A MINI PROJECT REPORT

on

INTELLIGENT STREET LIGHT SYSTEM USING IoT

Submitted in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

in

CSE(Artificial Intelligence & Machine Learning)

Submitted by

AKSHITHA JAIN	**(22UP1A6601)**
G. SRINIDHI	**(22UP1A6617)**
K. VARSHITHA	**(22UP1A6628)**
M. SRINIDHI	**(22UP1A6644)**

Under the Guidance of

Mr. VEERA REDDY

Assistant Professor

DEPARTMENT OF CSE(ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

VIGNAN'S INSTITUTE OF MANAGEMENT AND TECHNOLOGY FOR WOMEN

Accredited to NBA NAAC A+(CSE&ECE)

(Affiliated to Jawaharlal Nehru Technological University Hyderabad)

Kondapur (Village), Ghatkesar (Mandal), Medchal (Dist.), Telangana, Pincode-501301

www.vmtw.in

2022-2026

VIGNAN'S INSTITUTE OF MANAGEMENT AND TECHNOLOGY FOR WOMEN
(An Autonomous Institution)
[Sponsored by Lavu Educational Society, Affiliated to JNTUH & Approved by AICTE, New Delhi]
Kondapur (V), Ghatkesar (M), Medchal - Malkajgiri (D) - 501 301. Phone: 96529 10002/3

DEPARTMENT OF CSE(AI&ML)

CERTIFICATE

This is to certify that project work entitled "**INTELLIGENT STREET LIGHT SYSTEM USING IoT**" submitted by **AKSHITHA JAIN (22UP1A6601), G. SRINIDHI (22UP1A6617), K. VARSHITHA (22UP1A6628), M. SRINIDHI (22UP1A6644)** in the partial fulfilment of the requirements for the award of the degree of Bachelor of Technology in CSE(AI&ML) **VIGNAN'S INSTITUTE OF MANAGEMENT AND TECHNOLOGY FOR WOMEN** is a record of bonafide work carried by them under my guidance and supervision. The results embodied in this Project report have not been submitted to any other University or institute for the award of any degree.

Mini Project Guide	**Head of Department**
Mr. Veera Reddy	**Dr. D. SHANTHI., M. Tech., Ph. D**
Assistant Professor	Department of CSE(AI&ML)

DEPARTMENT OF CSE(AI&ML)

DECLARATION

We hereby declare that the work reported in the present project entitled "**INTELLIGENT STREET LIGHT SYSTEM USING IoT**" is a record of bonafide work duly completed by us in the Department of CSE (AI&ML) from Vignan's Institute of Management and Technology for Women, affiliated to JNTU, Hyderabad. The reports are based on the summer internship work done entirely by us and not copied from any other source. All such materials that have been obtained from other sources have been duly acknowledged.

The results embodied in this Project report have not been submitted to any other University or Institute for the award of any degree to the best of our knowledge and belief.

AKSHITHA JAIN (22UP1A6601)

G.SRINIDHI (22UP1A6617)

K. VARSHITHA (22UP1A6628)

M. SRINIDHI (22UP1A6644)

ACKOWLEDGEMENT

We would like to express our sincere gratitude and indebtedness to our project guide **Mr. VEERA REDDY**, Assistant Professor for his valuable suggestions and interest throughout the course of this project.

We would like to extend our gratitude to ‘**G.HARITHA’**, Mini Project Coordinator, Department of CSE- Artificial Intelligence and Machine Learning (AI&ML) from Vignan's Institute of Management and Technology for Women, for his valuable suggestions and timely help while the project.

We are also thankful to **Dr. D. SHANTHI**, Head of the Department of CSE- Artificial Intelligence and Machine Learning from Vignan's Institute of Management and Technology for Women, Hyderabad for providing excellent infrastructure and a nice atmosphere for completing this project successfully as a part of our B.Tech. Degree (CSM).

We convey our heartfelt thanks to the lab staff for allowing us to use the required equipment whenever needed.

Finally, we would like to take this opportunity to thank our family for their support through the work. We sincerely acknowledge and thank all those who gave directly or indirectly their support in the completion of this work.

AKSHITHA JAIN	**(22UP1A6601)**
G.SRINIDHI	**(22UP1A6617)**
K. VARSHITHA	**(22UP1A6628)**
M. SRINIDHI	**(22UP1A6644)**

ABSTRACT

In the age of smart technology, energy efficiency and automation play a crucial role in shaping the infrastructure of modern, sustainable cities. Street lighting, being a major contributor to energy consumption in urban areas, requires intelligent solutions to reduce wastage and improve performance. The Intelligent Street Light System proposed in this project addresses this need by leveraging Internet of Things (IoT) concepts to create an adaptive, low-power lighting solution. This system is built using an Arduino Uno microcontroller, Light Dependent Resistor (LDR) sensor, and LEDs to automatically monitor and adjust light intensity based on real-time ambient light conditions. The LDR sensor continuously measures the surrounding light level and communicates the data to the Arduino. The microcontroller then uses Pulse Width Modulation (PWM) to regulate the brightness of the street lights. When natural light levels drop, the LEDs brighten accordingly; when sufficient daylight is present, the LED intensity is reduced or turned off, thereby conserving energy while maintaining visibility and safety. It is designed to be cost-effective and scalable, the system can be easily deployed in both urban and rural settings.

