International Center for Free and Open Source Software

LM393 LIGHT SENSOR

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Internship

Open IoT

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Chapter 1

Introduction

1.1 General Background

LM393 light sensor module is used to detect the intensity of light. It is associated with both analog output pin and digital output pin labelled as AO and DO respectively on the board. When there is light, the resistance of LDR will become low according to the intensity of light. The greater the intensity of light, the lower the resistance of LDR. The sensor has a potentiometer knob that can be adjusted to change the sensitivity of LDR towards light.

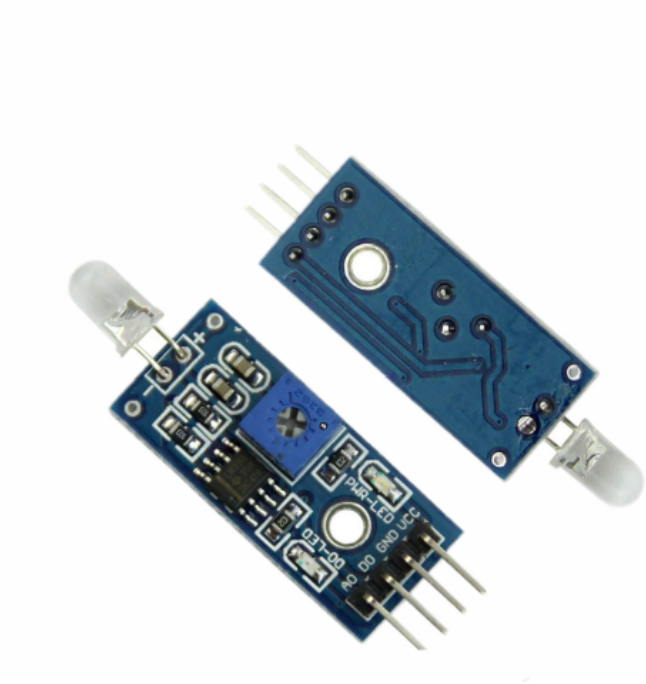

Figure 1.1: Integration of LM393 light sensor with Arduino

1.2 Working Principle

The LM393 light sensor operates on the principle of detecting changes in light intensity through a photovoltaic cell. When exposed to light, the photovoltaic cell generates a small electrical current proportional to the incident light intensity. This current is then amplified and converted into a voltage signal by the LM393's internal circuitry. The voltage output is compared to a reference voltage, and any deviation from this reference indicates a change in light intensity. This information is then relayed to the Arduino Uno microcontroller for further processing and analysis. By monitoring this voltage variation, the sensor can accurately measure the ambient light intensity, enabling applications such as automatic lighting control, daylight sensing, and environmental monitoring.

1.3 Components Needed

1. Arduino Board (e.g., Arduino Uno)
2. LM393 Light Sensor
    - Sensitivity to changes in light intensity
    - Operating voltage: typically 3 to 5 volts DC
    - Analog voltage output proportional to light intensity
    - Fast response time
    - Operating temperature range for reliable performance
    - Wide detection range from low to high light intensities
    - Some models feature adjustable sensitivity settings
    - Compact size for easy integration into electronic devices
3. LED
4. Breadboard
5. Jumper Wires

Chapter 2

Circuit Diagram

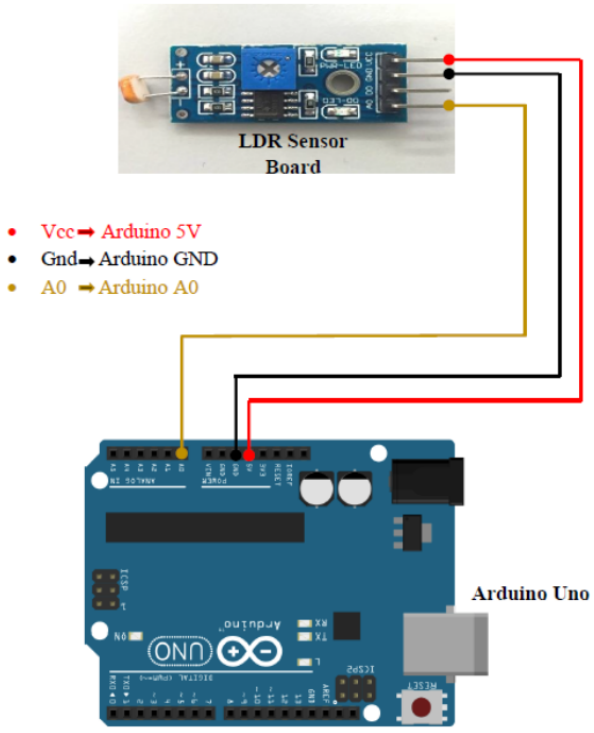

Figure 2.1: Circuit Diagram

2.1 Circuit Connections

1. Connect the VCC pin of the LM393 sensor to the 5V pin on the Arduino Uno for power.

2. Connect the GND pin of the LM393 sensor to the GND pin on the Arduino Uno

for ground.

