Electronic Devices and Circuits

Computer System Engineering Department

Sukkur Institute of Business Administration University

Project Report
Automatic Street Light

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Certificate

It is certified that I **_____Abdul Rehman_____** a student of **BE-III** has carried out the necessary work of **EDC as** per course of studies prevailed at the Computer System Engineering Department, Sukkur Institute of Business Administration for **FALL-2022.**

Date: _____ Instructor's Signature

Acknowledgments

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ABSTRACT

The **Automatic Street Light** project is designed to make street lighting smarter and more energy-efficient by turning lights ON and OFF automatically based on the level of natural light in the surroundings. At the heart of the system is an **LDR (Light Dependent Resistor)** that senses the ambient light. When it gets dark, the resistance of the LDR increases, triggering the circuit to switch ON the street light. When there's enough daylight, the light turns OFF on its own.

The system is built using simple and low-cost components, including **transistors (BC547)**, resistors, and an LED to represent the street light. This makes it a great example of how basic electronics can be used to solve real-world problems like energy wastage and unnecessary manual operation.

This project shows how a small idea can contribute to larger goals like **energy conservation** and **smart city development**. It's practical, easy to implement, and can be upgraded further with modern technologies like microcontrollers or solar power for even greater efficiency.

Chapter I

Introduction

Lighting up streets at night is essential for safety, visibility, and daily life. However, many street lights are still controlled manually or work on fixed timers—which means they often stay ON even when it's bright outside or fail to turn ON when it's actually needed. This leads to unnecessary energy consumption and can be inconvenient, especially in areas with limited maintenance support.

To solve this problem, this project focuses on building a **simple automatic street light system** that can turn itself ON when it gets dark and OFF when it's light again—all without any manual control. At the heart of the system is an **LDR (Light Dependent Resistor)**, a sensor that detects the level of ambient light. When it gets dark, the LDR signals the circuit to power the light ON. When daylight returns, the system automatically shuts the light OFF.

What makes this project special is its simplicity and affordability. It uses just a few basic electronic components—like resistors, transistors, and an LED—but delivers a practical and energy-saving solution. It's a small step toward **smarter, more efficient cities**, and shows how basic electronics can be used to make a real difference in everyday life.

Motivation:

The idea for this project came from something we all see but often overlook—**street lights staying ON even during the day**. It seemed like such a small thing, but when you think about how many lights are left running when they're not needed, the amount of wasted energy really adds up. In some areas, these lights are still controlled manually, which isn't always reliable or practical.

That got us thinking: *What if we could make a street light that just knew when to turn ON or OFF on its own?* Something simple, automatic, and energy-efficient. That's where the motivation for this project started.

We wanted to build a system that works on its own—**no switches, no timers, no need for someone to remember to turn it off**. Just a light that responds to the natural changes in the environment. And by using only basic components like an LDR, transistors, and resistors, we knew it could be built affordably, making it useful not just in cities but also in rural or underdeveloped areas.

More than anything, our motivation was to show that **small innovations can lead to meaningful change**, especially when it comes to saving energy and making everyday life a little easier.

Methodology:

To make our **automatic street light system** work, we kept things simple and practical. The idea was to create a circuit that could turn a light ON when it's dark and OFF when it's bright—all without any need for human input. Here's how we went about it:

1. Getting the Basics Right

We began by understanding how an **LDR (Light Dependent Resistor)** reacts to light. Its resistance changes depending on how much light falls on it—low resistance in bright light

and high resistance in darkness. That made it perfect for detecting day and night automatically.

2. Designing the Circuit

Once we understood how the components work, we started designing the circuit. We used:

An **LDR and a resistor** to create a voltage divider that reacts to light levels.

Two BC547 transistors to act like switches. When the LDR detects darkness, the transistors get triggered, which turns the LED (our simulated street light) ON.

During daylight, the LDR reacts to the brightness, lowering the voltage, which then turns the LED OFF.

3. Building the Prototype

We put the components together on a **breadboard** so we could test everything before making anything permanent. This also gave us the flexibility to tweak the setup easily.

4. Testing in Real Conditions

We tested the circuit by simulating day and night—covering the LDR to mimic darkness and shining a light on it to simulate daylight. The system responded just as we hoped: the light turned ON when it was dark and OFF when it was bright.