Keywords: Smart Street Light, IoT, Arduino, LDR Sensor, Energy Efficiency, Automation, PWM, Embedded System.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER-1
INTRODUCTION

1.1 INTRODUCTION

Street lighting is an essential part of urban and rural infrastructure, playing a critical role in ensuring public safety, traffic management, night-time visibility, and visibility in poor weather conditions. However, traditional lighting systems operate on fixed schedules, turning on and off at set times regardless of actual environmental conditions. This often leads to energy wastage, especially during seasons or weather changes when natural light availability varies.

For instance, during summer evenings, there may be enough daylight even at 7 pm, making street lighting unnecessary. On the other hand, during winter or rainy season, darkness may set in as early as 5 pm, requiring earlier lighting. These inconsistencies highlight the inefficiency of conventional systems and the need for smarter and more adaptive solutions. As cities move towards smartness and sustainability, incorporating environmental awareness and automation into street lighting has become increasingly important.

1.2 PROBLEM STATEMENT

Traditional street lights operate on fixed schedules and lack adaptability to changing weather and daylight conditions. This leads to energy waste—lights stay on even when not needed in summer and may turn on too late during dark, cloudy, or winter evenings. An automated system is needed to adjust lighting based on real-time ambient light for better efficiency and safety.

CHAPTER-2

LITERATURE REVIEW

2.1 SURVEY TABLE

S.NO	Titles	Authors	Methodology	Drawback
1	SMART STREET LIGHTING Using IoT	Sakshi Dhoke, Sharda Jadhav, Mayuri Jasturkar.	Proposed a motion-based street lighting system that activates lights when movement is detected.	Does not consider weather conditions like fog or rain.
2	Advanced Solar Power LED Street Lighting	Abubakar Mukhtar, Mr. Rakesh Kumar	Developed a solar-powered LED streetlight system for energy efficiency.	Lacks intelligent adaptive control for varying light conditions.
3	. Smart Street Lighting System Using IoT for Sustainable Urban Development	P. Sharma, D. R. Kalbande	The system utilizes PIR sensors to detect motion, enabling dynamic control of streetlights.	Lacks intensity of light variations.
4	IoT-Based Smart Street Light System	T. Gopinath, Dr. Princess maria john, Ph.D.	It discusses the integration of sensors and microcontrollers to automate street lighting, aiming to reduce energy consumption and enhance efficiency.	Does not consider changing the intensity of light.
5	Smart Street Light Control System Using Arduino	Mahendra Singh Sisodiya, Tarun Shrivastava, Ashish Patra	street lights ON when motion is detected and OFF when no motion is detected, using IR sensors and Arduino.	Lacks intelligent adaptive control for varying light conditions.

Table 1. Literature survey

2.2 MOTIVATION

Conventional street lighting systems typically remain on throughout the night, regardless of whether they are needed. This not only leads to significant energy wastage but also unnecessary operational costs for municipalities and local bodies. With the rapid urbanization and rise in energy demand, there is an urgent need to adopt intelligent and sustainable lighting solutions. The motivation for this project stems from the desire to create a street lighting system that reacts to its surroundings intelligently. By incorporating ambient light sensing and weather condition monitoring, we aim to make the lighting system more efficient, responsive, and capable of conserving energy without compromising public safety. The project also aims to be scalable and cost-effective, making it suitable for deployment in both urban and rural areas.

2.3 OBJECTIVE

● To develop an automated street lighting system that adjusts brightness based on real-time ambient light using LDR sensors.

● To implement a microcontroller-based control mechanism (Arduino Uno) that processes sensor data and manages the brightness of LEDs.

● To ensure energy efficiency by minimizing unnecessary usage of lights and enhancing their operational lifespan.

● To contribute toward a smart city infrastructure that is both environmentally conscious and economically sustainable.

CHAPTER-3

SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

Street lighting systems have evolved over time, with several types currently in use. However, most existing systems have limitations regarding adaptability, energy efficiency, and responsiveness to real-time environmental conditions. The major types of existing systems are:

1. **Manual Control Systems**
   In these systems, street lights are operated manually by switching them on or off at fixed times. This method is outdated and inefficient, as it often leads to lights staying on unnecessarily or not turning on when needed.

2. **Timer-Based Systems**
   These systems use preset timers to control the operation of street lights. Although they reduce human effort, they don't adapt to seasonal changes or weather conditions. For example, in summer, it may stay bright until 7 PM, but the lights still turn on at 6 PM, wasting electricity.

3. **LDR-Based Automatic Lighting**
   Some systems use Light Dependent Resistors (LDRs) to turn lights on/off based on the ambient light level. While this improves automation, it doesn't consider changing the intensity of light based on ambient light.

4. **Motion-Sensor Based Lighting**
   These systems activate lights when movement is detected. Although energy-saving, they are better suited for pathways or parks rather than long roadways, where continuous lighting is often required for safety.

