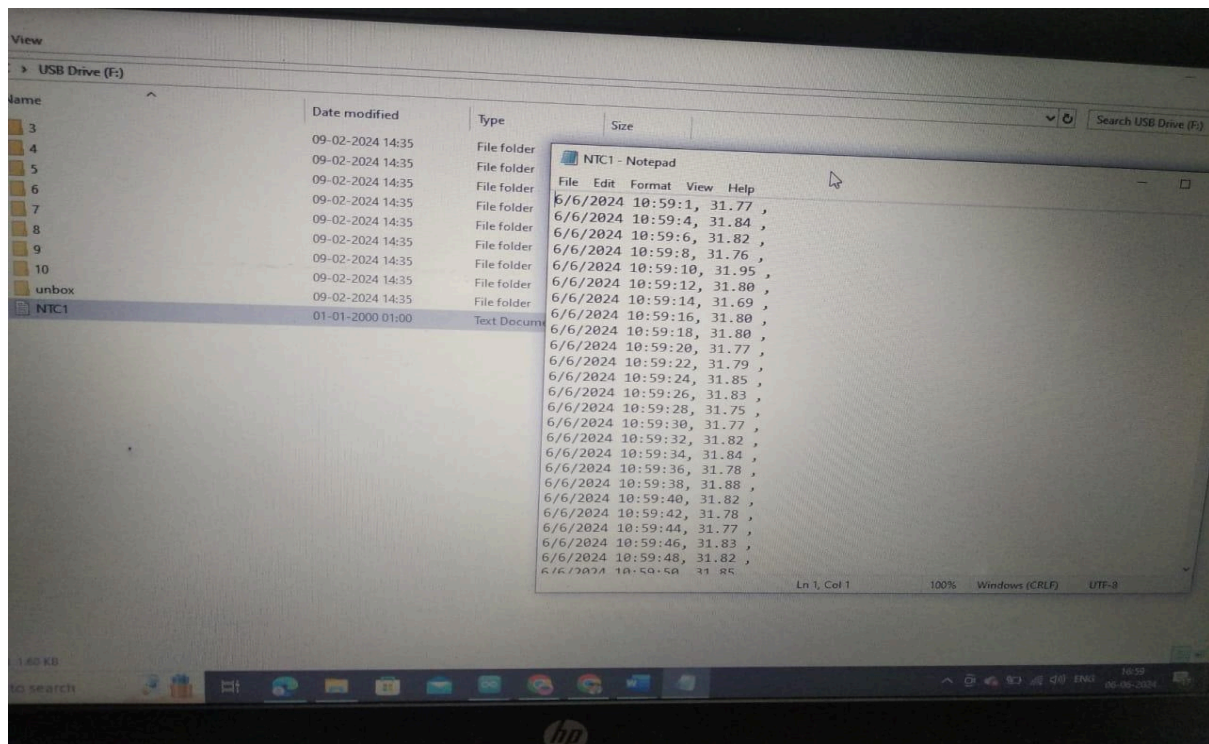
◆ FIRMWARE :-

```cpp
#include <SPI.h>  //for the SD card module
#include <SD.h>   // for the SD card
#include "RTClib.h"
RTC_DS1307 RTC;
#define RT0 100000  // Ω      //These values are in the datasheet
#define B 3950
#define VCC 5  //Supply voltage
#define R 10000  //R=10KΩ
const int chipSelect = 10;

File myFile;    // Create a file to store the data

float RT, VR, ln, t, TX, T0, VRT;   //Variables
uint16_t count=0;
void setup()
{
  RTC.begin();
```

```
  Serial.begin(9600);      //initializing Serial monitor

  if (!RTC.begin())
  {
    Serial.println("Couldn't find RTC");
  }
  else
  {
    RTC.adjust(DateTime(__DATE__, __TIME__));        // following line sets
the RTC to the date & time this sketch was compiled
  }
  if (!RTC.isrunning())
  {
    Serial.println("RTC is NOT running!");
  }
  Serial.print("Initializing SD card...");        // setup for the SD card
  if (!SD.begin(chipSelect))
  {
    Serial.println("initialization failed!");
    delay(1000);
  }
  Serial.println("initialization done.");

  //open file
}
void loop()
{
  Writedata();
  delay(1000);
}
void Writedata()
{
  myFile = SD.open("NTC1.txt", FILE_WRITE);
  if (myFile)
  {
    Serial.print("File opened ok  ");
    Serial.println(count);
    Count++;
    DateTime now = RTC.now();
```

```
myFile.print(now.day(), DEC);
myFile.print('/');
myFile.print(now.month(), DEC);
myFile.print('/');
myFile.print(now.year(), DEC);
myFile.print(' ');
myFile.print(now.hour(), DEC);
myFile.print(':');
myFile.print(now.minute(), DEC);
myFile.print(':');
myFile.print(now.second(), DEC);
myFile.print(",");

Serial.print(now.day(), DEC);
Serial.print('/');
Serial.print(now.month(), DEC);
Serial.print('/');
Serial.print(now.year(), DEC);
Serial.print(" ");
Serial.print(now.hour(), DEC);
Serial.print(':');
Serial.print(now.minute(), DEC);
Serial.print(':');
Serial.print(now.second(), DEC);

T0 = 25 + 273.15;
float VRT = 0;

for (int i = 0; i < 20; i++)
{
  VRT = VRT + analogRead(A0);  //Acquisition analog value of VRT
}
VRT = VRT / 20;
//Serial.println(VRT);
VRT = (5.00 / 1023.00) * VRT;  //Conversion to voltage
VR = VCC - VRT;
RT = VRT / (VR / R);  //Resistance of RT
ln = log(RT / RT0);
TX = (1 / ((ln / B) + (1 / T0)));  //Temperature from thermistor
TX = TX - 273.15;
```

```
    //debugging purposes
    Serial.print("\t");
    Serial.print(TX);
    Serial.println("°C");
    myFile.print(' ');
    myFile.print(TX);
    myFile.println(" ,");
    myFile.close();
  }
  else
  {
   Serial.println("not open");
  }
}
```