Program code -

```
#include "Arduino.h"

const int RedLed = 4; //red pin on LED connected to digital pin 4 on Arduino UNO

const int GreenLed = 5; //red pin on LED connected to digital pin 5 on Arduino UNO

const int BlueLed = 3; //red pin on LED connected to digital pin 3 on Arduino UNO

const int Enable = 9; //enable pin for motor connected to digital pin 9 on Arduino UNO

const int motorPin1 = 8; //control for positive motor pin connected to digital pin 8 on Arduino UNO

const int motorPin2 = 7; //control for negative motor pin connected to digital pin 7 on Arduino UNO

int ldrsensor = A3; //photoresistor connected to analog pin A3 on Arduino UNO

int tempsensor = 2; //temperature sensor connected to digital digital pin 2 on Arduino UNO

int LimitSwitch1 = 12; //Limit Switch at the bottom connected to digital pin 12 on Arduino UNO

int LimitSwitch2 = 11; //Limit Switch at the top connected to digital pin 11 on Arduino UNO

int LM1 = 0; //initial condition for the bottom limit switch

int LM2 = 0; //initial condition for the top limit switch

#include <OneWire.h>

OneWire ds(2);

  int HighByte, LowByte, TReading, SignBit, Tc, Tf_Whole, Tf_Fract, Whole, Fract;

  byte i;

  byte present = 0;

  byte data[12];

  byte addr[8];

void setup()

{

  // Setup Serial which is useful for debugging
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  // Use the Serial Monitor to view printed messages
  Serial.begin(9600);

  pinMode(RedLed, OUTPUT); //sets Red LED pin as Output
  pinMode(GreenLed, OUTPUT); //sets Green LED pin as Output
  pinMode(BlueLed, OUTPUT); //sets Blue LED pin as Output

  pinMode(motorPin1, OUTPUT); //sets motorPin1 as Output
  pinMode(motorPin2, OUTPUT); //sets motorPin1 as Output
  pinMode(Enable, OUTPUT); //sets enable for motor as Output

  pinMode(LimitSwitch1, INPUT); //sets LimitSwitch1 as Input
  pinMode(LimitSwitch2, INPUT); //sets LimitSwitch2 as Input
  Serial.println("Automated Sun Shade Initialized");
}
void setColor(int red, int green, int blue)
{
  analogWrite(RedLed, 255 - red);
  analogWrite(GreenLed, 255 - green);
  analogWrite(BlueLed, 255 - blue);
}

void loop()
{
   LM1 = digitalRead(LimitSwitch1);
   LM2 = digitalRead(LimitSwitch2);

  ds.reset_search();
  if ( !ds.search(addr)) {
     Serial.print("No more addresses.\n");
```

```
    ds.reset_search();
    return;
  }
  for( i = 0; i < 8; i++) {
  }
  if ( addr[0] == 0x10) {
  }
  else if ( addr[0] == 0x28) {
  }
  ds.reset();
  ds.select(addr);
  ds.write(0x44,1);         // start conversion, with parasite power on at the end

 delay(750);     // maybe 750ms is enough, maybe not
  // we might do a ds.depower() here, but the reset will take care of it.
  present = ds.reset();
  ds.select(addr);
  ds.write(0xBE);         // Read Scratchpad

  for ( i = 0; i < 9; i++) {           // we need 9 bytes
   data[i] = ds.read();
  }
   LowByte = data[0];
  HighByte = data[1];
  TReading = (HighByte << 8) + LowByte;
  SignBit = TReading & 0x8000;  // test most sig bit
  if (SignBit) // negative
  {
   TReading = (TReading ^ 0xffff) + 1; // 2's comp
```

```
  }
  Tc = (6 * TReading) + TReading / 4;    // multiply by (100 * 0.0625) or 6.25

  Whole = Tc / 100;  // separate off the whole and fractional portions
  Fract = Tc % 100;
  Tf_Whole = 1.8*(Whole) + 32;
  Tf_Fract = 1.8*(Fract);

  if (SignBit) // If its negative
  {
    Serial.print("-");
  }
  Serial.print("Temperature is: ");
  Serial.print(Tf_Whole); //display whole temperature in fahrenheit
  Serial.print(".");
  Serial.print(Tf_Fract); //display fraction temperature in farenheit
  Serial.print("\n");

if (Tf_Whole>68) { //If temperature is above 73°F
     int ldrsensor = analogRead(A3);

    Serial.print(LM1); //display value of limit switch 1
    Serial.print('\t');
    Serial.print(LM2); //display value of limit switch 2
    Serial.print('\t');
    Serial.print(ldrsensor); //display value of light sensor
    Serial.print('\t');

       if ((LM1 == LOW) && (LM2 == HIGH)) { //If the bottom limit switch is pressed
```

```
        if (ldrsensor <= 300) { //It is Dark
          setColor(0, 0, 255); //LED lights up Red
          analogWrite(Enable, LOW); //sets enable to low(0v) not allowing the motor to be able to spin
          digitalWrite(motorPin1, LOW);//sets motorPin1 to low(0v) and turns off