3.2 EXISTING SYSTEM DISADVANTAGES

Timer-based and manual systems often keep lights ON even when not needed, especially during bright evenings in summer, leading to unnecessary power consumption.

Basic systems only turn lights ON or OFF; they do not adjust the brightness based on real-time needs, which limits energy-saving potential and fails to adapt to varying visibility.

Manual systems require human intervention, and some smart systems (like motion sensors or IoT-connected setups) are expensive to install and maintain.

Existing solutions are not optimized for all scenarios—motion-sensor lights may not be suitable for long roads, and solar lights may fail during prolonged cloudy or rainy periods.

3.3 PROPOSED SOLUTION

The proposed system is a smart, automated street lighting solution that adjusts the intensity of streetlights based on real-time environmental conditions, such as ambient light. The system uses a combination of IoT-based sensors and an Arduino microcontroller to create an energy-efficient and responsive lighting solution.

The system utilizes an LDR (Light Dependent Resistor) sensor to detect the level of natural light in the environment. Based on this input, the system automatically adjusts the brightness of the street lights. When ambient light is low (e.g., during dusk, cloudy weather, or in winter), the lights will increase in brightness, ensuring visibility and safety. When there is sufficient natural light (e.g., during bright days or summer evenings), the lights dim or turn off completely to conserve energy.

The Arduino Uno board serves as the central controller, processing the inputs from the sensor and controlling the LEDs based on pre-programmed thresholds. The system uses analog output to dynamically adjust the brightness of the LEDs, allowing for smooth transitions rather than abrupt on/off switching.

By adjusting the light intensity based on real-time environmental data, the system significantly reduces energy consumption compared to conventional street lighting. The adaptive control ensures that lights are on only when necessary and at the required brightness level, offering a more sustainable solution that lowers operational costs.

The system is designed to be scalable, making it suitable for both small urban setups and large city-wide implementations. With the use of low-cost components (Arduino, sensors, and LEDs), the proposed system can be easily deployed in rural and underserved areas, where traditional smart street lighting solutions may be cost-prohibitive.

3.4 HARDWARE & SOFTWARE REQUIREMENTS

Hardware Requirements

1. **Arduino Uno** – Acts as the microcontroller to process sensor data and control LED brightness.
2. **LDR Sensor** – Detects ambient light levels to decide brightness adjustments.
3. **LEDs (Light Emitting Diodes)** – Used as street lights with brightness controlled.
4. **Power Supply** –USB power for the Arduino and components.

Software Requirements

1. **Arduino IDE** – Used to write, compile, and upload code to the Arduino board.
2. **Embedded C++** – A programming language for writing microcontroller logic.
3. **Serial Monitor (Arduino)** – For testing and debugging sensor readings.