3. Connect the OUT pin of the LM393 sensor to any analog input pin on the Arduino Uno (e.g., A0) to read the analog voltage output.

2.2 Block Diagram

Figure 2.2: Block Diagram

Chapter 3

Implementation

3.1 Procedure

1. Setup Hardware: Gather all necessary components. Connect them according to the circuit diagram.

2. Install Arduino IDE: Download and install Arduino IDE from the official website.

3. Open Arduino IDE: Launch the Arduino IDE software.

4. Write Code: Compose your program using Arduino programming language (based on C/C++).
   Write setup and loop functions.

5. Verify Code: Click on the Verify button (checkmark icon) to check for any errors in the code.

6. Upload Code: Connect Arduino board to the computer via USB. Select the correct board and port from Tools menu.
   Click on the Upload button (right arrow icon) to upload the code to the Arduino board.

7. Test: Make sure the hardware is powered on.

Chapter 4

Code

4.1 Code for implementing LM393 sensor

It is done through ArduinoIDE

Code

```
const int sensorPin = A0; // Analog pin 0

void setup() {
  Serial.begin(9600);
  // Initialize serial communication at 9600 baud
}

void loop() {
  // Read the value from the sensor
  int sensorValue = analogRead(sensorPin);

  // Print the sensor value to the serial monitor
  Serial.println(sensorValue);

  int brightness = map(sensorValue, 0, 1023, 0, 100);

  // Print the brightness percentage to the serial monitor
```

```
  Serial.print("Brightness: ");
  Serial.print(brightness);
  Serial.println("%");



  delay(1000); // Wait for 1 second before taking the next reading
}
```

4.2 Serial Monitor Output

```
940
Brightness: 91%
944
Brightness: 92%
951
Brightness: 92%
954
Brightness: 93%
949
Brightness: 92%
961
Brightness: 93%
973
Brightness: 95%
976
Brightness: 95%
978
Brightness: 95%
982
Brightness: 95%
980
Brightness: 95%
977
Brightness: 95%
975
Brightness: 95%
977
Brightness: 95%
979
Brightness: 95%
981
Brightness: 95%
978
Brightness: 95%
977
Brightness: 95%
975
Brightness: 95%
973
Brightness: 95%
970
Brightness: 94%
977
Brightness: 95%
```

Figure 4.1: Serial Monitor

Chapter 5

Result

5.1 Result

After integrating the LM393 light sensor with the Arduino Uno and conducting various experiments, we successfully obtained accurate measurements of light intensity and brightness levels in real-time. The sensor demonstrated consistent performance across a range of lighting conditions, effectively capturing subtle changes in ambient light.

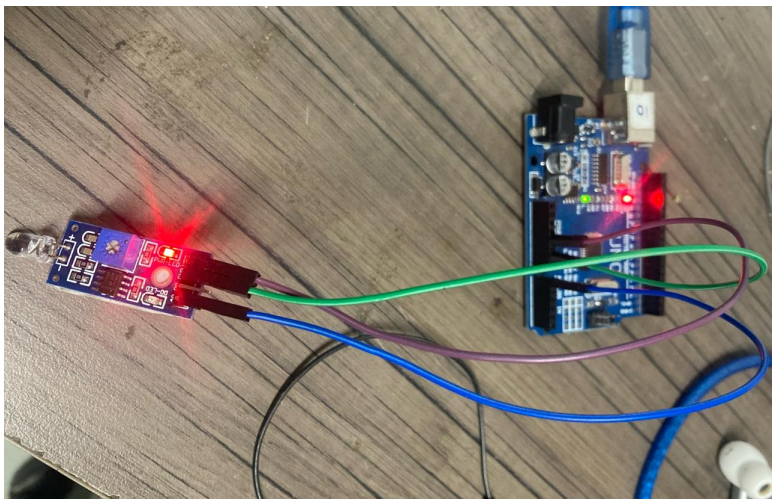

Figure 5.1: LM393 ligh sensor integration with arduino uno