A logo for a university

Description automatically generated **East West University**

**Project Report**

**Semester:** Fall-2024

**Course Title:** Electronic Circuits **Course Code:** CSE251

**Sec:** 03

**Group No: 07**

**Group Members:**

|  |  |
| --- | --- |
| **Student Name** | **Student Id** |
| **Shiekh Sarafat Hossain** | **2022-3-60-109** |
| **Rijia Parveen Raya** | **2022-3-60-192** |
| **G.M. Rakibul Islam Nazmul** | **2022-3-50-024** |
| **Nadira Akter** | **2022-3-60-220** |
| **Sadia Islam Smrity** | **2022-2-60-101** |

**Submitted by-**

Name: Rijia Parveen Raya

Id: 2022-3-60-192

**Submitted to-**

Dr. Sarwar Jahan

Associate Professor

Department of Computer Science & Engineering

East West University

**Date of Submission: 16th January 2025**

**An Automatic Night Light**

**Introduction:**

The Automatic Night Light is an efficient lighting solution that automatically turns on in low-light conditions, ensuring convenience and energy savings. The system uses a Light Dependent Resistor (LDR) as the light sensor, a Bipolar Junction Transistor (BJT) in a common-emitter configuration as the driver circuit, and two LEDs to represent the lights that operate in response to ambient light levels. The power supply for the circuit is a 9V battery.

**Objective:**

To design and implement a circuit that:

* Uses a light sensor to detect the ambient light level.
* Automatically turns on the lights (LEDs) in the absence of sufficient ambient light.
* Demonstrates the use of a common-emitter follower circuit as the driver.
* Displays the required voltages and currents for proper circuit operation.

**Components Used:**

1. **Light Sensor:** Light Dependent Resistor (LDR)
2. **Transistor:** NPN Bipolar Junction Transistor (BJT)
3. **Resistors:**

* R1 (1 kΩ): Voltage divider for the LDR
* R2 (470 Ω): Current limiting resistor for LED 1 (Red)
* R3 (470 Ω): Current limiting resistor for LED 2 (Green)

1. **LEDs:**

* D1 (Red)
* D2 (Green)

1. **Power Source:** 9V Battery

Miscellaneous: Jumper wires, breadboard

**Circuit Design:**

A diagram of a battery

Description automatically generated

A diagram of a circuit

Description automatically generated

**The circuit schematic and breadboard implementation are provided. Below is a description of the design:**

1. The LDR forms a voltage divider with resistor R1 to sense the ambient light. The resistance of the LDR decreases as light intensity increases, altering the voltage across it.
2. The BJT acts as a switch. Its base is connected to the voltage divider output, enabling the transistor to conduct when ambient light is low.
3. When the transistor is in saturation mode (low-light conditions), the current flows through R2 and R3, illuminating LEDs D1 (Red) and D2 (Green).
4. When the ambient light level is high, the LDR's resistance is low, causing the base-emitter voltage of the transistor to fall below the threshold. The transistor switches off, turning off the LEDs.

**Operation:**

1. **Daylight:**

High ambient light decreases LDR resistance. Voltage at the base of the BJT is insufficient to turn it on. LEDs remain off, conserving energy.

1. **Night or Low Light:**

Low ambient light increases LDR resistance. Voltage at the base of the BJT rises, turning it on. The LEDs are illuminated.

**Advantages:**

* Energy-saving by turning on lights only when necessary.
* Simple and cost-effective design.
* Demonstrates practical use of transistors and light sensors.

**Limitations:**

* Sensitivity to ambient light depends on the LDR's characteristics.
* Adjusting the resistor values manually may be required for different environments.

**Future Improvements:**

* Replace the LEDs with higher-power bulbs for practical room lighting.
* Add a potentiometer to adjust the light sensitivity threshold.
* Add a relay circuit to control AC-powered devices.

**Conclusion:**

The Automatic Night Light project represents the use of basic electronic components to create a functional circuit that responds to ambient light levels. The circuit's simplicity and efficiency make it a practical solution for automated lighting systems.