          digitalWrite(motorPin2, LOW); //sets motorPin2 to low(0v) and turns off
          Serial.println("It is Dark, Sun Shade is Down");
        }
        else if (ldrsensor > 300) { //It is Light
          setColor(0, 0, 255); //LED lights up Red
          analogWrite(Enable, 180);   //sets enable to 70.6% Duty Cycle allowing the motor to be able to spin
          digitalWrite(motorPin1, LOW);//sets motorPin1 to low(0v) and turns off
          digitalWrite(motorPin2, HIGH); //sets motorPin2 to high(5v) and motor turns Counter CLockwise
          Serial.println("It is Light, Sun Shade will Begin Moving Up");
        }
      }
      else if ((LM1 == HIGH) && (LM2 == LOW)) {  //If the top limit switch is pressed
        if (ldrsensor <= 300) { //It is Dark
          setColor(0, 128, 255); //LED lights up Violet
          analogWrite(Enable, 80); //sets enable to 31.4% Duty Cycle allowing the motor to be able to spin
          digitalWrite(motorPin1, HIGH);//sets motorPin1 to high(5v) and motor turns CLockwise
          digitalWrite(motorPin2, LOW); //sets motorPin2 to low(0V) and turns off
          Serial.println("It is Dark, Sun Shade is Not Needed");
        }
        else if (ldrsensor > 300) { //It is Light
          setColor(0, 128, 255); //LED lights up Violet
```

```
          analogWrite(Enable, LOW); //sets enable to low(0v) not allowing the motor to be able to spin
          digitalWrite(motorPin1, LOW);//sets motorPin1 to low(0v) and turns off
          digitalWrite(motorPin2, LOW); //sets motorPin2 to low(0V) and turns off
          Serial.println("It is Light, Sun Shade is at the Top Position");
         }
        }
       else if ((LM1 == HIGH) && (LM2 == HIGH)) { //If neither limit switch is pressed

         if (ldrsensor <= 300) { //It is Light
          setColor(0, 255, 0); //LED lights up Blue
          analogWrite(Enable, 80); //sets enable to 31.4% Duty Cycle allowing the motor to be able to spin
          digitalWrite(motorPin1, HIGH); //sets motorPin1 to high(5v) and motor turns CLockwise
          digitalWrite(motorPin2, LOW); //sets motorPin2 to low(0v) and turns off
          Serial.println("It is Dark, Sun Shade is Moving Down");
         }

         else if (ldrsensor > 300) { //It is Light
          setColor(0, 255, 0); //LED lights up Blue
          analogWrite(Enable, 180); //sets enable to 70.6% Duty Cycle allowing the motor to be able to spin
          digitalWrite(motorPin1, LOW); //sets motorPin1 to low(0v) and turns off
          digitalWrite(motorPin2, HIGH); //sets motorPin2 to high(5v) and motor turns Counter CLockwise

          Serial.println("It is Light, Sun Shade is Moving Up");
         }
        }
    }
     else if (Tf_Whole<=68) { //If Temperature is below 73°F
```

```
    if ((LM1 == LOW) && (LM2 == HIGH)) { //If the bottom limit switch is pressed


      setColor(0, 0, 255); //LED lights up Red
      analogWrite(Enable, LOW); //sets enable to low(0v) not allowing the motor to be able to spin
      digitalWrite(motorPin1, LOW);//sets motorPin1 to low(0v) and turns off
      digitalWrite(motorPin2, LOW); //sets motorPin2 to low(0v) and turns off
      Serial.println("Temperature is below 70 degrees, Sun Shade is Not Needed");
    }
    else if ((LM1 == HIGH) && (LM2 == LOW)) { //If the top limit switch is pressed


      setColor(0, 128, 255); //LED lights up Violet
      analogWrite(Enable, 80); //sets enable to 31.4% Duty Cycle allowing the motor to be able to spin
      digitalWrite(motorPin1, HIGH); //sets motorPin1 to high(5v) and motor turns Clockwise
      digitalWrite(motorPin2, LOW); //sets motorPin2 to low(0v) and turns off

      Serial.println("Temperature is below 70 degrees, Sun Shade is Not Needed");
     }
    else if ((LM1 == HIGH) && (LM2 == HIGH)) { //If neither limit switch is pressed


      setColor(0, 255, 0); //LED lights up blue
      analogWrite(Enable, 80); //sets enable to 31.4% Duty Cycle allowing the motor to be able to spin
      digitalWrite(motorPin1, HIGH); //sets motorPin1 to high(5v) and motor turns CLockwise
      digitalWrite(motorPin2, LOW); //sets motorPin2 to low(0v) and turns off

      Serial.println("Temperature is below 70 degrees, Sun Shade is Not Needed");
    }
  }
```

```
}
```