UNITED INTERNATIONAL UNIVERSITY

Lab Report 2

Course Name: Microprocessors and Microcontrollers Laboratory

Course Code: CSE 4326

Section: D

Submitted by:

Abdulla Al Samir (011192039)

Submitted to:

Sumaiya Jahan Tabassum

Lecturer, United International University

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Experiment no. 3

LED Indication of Solar Cell Rotation

Objective:

Suppose, there are two LDR sensors connected to two sides of a solar cell. If the solar cell is rotating counterclockwise, then the first LED will be lit. On the other hand, if the solar cell is rotating clockwise, then the second LED will be lit.

Equipment:

- Arduino Uno R3
- Arduino IDE (Compiler)
- Proteus (Simulator)

Introduction:

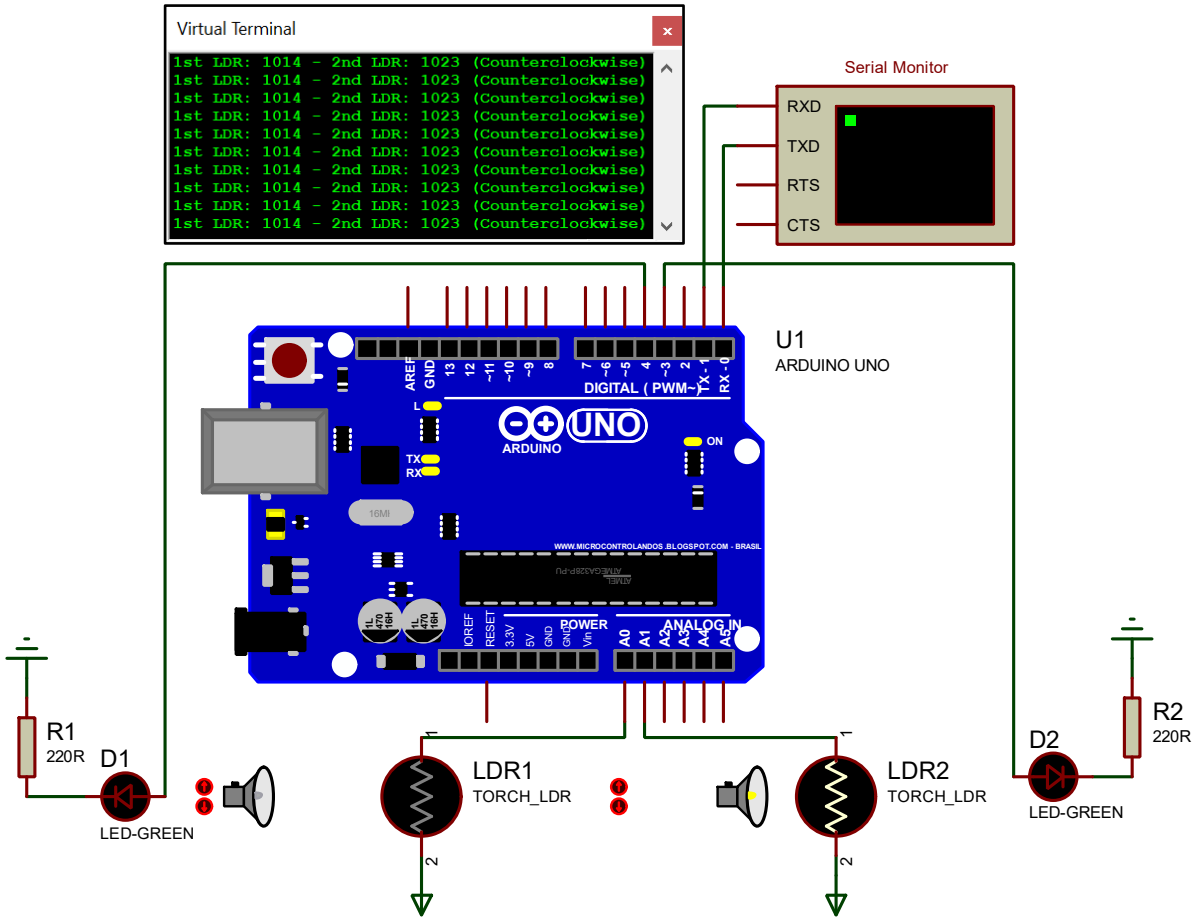
In this experiment, we propose a Sunlight Tracking System that utilizes Light Dependent Resistor (LDR) sensors connected to an Arduino microcontroller. By monitoring the light intensity on two sides of a rotating solar cell, the system can determine the solar cell's rotation direction and control the activation of corresponding LEDs. This tracking mechanism ensures that the solar cell is properly aligned with the sunlight.

Components and its Functions:

1. **Arduino Uno:** The Arduino microcontroller acts as the central processing unit of the system. It receives input from the LDR sensors and analyses the readings to determine the solar cell's rotation direction.
2. **Light Dependent Resistor (LDR) Sensors:** Two LDR sensors are placed on opposite sides of the solar cell. These sensors detect the intensity of light falling on them and provide analog voltage readings proportional to the incident light levels.
3. **Light Emitting Diodes (LEDs):** Two LEDs are connected to the Arduino. The first LED corresponds to the left side of the solar cell, while the second LED corresponds to the right side. These LEDs serve as indicators, lighting up to indicate the direction of rotation of the solar cell.
4. **Resistors:** Appropriate resistors are connected in series with the LEDs to limit the current flowing through them, ensuring safe operation.

5. **Serial Monitor:** The Serial Monitor is a feature in the Arduino IDE that allows communication between the Arduino board and the computer. In this experiment, the Serial Monitor is used to display the LDR sensor values and the rotation status of the solar cell.
6. **Power Source (5V):** A suitable power source, such as a battery or external power supply, is required to power the Arduino and provide the necessary voltage for the system to operate.
7. **Wiring and Connectors:** Wiring and connectors are used to establish the electrical connections between the components, ensuring the flow of data and power signals.

Circuit Diagram:



Discussion:

To determine the rotation direction of the solar cell, the Arduino compares the LDR sensor readings. If the second LDR sensor receives more light than the first, it indicates that the solar cell is rotating counterclockwise. On the other hand, if the first LDR sensor receives more light than the second, it indicates clockwise rotation.

Arduino Code:

```
const int ldrPinLeft = A0;
const int ldrPinRight = A1;
const int ledPinRight = 3;
const int ledPinLeft = 4;

void setup() {
  pinMode(ledPinLeft, OUTPUT);
  pinMode(ledPinRight, OUTPUT);
  Serial.begin(9600);
}

void loop() {
  int ldrValueLeft = analogRead(ldrPinLeft);
  int ldrValueRight = analogRead(ldrPinRight);

  Serial.print("1st LDR: ");
  Serial.print(ldrValueLeft);
  Serial.print(" - 2nd LDR: ");
  Serial.print(ldrValueRight);

  if (ldrValueLeft < ldrValueRight) {
    Serial.println(" (Counterclockwise)");
    digitalWrite(ledPinLeft, HIGH);
    digitalWrite(ledPinRight, LOW);
  } else if (ldrValueLeft > ldrValueRight) {
    Serial.println(" (Clockwise)");
    digitalWrite(ledPinLeft, LOW);
    digitalWrite(ledPinRight, HIGH);
  } else {
    Serial.println(" (No rotation)");
    digitalWrite(ledPinLeft, LOW);
    digitalWrite(ledPinRight, LOW);
  }

  delay(100);
}
```