VISVESVARAYA TECHNOLOGICAL UNIVERSITY

JNANA SANGAMA, BELAGAVI – 590014

A Mini Project Phase-1 Report On

"AUTOMATIC STREET LIGHT CONTROLLER"

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

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

Submitted by:

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ANGADI INSTITUTE OF TECHNOLOGY & MANAGEMENT

BELAGAVI-590009

2024-2025

ANGADI INSTITUTE OF TECHNOLOGY & MANAGEMENT

BELAGAVI - 590009

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

This is to certify that the Project entitled **" AUTOMATIC STREET LIGHT CONTROLLER "** is work carried out by Neelamma Budannavar (USN: 2AG22EC030), Daneshwari Bevinakatti (USN:2AG22EC017), Preeti Patil(USN:2AG22EC036) in partial fulfillment of the requirements for the award of the degree of Bachelor of Electronics and Communication Engineering under Visvesvaraya Technological University, Belagavi, during the year 2024-2025. The Pre-Final year Project report has been approved as it satisfies the academic requirements in respect of the project work prescribed for the Bachelor of Engineering degree.

Signature of the Guide	Signature of the HOD	Signature of the Principal
Prof.Kiran.Veergoudar	**Prof. Sriram K.V**	**Dr. Anand Deshpande**
Assistant Professor,	**Assistant Professor and Head**	**Principle and**
Director,		
Dept. of ECE, AITM	**Dept. of ECE, AITM**	**AITM, Belagavi**

Name of the Examiners: Signature with date:

1. ………………………………. ……………………..

2. ……………………………… ……………………..

INSTITUTION VISION AND MISSION

VISION

To become a premier institute committed to academic excellence and global competence for the holistic development of students.

MISSION

M1: Develop competent human resources, adopt outcome-based education (OBE) and implement cognitive assessment of students.

M2: Inculcate the traits of global competencies amongst the students.

M3: Nurture and train our students to have domain knowledge, develop the qualities of global professionals and to have social consciousness for holistic development.

DEPARTMENT VISION AND MISSION

VISION

To impart quality and responsive education in Electronics and Communication engineering for the overall development of students to meet the global challenges.

MISSION

M1: Adopt a transformative teaching-learning pedagogy to empower our students with domain knowledge and practical skills in resonance with technological developments.

M2: Impart multi-disciplinary knowledge, and train our students to develop the relevant professional competency skills.

M3: Create a cogent ambiance to comprehend the technical and management principles, and the efficacy of lifelong learning.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Our graduates will be able to:

PEO1 Acquire core knowledge of Electronics, Communication, Programming, Scientific and Engineering fundamentals necessary to formulate, analyze and solve electronics and IT related engineering problems, and meet industry related challenges.

PEO2 Demonstrate an ability to analyze the requirements and technical specifications of hardware, software and firmware to articulate novel engineering solutions for an efficient product design.

PEO3 Adapt to the emerging technologies, and work as teams on multidisciplinary projects which in turn may develop communication skills and leadership qualities.

PEO4 Pursue professional career adopting work values with a social concern to bridge the digital divide, while meeting the requirements of Indian and multinational companies.

PEO5 Understand the efficacy of life-long learning, professional ethics and practices, so that they may emerge as global leaders.

DECLARATION

We, **Neelamma Budannavar** (2AG22EC030), **Daneshwari Bevinakatti** (2AG22EC017) And **Preeti Patil** (2AG22EC036) studying in the Pre-final year of Bachelor of Engineering in Electronics and Communication Engineering at Angadi Institute of Technology and Management, Belagavi, hereby declare that this project work entitled "**AUTOMATIC STREET LIGHT CONTROLLER"** which is being submitted by using the partial fulfillment for the award of the degree of Bachelor of Engineering in Electronics and Communication Engineering from Visvesvaraya Technological University, Belagavi is an authentic record of us carried outduring the academic year 2024-2025 under the guidance of **Prof.Kiran Veergoudar** Department of Electronics and Communication Engineering, Angadi Institute of Technology and Management, Belagavi.

We further undertake that the matter embodied in the dissertation has not been submittedpreviously for the award of any degree by us to any other university or institution.