5. Final Touches

After confirming that the circuit worked properly, we finalized the layout and made sure all the components were placed securely. We also made notes on how the system could be upgraded in the future, such as adding solar panels or using microcontrollers for smarter features.

Chapter II:

Requirements

To build this automatic street light system, we didn't need anything too complex or expensive. Our goal was to use **simple, easy-to-find components** that could demonstrate the concept clearly and effectively. Here's what we needed:

1. Main Components

LDR (Light Dependent Resistor): This is the heart of the project. It senses how bright or dark it is around the circuit.

BC547 Transistors (x2): These act like switches. When it gets dark, they help turn the light ON automatically.

LED (Light Emitting Diode): This stands in for the actual street light in our prototype. It lights up when the system is triggered.

Resistors: Used to control current and work together with the LDR to detect light changes.

Wires: For connecting all the components together.

Breadboard: A handy tool to build and test the circuit without soldering.

Power Source (Battery – 5V or 9V): To run the entire circuit.

2. Tools We Used

Multimeter: To check connections and make sure everything's working.

Wire Stripper: To prepare the wires for clean connections.

(Optional) Soldering Kit: If you want to make a permanent version instead of using a breadboard.

3. What We Needed to Know

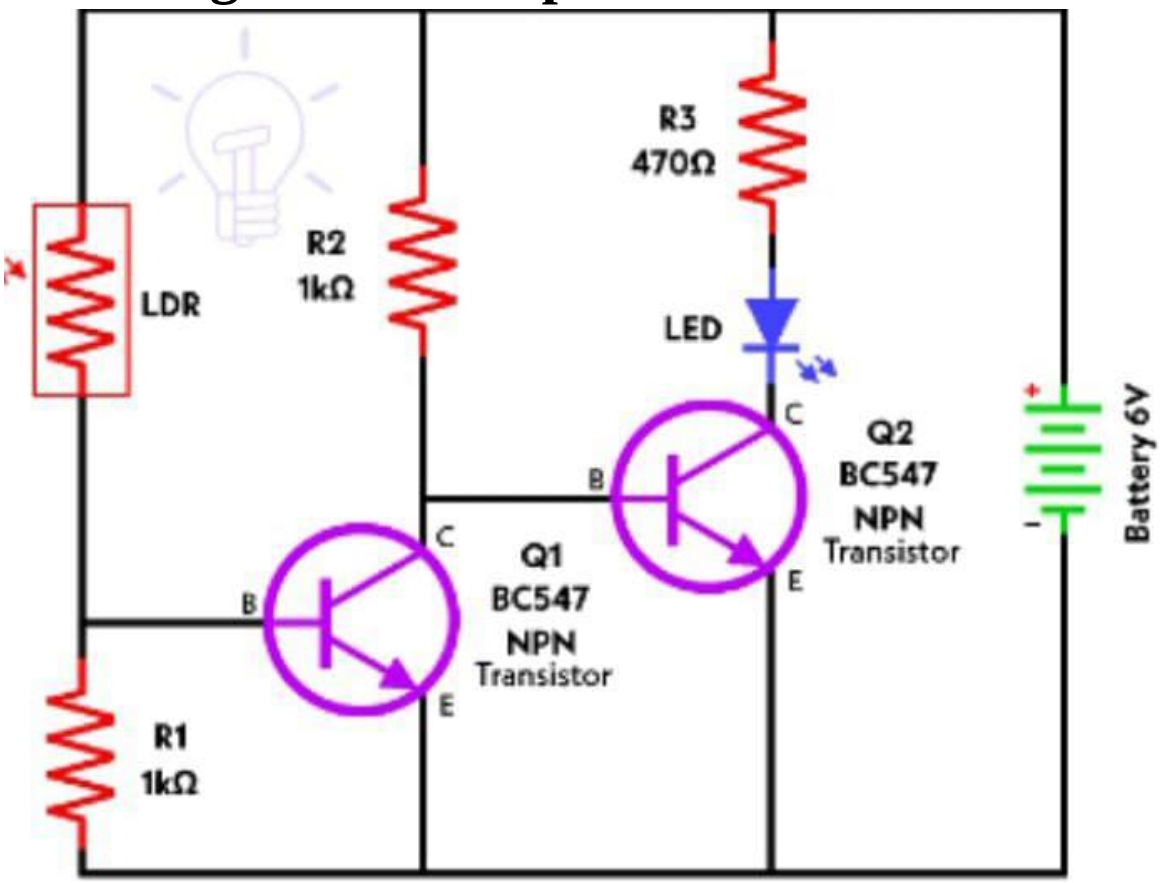
A basic idea of how an LDR and transistors work.