CHAPTER-4

SYSTEM DESIGN

4.1 ARCHITECTURE

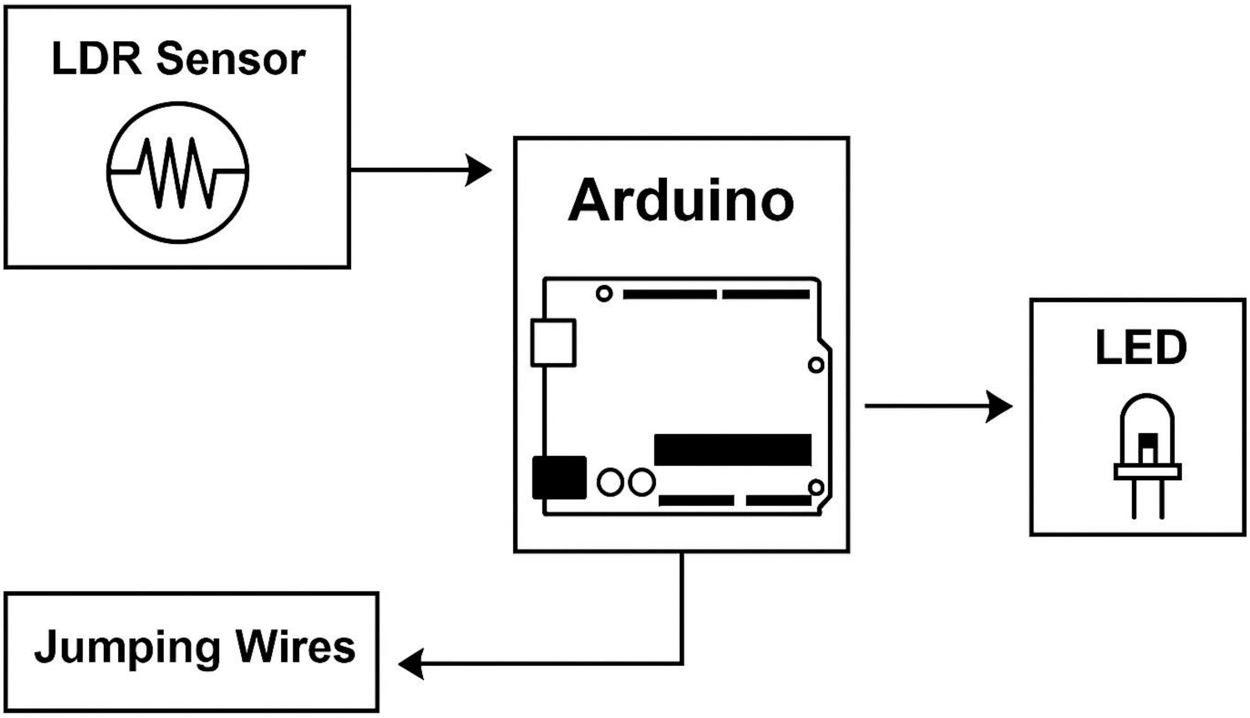

Figure 1. System Architecture

- Uses LDR sensor to detect light intensity.
- Arduino processes the sensor data in real-time.
- Automates lighting based on natural conditions
- Reduces manual effort and energy consumption.

4.2 UML Diagrams

To better visualize the system architecture and workflow, Unified Modeling Language (UML) diagrams are used. The following diagrams illustrate the structural and behavioral aspects of the Intelligent Street Light System:

Use Case Diagram

The use case diagram represents the interaction between external users (or actors) and the system. It defines the system boundaries and identifies key functionalities such as detecting light levels, adjusting brightness.

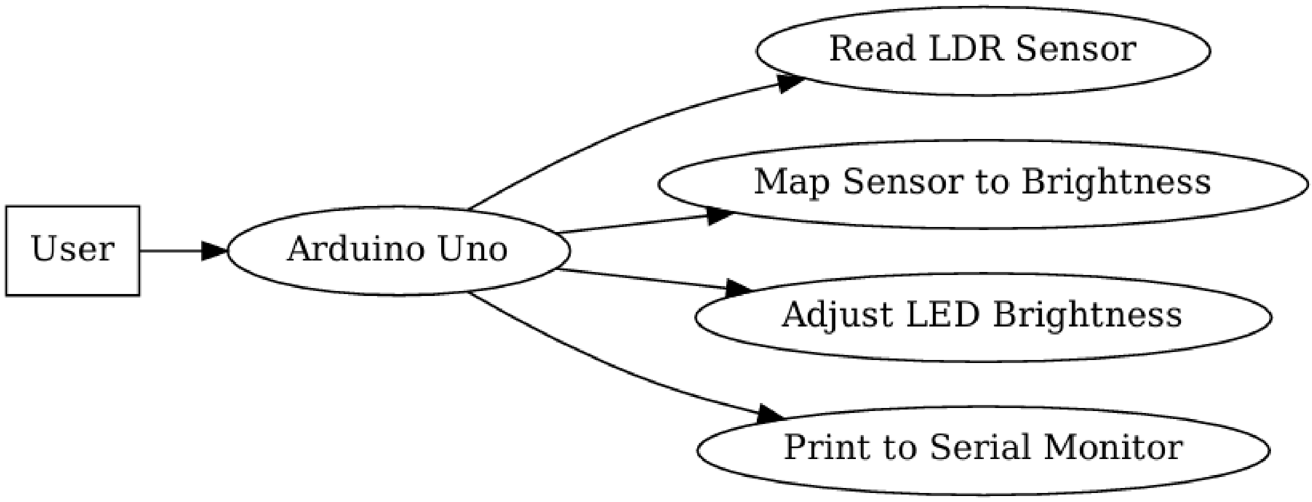

Figure 2. Use Case Diagram

Activity Diagram

The activity diagram illustrates the workflow and logical sequence of operations, such as: Sensing ambient light, comparing values with the threshold, adjusting LED brightness.

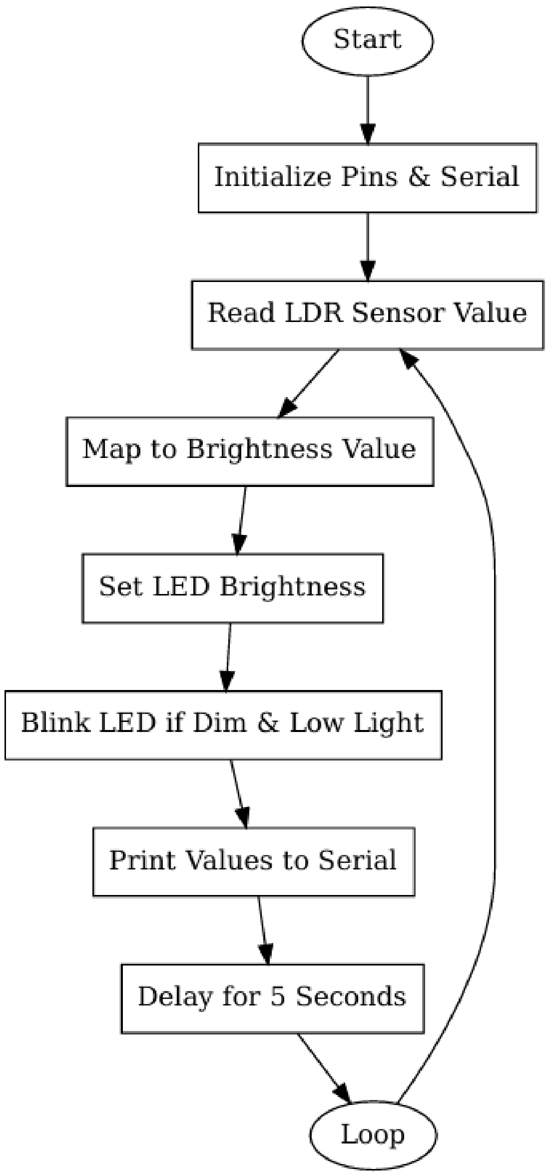

Figure 4.2: Activity Diagram

CHAPTER-5

IMPLEMENTATION

5.1 MODULE SPLIT–UP

The proposed system is divided into the following modules:

1. Ambient Light Sensing Module

○ Uses an LDR (Light Dependent Resistor) to detect natural light levels.

○ Determines whether the streetlights should be brightened, dimmed, or turned off.

2. Microcontroller Control Module

○ Based on Arduino Uno, it acts as the core processing unit.

○ Takes sensor inputs and adjusts LED intensity via analog output (PWM).

○ Executes logic programmed to handle various environmental scenarios.

3. LED Lighting Module

○ High-brightness LEDs are used to simulate streetlights.

○ Their brightness levels are controlled using PWM signals from the Arduino based on sensor feedback.

4. Power Supply Module

○ Provides power to all system components.

○ Can be extended in the future to include solar panels for sustainable energy

5.2 IMPLEMENTATION

The implementation involved both hardware integration and embedded software development. The major steps are as follows:

- Sensor Integration
    - The LDR was connected to an analog pin to detect ambient light levels.
- Control Logic Development
    - Using Arduino IDE, code was written to read values from the LDR sensors.
    - Logic was implemented to interpret these values and adjust LED brightness output from the Arduino.
- Light Control Strategy

- When the LDR detects low ambient light, the system increases LED brightness. .
- During daylight or high ambient light, the system dims or turns off the lights.

● Testing

- The system was tested in various lighting and environmental conditions to validate dynamic adjustments.
- The performance was evaluated for responsiveness and power efficiency.

5.3 ALGORITHM

The control logic for the Smart Street Light system is implemented on the Arduino Uno using embedded C++. The algorithm continuously monitors ambient light levels through an LDR sensor and adjusts the brightness of the LED accordingly using internal PWM. The system operates in real time to provide adaptive lighting and optimize energy usage.

Step-by-Step Algorithm:

1. **Initialize Pins and Variables:**

Set the sensor pin (sensorPin) to A0, which reads the potentiometer (simulating ambient light).
Set the LED pin (ledPin) to 9, which will control the brightness of the LED.
Define sensorValue to store the raw value from the sensor.
Define brightness to store the mapped brightness value for the LED.

2. **Setup:**

Set the LED pin (ledPin) as an output to control the LED.
Begin serial communication at a baud rate of 9600 to send data to the Serial Monitor.

3. **Loop:**

Step 1: Read the analog value from the sensor pin (sensorPin) and store it in sensorValue (range 0-1023).
Step 2: Map the sensorValue from the range 0-1023 to the PWM range (0-100) and store it in brightness.

Step 3: Adjust the LED brightness using the analogWrite() function based on the mapped brightness value.

Step 4: Print the sensorValue and the corresponding brightness value to the Serial Monitor for debugging.

Step 5: If the brightness value is less than 20 and sensorValue is less than or equal to 80:

Set the LED brightness to brightness.

Turn the LED off (set brightness to 0) after a short delay of 100 milliseconds.

Wait for 1 second (1000 milliseconds).

Step 6: Wait for 5 seconds before the next loop iteration.

4. **End of loop:**

The loop repeats continuously to adjust the LED brightness based on the sensor reading.

5.4 TECHNOLOGIES USED

Microcontroller Tool: Arduino Uno

Purpose: Acts as the central control unit for processing sensor data and controlling the brightness of LEDs

Ambient Light Sensor Tool: LDR (Light Dependent Resistor)

Purpose: Detects the level of natural light in the surroundings to determine whether the lights need to be turned on, off, or adjusted.

Lighting Tool: High-power LEDs

Purpose: Simulates real streetlights and supports variable brightness control for energy-efficient lighting.

Programming Language Technology: C++ (Arduino IDE)

Purpose: Used for writing embedded control logic and managing the functioning of all hardware components.

CHAPTER-6

RESULTS

6.1 SCREENSHOTS

The following images demonstrate the practical implementation of the Intelligent Street Light System using an Arduino Uno, an LDR sensor module, and an LED light. These snapshots capture the setup and the system's behavior under different lighting conditions.