Place: Belagavi

Date: **1**0/12/2024

Neelamma Budannavar
Daneshwari Bevinakatti
Preeti Patil

ACKNOWLEDGEMENT

We Neelamma Budannavar(USN:2AG22EC030),Daneshwari Bevinakatti(USN: 2AG22EC017), And Preeti Patil(USN: 2AG22EC036), studying in the Pre-final year of Bachelor of Engineering in Electronics and Communication Engineering at Angadi Institute of Technology and Management, Belagavi, hereby declare that this project work entitled **"AUTOMATIC STREET LIGHT CONTROLLER"** which is being submitted by using the partial fulfillment for the award of the degree of Bachelor of Engineering in Electronics and Communication Engineering from Visvesvaraya Technological University, Belagavi is an authentic record of us carried out during the academic year 2024-2025 under the guidance of **Prof. Kiran Veergoudar,** Department of Electronics and Communication Engineering, Angadi Institute of Technology and Management, Belagavi.

We further undertake that the matter embodied in the dissertation has not been submitted previously for the award of any degree or diploma by us to any other university or institution.

Place: Belagavi

Date: 20/12/2023

Neelamma Budannavar
Daneshwari Bevinakatti
Preeti Patil

ABSTRACT

The Automatic Street Light Controller system is designed to optimize energy consumption and enhance operational efficiency in street lighting. Utilizing sensors such as light-dependent resistors (LDRs) and motion detectors, the system dynamically adjusts streetlight intensity based on ambient light conditions and pedestrian or vehicle movement. During low-traffic hours, the lights operate at minimal brightness and increase when activity is detected, ensuring energy savings without compromising safety. Additionally, the system incorporates microcontroller-based automation for real-time monitoring and remote management, making it a cost-effective and environmentally friendly solution for modern urban infrastructure. This project highlights the potential for intelligent systems to reduce electricity usage and support sustainable development.

CONTENT Page No.

CHAPTER-1

1.1 INTRODUCTION

Street lighting plays a vital role in ensuring safety and security for pedestrians and vehicles during nighttime. However, traditional street lighting systems often result in excessive energy consumption due to their inability to adapt to varying conditions such as traffic density or ambient light levels. This inefficiency leads to significant energy wastage and increased operational costs.

The **Automatic Street Light Controller** system addresses these challenges by integrating intelligent sensors and automation technologies to optimize street lighting operations. By employing light-dependent resistors (LDRs) to detect ambient light and motion sensors to monitor pedestrian and vehicle activity, the system can adjust the brightness of streetlights dynamically. During periods of low activity, lights dim to conserve energy, while they brighten when movement is detected, ensuring adequate illumination only when needed.

This system is managed by a microcontroller, which facilitates real-time decision-making and remote monitoring capabilities. It promotes sustainability by reducing electricity usage, lowering carbon emissions, and minimizing maintenance efforts. The Automatic Street Light Controller represents a step toward smarter urban infrastructure, contributing to energy efficiency and environmental conservation.

Street lighting is a critical component of urban infrastructure, ensuring safety, security, and accessibility after dark. However, traditional streetlight systems, which operate uniformly throughout the night, are inherently inefficient. The Automatic Street Light Controller system offers an intelligent alternative by leveraging advanced technologies, including microcontrollers, sensors, and energy-efficient LEDs.

This system integrates an LDR to monitor ambient light levels and PIR motion sensors to detect movement of pedestrians and vehicles. A microcontroller processes this data to dynamically adjust the brightness of streetlights. During periods of low activity, the lights operate at reduced intensity, saving energy, while they brighten instantly when motion is detected. This real-time adaptability not only ensures public safety but also minimizes energy wastage.

Additionally, the system can be integrated with IoT platforms, enabling remote monitoring, diagnostics, and centralized control. This makes it suitable for smart city initiatives, where sustainability and efficiency are paramount. With the potential to reduce electricity consumption by up to 60%, the Automatic Street Light Controller is a significant step toward greener urban development.

CHAPTER-2

2.1 LITERATURE SURVEY

Paper 1

Author name: Kavita & Tushar

Title: Energy Efficient of Street Lighting System

Year: 2015

In this reported that public sector lighting systems are still designed to meet the old standards and often do not benefit from state-of-the-art technological development, the use of new technologies in light sources and the use of the sensor combinations to achieve high street lights efficiency, and efficiency can easily be combined to maximize efficiency at each stage. It is the ideal option as it provides advantages, including conserving electricity and extended life, for Light Emitting Diode (LED) technologies instead of sodium vapor lamp and Compact Fluorescent Light (CFL) (Kavita & Kavita, 2015). Given the long-term advantages and the initial expense, maintaining the time spent for return on investment would never be an issue. The idea may be used in several different applications, such as lighting in industry, campuses and parking areas in big retail centers. This can also be utilized in corporate and industrial monitoring. Sakshée (2013) stressed that smart street light management and monitoring system that combines modern technologies, easily maintained and energy saved. With the usage of the solar panel on the lamp post utilizing LDR, you may save some energy and energy by using the Graphics Application to display the status of lights on streets or highways, monitoring and managing the street lights. Subramanyam1 et al. (2013) opined that design of the energy efficient street light automation wireless framework recommended an intelligent control of the lamps by transmitting Zigbee wireless communication data to a central station. Maintenance from the central station can be simply and effectively scheduled, providing further savings with the proposed method. Nithya et al. (2014) argued that the automatic street light system for ZigBee remote control streetlight management system helps to save energy, identify defective lights and maintain time and enhance system life. Srikanth (2014) found that GSM basic high-efficiency remote control system smart street lighting system uses the Zigbee devices and sensor network.