How to follow a simple circuit diagram.

Some basic hands-on electronics skills to assemble and test the setup.

CHAPTER III:

Diagram & Components



Components Used

- Light Dependent Resistor (LDR)
- BC547 Transistors (2 pieces)
- LED (Light Emitting Diode)
- Fixed Resistors
- Battery (5V or 9V)
- Breadboard
- Connecting Wires

Chapter V

Algorithm

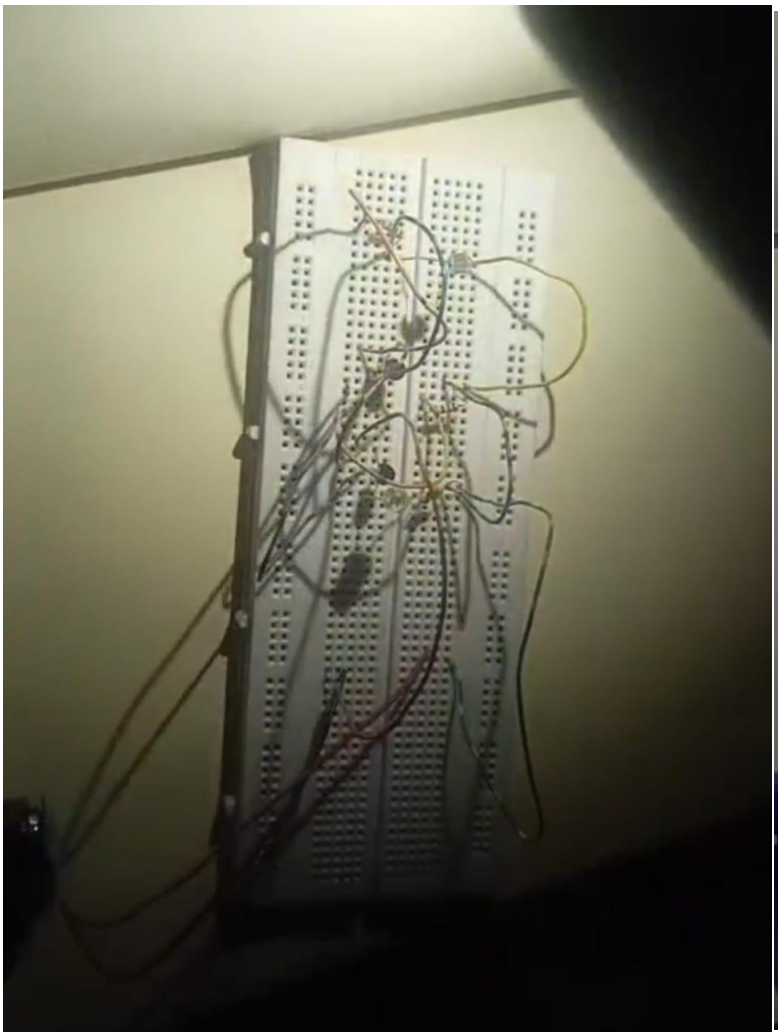
The algorithm is basically the step-by-step logic that our automatic street light follows to decide when to turn the light ON or OFF. Even though our system doesn't use a microcontroller or any coding, the **electronic components follow a logical flow**—almost like a simple program written in hardware.