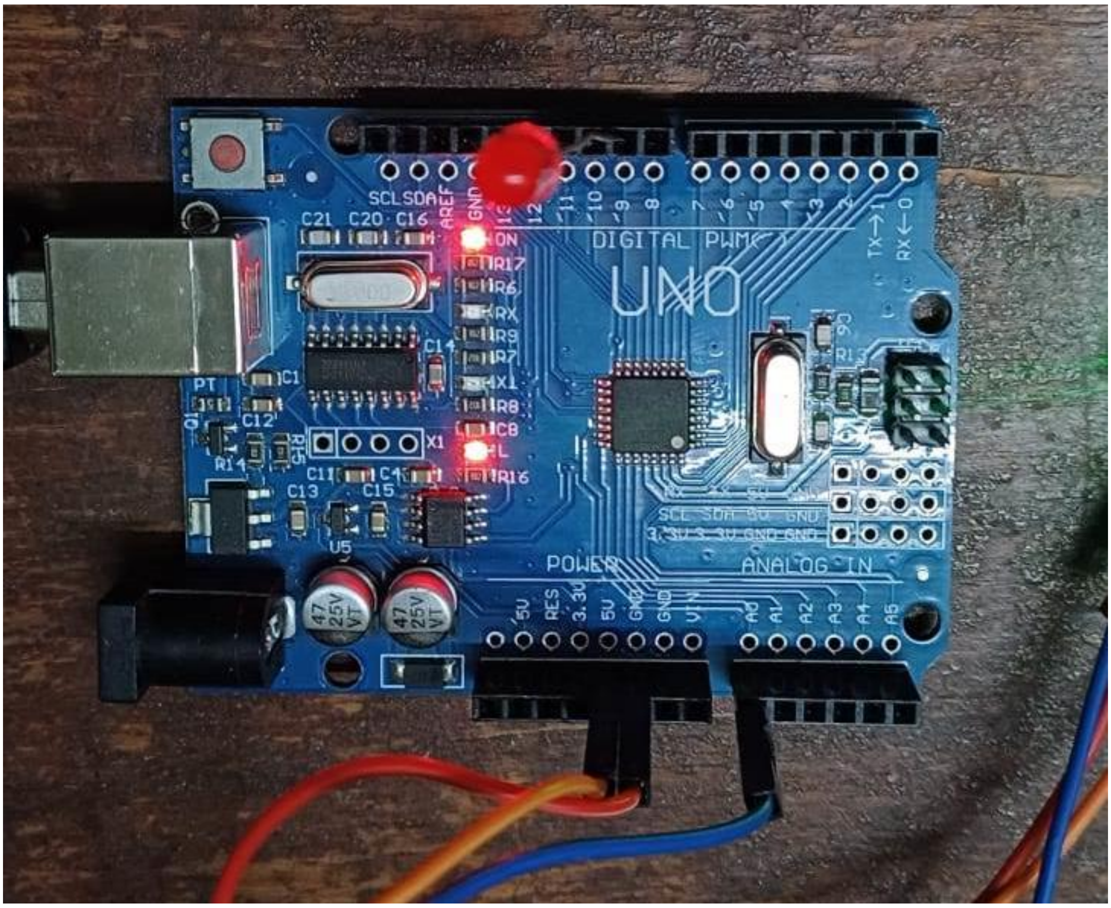

Figure 4. Arduino Uno connected with LDR sensor and LED

This image shows the basic wiring of the Arduino Uno board. The LED is connected to pin 9 for PWM brightness control, while the LDR is connected to analog input A0.

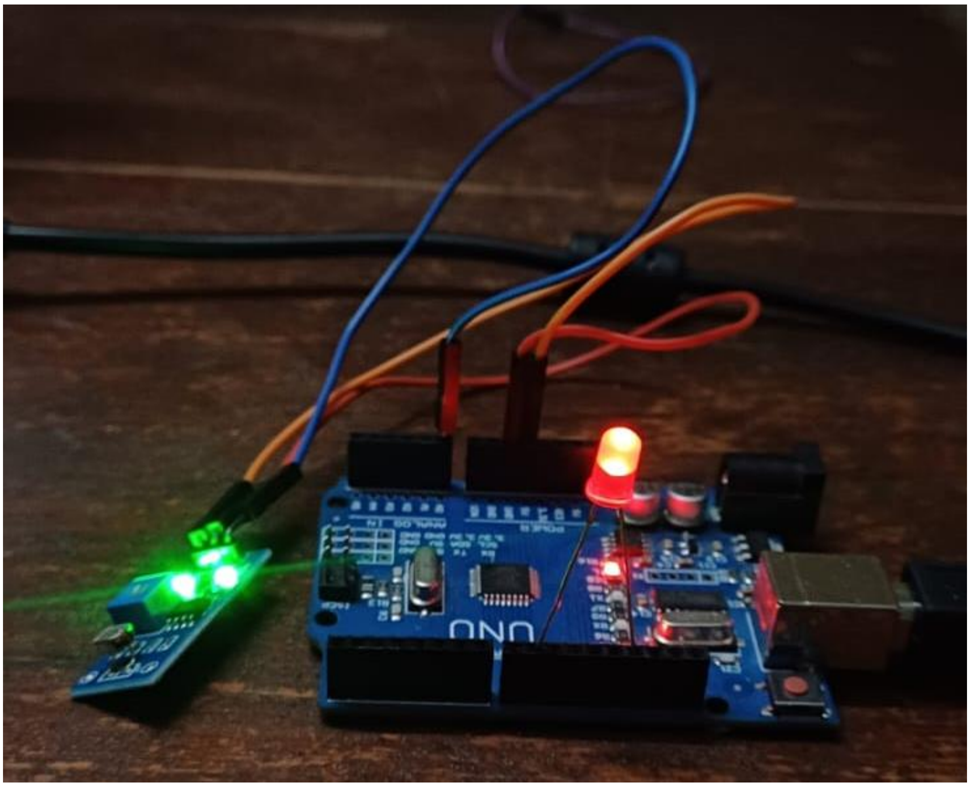

Figure 5. LED glowing at high intensity under low light

This demonstrates the LED turning ON at higher brightness when the sensor detects reduced ambient light.

