

# Arduino Project Report

## Light-Activated LED with PWM Control

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### Project Objective

This project demonstrates how to use a photoresistor (LDR) with an Arduino to control an LED based on ambient light levels using Pulse Width Modulation (PWM). The LED behavior is:

- If the light level is **low**, the LED turns **fully on**.
- If the light level is **high**, the LED turns **off**.
- If the light level is **in between**, the LED glows at **50% brightness**.

### Components Used

- Arduino Uno board
- Breadboard
- LED (Red)
- 220 resistor (for LED)
- LDR (Light Dependent Resistor)
- 10k resistor (pull-down for LDR)
- Jumper wires
- USB Cable

## Circuit Diagram

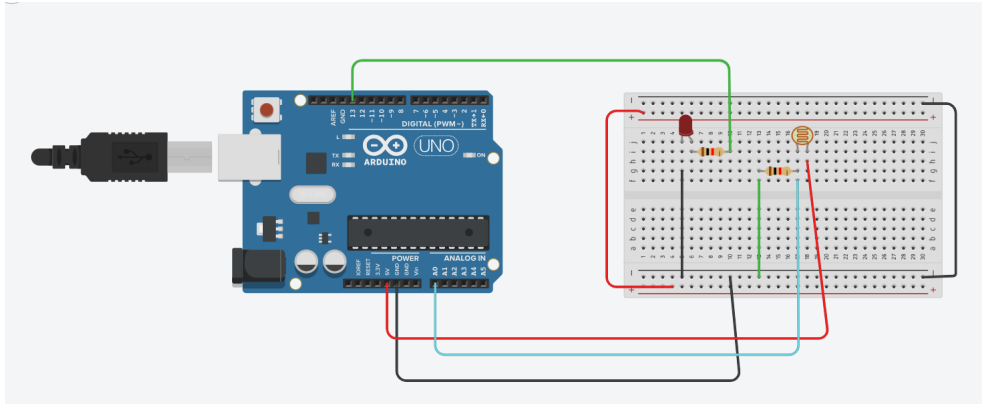


Figure 1: Arduino Circuit for LDR-Controlled LED

## Wiring Explanation

- The LDR is connected in a voltage divider configuration between 5V and GND.
- The junction of the LDR and 10k resistor goes to analog pin A0 of the Arduino.
- The LED is connected to digital pin 13 via a 220 resistor.

## Arduino Code

```
// set variables
int sensorValue = 0;

void setup() {
  // pin for LDR
  pinMode(A0, INPUT);
  // pin for LED
  pinMode(13, OUTPUT);
  // starts the serial monitor
```

```

    Serial.begin(9600);
}

void loop() {
    // read the value from the sensor (range: approx. 54 - 974)
    sensorValue = analogRead(A0);

    // print the sensor reading to Serial Monitor
    Serial.println(sensorValue);

    // map the sensor reading to LED brightness
    int fade = map(sensorValue, 54, 974, 0, 255);
    Serial.println(fade);

    analogWrite(13, fade);
    delay(100); // delay for stability
}

```

## Tinkercad Simulation

You can simulate this circuit online using the link below:

<https://www.tinkercad.com/things/5T32jPLbcHc-task3?sharecode=1FuUD7XkfRCc-Bpv675B8>

## How It Works

- The LDR senses ambient light. As light intensity increases, resistance decreases, causing a voltage change at A0.
- The Arduino reads this voltage and maps it to a PWM value (0-255).
- The LED brightness changes based on this value.

## Extensions and Harder Versions

- Add an LCD screen to display light levels.
- Use multiple LEDs with different brightness levels.

- Add a real-time clock (RTC) to adjust brightness based on time.
- Use a relay to control AC appliances depending on light.

## Similar Projects

- Automatic Street Lighting System
- Light-Sensitive Night Lamp
- Plant Growth Monitoring System
- Smart Window Blinds using LDR and Servo

## Photo of the Real Circuit



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