Paper 2

Author name: Devi & Anila

Title: Temperature LED Street Light

Year: 2014

The investigated about saving power in street lighting using six components in controller PIC16ff877A, LCD display, current transformer and GSM module (DTMF). Microcontroller PIC16ff877A; used to link all other elements together, GSM module; used to show load value for SMS transmittal to the control station, LCD for Dim, Brighten LED for DTMF and DTMF, DTMF specifies times to move the LED. The main goal was to manage the lighting of the street (dim at morning and also to radiate at night). The street light was regulated by engineers based on the Electricity Board. During transmission of the information to the power system through GSM, a disconnection occurred in the case of an overload. Data was forwarded to the power board using an RFID reader to be placed in a street light pole in which the tag was issued to every consumer in the case of consumer complaints. Rubananth et al. (2012) suggested that a novel approach for decreasing the energy usage was presented. The recovery duration was decreased after electricity failure. The GSM module suggested streetlight maintenance, load maintenance and other electricity concerns. The writers stated that this approach would be embraced by the electricity divisions in order to remember that the final objective is to preserve power and time.

Paper 3

Author name: Sumathi et al

Title: Light Sensor

Year: 2013

posited that some sensors were used to improve and operate the system efficiently. A movement felt by the IR sensor. When a human was spotted in detection, street lights were turned ON. The system has employed a GSM module for effective administration and control of street lamps. The road light condition was verified and a problem notice was sent to the control centre. The GSM module method helped to save considerable electricity and increases the system's performance and maintenance. Vinitha et al. (2012) investigated on the creation of an integrated street light energy saving system. This study provided an excellent alternative for wasting electricity. Manual lighting system operation in this research was completely destroyed, the authors used two sensors used for indicating day and night dependent resistance and IR sensors used for detection of street motion. The street light control was using PIC16F877A microcontroller. The language utilized in this programming was C. On a prototype version the system was implemented. The two sensors utilized to operate the circuit were the LDR sensor and the IR sensor. The automation of each lighting column was controlled by each sensor. A microcontroller was applied effectively to the street light (Chaitanya et al., 2013).

CHAPTER-3

3.1 PROBLEM DEFINITION

Modern urban areas require efficient and cost-effective street lighting systems to enhance safety, security, and visibility during nighttime. Traditional street lighting systems often rely on manual operation or fixed schedules, leading to challenges such as energy wastage, higher maintenance costs, and inefficiency in response to varying environmental conditions.

The goal of an **Automatic Street Light Controller** is to address these challenges by designing a system that automatically controls streetlights based on environmental conditions and activity levels. This system aims to provide optimal illumination while minimizing energy consumption and operational costs.

3.2 OBJECTIVES

General objectives of the project are defined as:

1.Minimize energy consumption by ensuring streetlights operate only when required, such as during low ambient light conditions or when motion is detected.

2.Eliminate the need for manual operation by automating the switching ON and OFF of streetlights based on environmental factors and activity levels.

3.Adapt to varying environmental conditions, such as changes in natural light, weather, and traffic flow, to provide optimal lighting at all times.

4. Reduce operational and maintenance costs by using energy-efficient lighting (e.g., LEDs) and implementing systems for real-time monitoring and fault detection.

3.3 SYSTEM DESCRIPTION

An **Automatic Street Light Controller** is an intelligent lighting system designed to automatically manage the operation of streetlights based on real-time environmental and activity data. It integrates sensors, controllers, and energy-efficient technologies to optimize performance and reduce energy consumption.

A microcontroller or microprocessor serves as the central control unit, processing data from sensors and making decisions to activate or deactivate streetlights.Includes preprogrammed logic or algorithms for scheduling and dynamic adjustments. Energy-efficient LED lights are used for illumination, offering better brightness and longevity compared to traditional lamps.Dimmable LEDs may be used to adjust brightness based on specific needs.Enables remote monitoring, data collection, and system diagnostics.