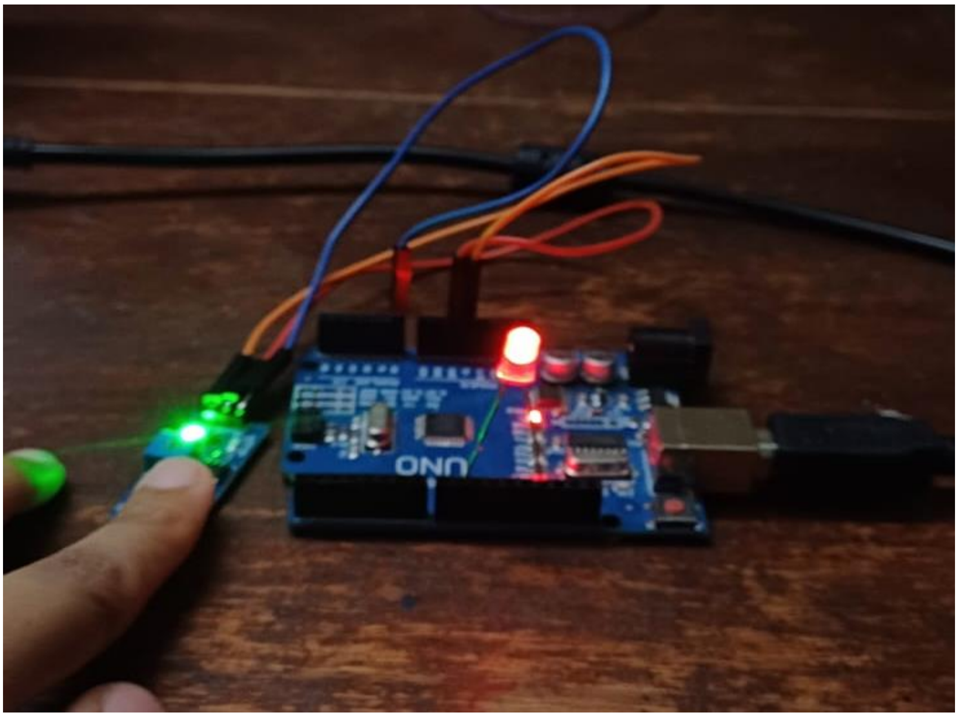

Figure 6. LDR module reacting to changing light

The user’s finger is used to block the LDR partially to simulate dim conditions. The LED responds by increasing its brightness accordingly.

CHAPTER-7

TESTING

To verify the accuracy and reliability of the IoT-Based Smart Street Light System, multiple testing strategies were applied, including Integration Testing and Black-Box Testing. The objective was to validate both individual components and their interaction under different real-world conditions.

7.1 Unit Testing

Unit testing was conducted to verify the functionality of individual components in isolation. This ensured that each hardware and software module performed its intended function before integration.

Test Case	Unit Tested	Input/Condition	Expected Output	Result
UT-1	LDR Analog Read	Simulated light levels	Analog values between 0–1023	Pass
UT-2	PWM Brightness Logic	Sensor value = 600	LED operates at medium brightness	Pass
UT-3	Delay and Blinking Logic	Sensor value < 80	LED blinks briefly, then resumes	Pass
UT-4	Serial Output Monitoring	Varying light on LDR	Correct sensor and brightness logs	Pass

Table 2. Unit Test Case

7.2 Integration Testing

Integration testing was conducted to ensure proper communication between key hardware components: the LDR sensor, Arduino Uno, LED, and circuit.

Test Case	Component Interaction	Expected Output	Result
IT-1	LDR Sensor → Arduino A0	The correct analog value is read	Pass
IT-2	Arduino PWM (pin 9) → LED	LED brightness varies with light input	Pass
IT-3	Jumper Wires + Circuit Stability	No loose connections or flickering	Pass

Table 3. Integration Test Case

7.3 Black-Box Testing

This approach tested the system’s output responses without considering internal logic/code. Different lighting conditions were simulated to observe LED behavior.

Test Case	Input Condition	Expected Output	Actual Output	Status
BB-1	Bright light on LDR	LED OFF	LED OFF	Pass
BB-2	Covered LDR (dark)	LED ON	LED ON	Pass
BB-3	Fluctuating light levels	LED brightness varies	LED varied	Pass
BB-4	Very low light (<80 value)	LED blinks briefly	LED blinks	Pass

Table 4. Black-Box Testing

.