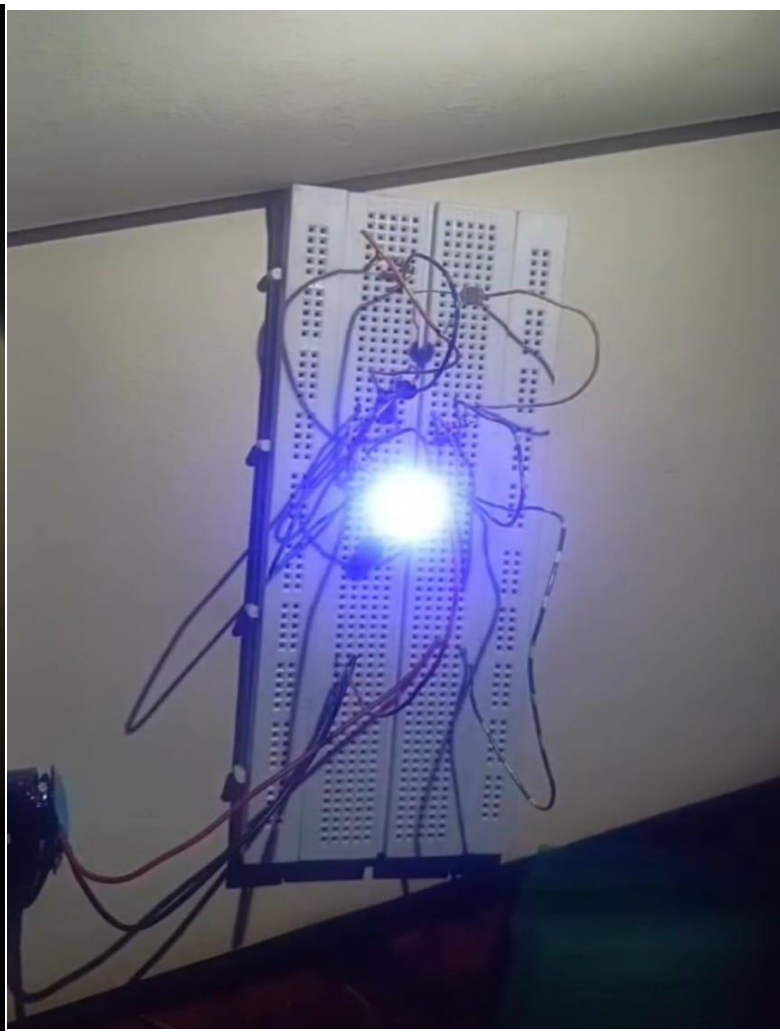
Here's how that logic works:

1. **Start the system** – Power is supplied to the circuit.
2. **Check the surrounding light** using the **LDR**.
3. If there is **enough light (daytime):**
    - The resistance of the LDR is **low**.
    - Voltage at the base of the transistor is **too low** to activate it.
    - Result: **Transistors remain OFF**, and the **LED (street light) stays OFF**.
4. If it is **dark (nighttime):**
    - The resistance of the LDR is **high**.
    - Voltage at the base of the transistor is **high enough** to turn it ON.
    - Result: **Transistors activate**, and the **LED (street light) turns ON**.
5. This process **keeps running continuously** as long as the circuit is powered.
6. The system **automatically adjusts** as the light conditions change—no manual input needed.

Chapter VI

OUTPUT





CHAPTER VII:

Recommendations & Conclusion

Working on this project gave us a lot of insight into how even simple technology can make life easier and smarter. While our automatic street light system works well for its purpose, we discovered a few ways it could be improved or expanded in the future:

1. **Use Solar Power**
   Integrating a small solar panel would allow the system to charge itself during the day and operate completely off-grid at night. This would be especially useful in rural or remote areas where electricity is limited.
2. **Add a Microcontroller**
   While our circuit works without programming, using something like an Arduino could make it even smarter. For example, we could adjust sensitivity, add timers, or create a system that controls multiple lights with custom settings.
3. **Include Motion Sensors**
   To save even more energy, we could add motion detection so the lights only brighten when someone passes by—perfect for walkways or less-busy roads.
4. **Protect the Hardware**
   For real-world outdoor use, the circuit would need to be placed in a weatherproof enclosure. This would protect it from rain, dust, and heat, ensuring long-term durability.
5. **Expand the System**
   The concept can be scaled up to control a series of lights, which could be used for an entire street, a campus, or a parking lot—making it even more useful in everyday life.

Conclusion

This project showed us how technology doesn't always need to be complex to be meaningful. Using just a few basic electronic parts, we were able to build a system that reacts automatically to light conditions—turning a light ON at night and OFF during the day without anyone needing to flip a switch.

It was a simple idea, but seeing it come to life helped us understand the **real value of automation**. Projects like this are not only a great learning experience but also a reminder of how small innovations can lead to more sustainable, efficient solutions for our communities.

We’re proud of what we’ve achieved and excited by the possibilities this project opens up for future improvements and real-world applications.

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