Facilitates real-time adjustments and alerts for maintenance needs.Supports time-based scheduling for automatic switching according to predefined patterns (e.g., ON at dusk and OFF at dawn).Monitors system health, detects failures in lights or sensors, and sends notifications for maintenance.

3.4 APPLICATIONS

1. **Urban and Residential Areas**

- Efficient lighting management in streets, parks, and neighborhoods.
- Enhanced safety by ensuring streets are well-lit during nighttime.

2. **Highways and Expressways**

- Automatic activation based on ambient light or vehicle movement.
- Reduces power consumption in low-traffic hours.

3. **Industrial Complexes and Campuses**

- Energy-efficient lighting in large outdoor areas such as factories, warehouses, and educational campuses.
- Ensures safety and security without manual intervention.

4. **Smart Cities**

- Integrated with IoT systems for real-time monitoring and control.
- Supports smart grid systems for optimized energy usage.

5. **Public Spaces**

- Lighting for bus stops, railway stations, and pedestrian walkways.
- Automated systems provide reliability and cost-effectiveness in public infrastructure.

3.5 ADVANTAGES

1. **Energy Efficiency**

- Lights operate only when needed, significantly reducing electricity consumption.
- Eliminates unnecessary lighting during daylight or low-traffic periods.

3. Cost Savings

- Reduced energy bills due to optimized usage.
- Minimizes maintenance costs by automating operations and extending the lifespan of lights.

3. **Environmental Benefits**

- Promotes sustainable energy use by conserving electricity.
- Reduces carbon footprint associated with excessive energy consumption.

4. **Convenience and Automation**

- Eliminates the need for manual control or supervision.
- Provides consistent performance regardless of human error or absence.

5. **Enhanced Safety**

- Ensures well-lit streets during darkness or low visibility conditions, improving safety for pedestrians and vehicles.
- Reduces accidents and crime rates in poorly lit areas.

6. **Low Maintenance**

- Automated systems reduce wear and tear from frequent manual operations.
- Remote monitoring (in smart systems) simplifies fault detection and repair.

3.6 DISADVANTAGES

1. Initial Installation Cost

- The setup, including sensors, microcontrollers, and other components, may involve higher initial investment compared to conventional systems.

2. **Complexity in Maintenance**

- Requires skilled personnel to handle troubleshooting, repairs, or software updates.
- Faulty sensors or components can disrupt the system's functionality.

3. **Dependence on Sensors**

- Performance relies heavily on sensors such as LDRs or motion detectors, which can degrade over time or malfunction in adverse conditions (e.g., dust, fog, or extreme temperatures).

4. **Power Supply Issues**

- Inconsistent power supply in some regions can affect system performance, particularly in areas with frequent power outages.
- Backup systems (e.g., batteries) add to the cost and require additional maintenance.

5. **Limited Customization in Basic Models**

- Basic automatic systems may lack advanced features such as remote monitoring or integration with smart city platforms.
- Upgrading to smarter systems involves additional costs.

6. **Susceptibility to Environmental Factors**

- Weather conditions like heavy rain, snow, or fog can affect the accuracy of light or motion sensors.
- Accumulated dirt on sensors can lead to incorrect operation.

CHAPTER-4

4.1 EXISTING SYSTEM

The traditional street lighting systems currently in use in many areas operate on a fixed schedule or manual control. These systems have notable limitations in terms of energy efficiency, adaptability, and maintenance. Below is an overview of the existing systems. Streetlights are turned ON and OFF manually by operators, often leading to delays or human errors. Lights may remain ON during daylight hours due to operational inefficiencies.Lights operate on predefined schedules using timers (e.g., ON at 6:00 PM and OFF at 6:00 AM).Most systems are entirely dependent on grid power, lacking integration with renewable energy sources like solar panels.Faults such as bulb failures often go unnoticed until reported, leading to delays in repairs and increased maintenance costs

4.2 PROPOSED SYSTEM

The proposed system for an automatic street light controller is designed to enhance energy efficiency and ensure optimal lighting based on environmental and activity conditions. It uses light sensors, such as LDRs or photodiodes, to detect ambient light levels, automatically turning lights on at dusk and off at dawn. Motion sensors, like PIR or ultrasonic sensors, enable lights to activate only in specific areas when movement is detected, particularly during late-night hours with minimal traffic. A microcontroller serves as the central unit, processing data from sensors and managing the lights, while a real-time clock module ensures precise time-based operations. The system employs energy-efficient LED lights with dimming capabilities to conserve power during low-traffic periods. Optional communication modules, such as LoRa or Zigbee, facilitate remote monitoring and fault detection. The system can be powered by the electrical grid, solar panels, or hybrid energy systems with battery storage. This design not only reduces energy consumption but also enhances safety, extends the lifespan of streetlights, and minimizes maintenance costs.