CHAPTER-8

CONCLUSION

The Intelligent Street Light System, this project is a low-cost, IoT-based automation that can revolutionize public infrastructure. Designed using an Arduino Uno, LDR sensor, and energy-efficient LEDs, the system intelligently adapts to real-time environmental lighting conditions and adjusts streetlight brightness accordingly. This dynamic behavior is achieved through internal Pulse Width Modulation (PWM), which ensures that the lighting is neither excessive nor insufficient, but optimally suited to the ambient conditions.

Traditional street lighting systems rely heavily on static control mechanisms such as timers or manual switching, which leads to either overconsumption of energy or poor visibility. In contrast, this smart system eliminates those inefficiencies by responding directly to real-world factors like changing daylight intensity, cloud cover, or early dusk. The prototype has been rigorously tested through multiple phases, including unit, integration, black-box, and acceptance testing, all of which validated its robust performance and adaptability.

One of the key advantages of this system is its cost-effectiveness. Built using easily available components like Arduino, LDR, and LEDs, the system is ideal for implementation in both urban and rural areas, especially where budget constraints exist.

From an environmental perspective, the Intelligent Street Light System supports sustainable development by significantly reducing electricity consumption, lowering carbon footprints, and decreasing the burden on energy grids. Its automated operation reduces the need for manual monitoring and intervention, allowing for smarter allocation of human resources.

CHAPTER-9

FUTURE ENHANCEMENT

In the future, this Intelligent street light system can be significantly improved by integrating additional low-cost sensors to enhance its responsiveness and functionality. Sensors such as PIR (Passive Infrared) or ultrasonic sensors can detect the presence of vehicles or pedestrians and adjust the light intensity accordingly, providing illumination only when required and conserving more energy. Environmental sensors like the MQ-135 for air quality, BMP180 for pressure, or a basic rain sensor module can further improve the system's ability to respond to poor visibility conditions caused by weather changes.

Incorporating solar panels and battery storage would make the system more eco-friendly and ideal for deployment in areas with limited or unreliable electricity. Another important enhancement is the implementation of LED fault detection mechanisms. By continuously monitoring the health of LEDs, the system can identify failures and send alerts to maintenance teams for timely repairs, ensuring uninterrupted functionality.

Moreover, wireless communication modules like ESP8266 (Wi-Fi) or GSM can enable real-time monitoring and centralized control through cloud platforms. This allows authorities to manage streetlights remotely, schedule operations, and analyze performance data. In addition, a user-friendly mobile application or dashboard can be developed for easier system interaction, monitoring, and manual override when needed. These enhancements would elevate the system into a more intelligent, scalable, and sustainable solution for smart city infrastructure.

CHAPTER-10

REFERENCES

1. Sakshi Dhoke, Sharda Jadhav, Mayuri Jasturkar "SMART STREET LIGHTING Using IOT" Volume: 10 Issue: 04 | Apr 2023
2. Abubakar Mukhtar, Mr. Rakesh Kumar "Advanced Solar Power LED Street Lighting" 2020 JETIR May 2020, Volume 7, Issue 5.
3. T. Gopinath, Dr. Princess maria john, Ph.D. "IOT BASED SMART STREET LIGHT SYSTEM" Vol. 11, Issue 5, May 2024
4. Mahendra Singh Sisodiya, Tarun Shrivastava, Ashish Patra. "Smart Street Light Control System Using Arduino" - Vol. 9, Issue 6, June 2021
5. An Energy Efficient IoT-Based Smart Street Lighting Using Low Cost SOC" by Anitha Velu, Raghu Ramamoorthy, Manasa S M, and Devakirubai Navulkumar
6. Mahesh Boda, Raju Athe, Shivani Chettukindi, Vyshnavi Katakam, Sathyam., "IOT based Smart Street Light System" -Bonala ISSN (Online): 2347-3878 Impact Factor (2020): 6.733
7. V. S. Kanase et al., "Advanced Solar Power LED Street Lighting With Auto Intensity Control," JETIR, vol. 7, no. 5, 2021.
8. Mahendra Singh Sisodiya, Tarun Shrivastava, Ashish Patra., "Smart Street Light Control System Using Arduino," IJIREEICE, vol. 9, no. 6, 2021.
9. Fomrudee, S., et al. (2023). "Smart Street Light Control: Review of Innovations and Applications. Energies", 16(21), 7415

SAMPLE CODE

```
int sensorPin = A0;

int ledPin = 9;

int sensorValue = 0;

int brightness = 0;

void setup() {

  pinMode(ledPin, OUTPUT);

  Serial.begin(9600);

}

void loop() {

  sensorValue = analogRead(sensorPin);

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

  analogWrite(ledPin, brightness);

  Serial.print("Sensor: ");

  Serial.print(sensorValue);

  Serial.print(" -> Brightness: ");

  Serial.println(brightness);

  if(brightness < 20 && sensorValue<=80){

     analogWrite(ledPin , brightness);

        delay(100);

      analogWrite(ledPin , 0);
```

```
  delay(1000);
 }
  delay(5000);
}
```