Automate street light operation to turn on at dusk and off at dawn. Reduce energy consumption using adaptive control based on environmental conditions and activity.Enhance safety and visibility on roads.Significant energy savings due to adaptive lighting.Extended lifespan of lights with optimized usage.Improved safety for pedestrians and drivers.Reduced maintenance costs with remote fault monitoring.

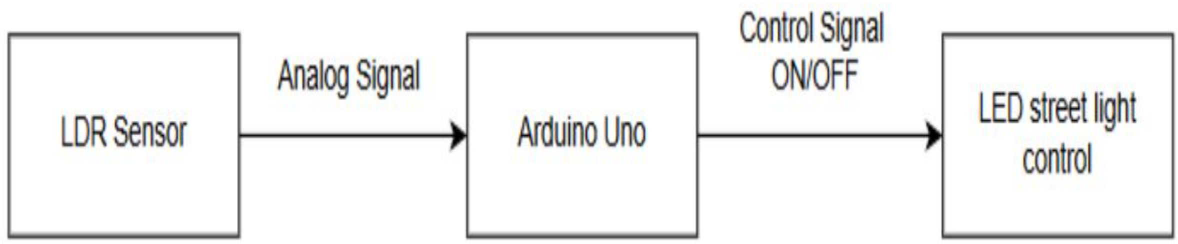

Fig:4.2.1 Block diagram of Automatic street light controller

Hardware Components: Arduino Uno(microcontroller), LDR Sensor, Register, LEDs, Power Supply.

In the above fig:4.2.1 the proposed device for automatic street lighting control using an Arduino Uno R3 microcontroller. Here's a breakdown of the components and their roles:Power Supply: Provides the necessary electrical power to the Arduino Uno and connected components.Arduino Uno R3 (Microcontroller): Acts as the main control unit. It processes inputs from sensors and controls the output to the streetlights.LDR Sensor (Light-Dependent Resistor): Detects ambient light levels. It is used to determine whether it is day or night.Street Lights: The output devices that are controlled by the Arduino based on the inputs from the sensors. They turn on or off depending on the light and motion conditions.Upload Code: Refers to the step of programming the Arduino Uno with the desired control logic. The code is uploaded from a computer via a USB cable.Working Principle:The LDR sensor monitors the surrounding light. If it detects darkness (night), it allows the Arduino to consider activating the streetlights.This system optimizes energy usage by ensuring that the streetlights are only on when necessary.The LDR sensor will still detect the ambient light to decide whether it's day or night.The resistor in this case would likely act as part of a voltage divider circuit, which might adjust the sensitivity of the LDR circuit or provide a fixed reference voltage to the Arduino.

The Arduino will rely solely on the LDR sensor to control the streetlights. This means the streetlights will turn on during darkness and remain on regardless of whether motion is detected or not.

The resistor might be used to stabilize the circuit or fine-tune sensor readings from the LDR.Power Supply: Provides the required voltage and current to the Arduino and other components.LDR Sensor: Detects the ambient light levels. It generates an analog signal that corresponds to the intensity of light in the environment.Acts as the brain of the system. It reads the voltage output from the LDR-resistor circuit and determines whether the streetlights should be turned on or off based on programmed thresholds.Street Lights: The output devices controlled by the Arduino. They turn on during darkness and off during sufficient light.Upload Code: Refers to programming the Arduino Uno with logic that enables it to interpret the sensor signals and control the streetlights.

CHAPTER-5

5.1 REQUIREMENTS

The hardware and software requirements are declared in below

5.2 HARDWARE REQUIREMENTS

1. Arduino Uno
2. LDR Sensor
3. Registers
4. LEDs

ARDUINO UNO

Arduino UNO is a microcontroller board based on the **ATmega328P**. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz

ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

The microcontroller is an embedded computer chip that controls most of the electronic gadgets and appliances that people use on a daily basis, right from mobile phones, washing machines to anti-lock brakes in cars. The microcontroller was introduced in the electronics industry with the purpose of making our tasks easy that come with even a remote connection with automation in any way. Microcontroller is just an **on system 40 pin chip** that comes with a built-in microprocessor and Arduino is a **board that comes with the microcontroller in the base of the board** as shown in the above fig. Arduino also comes with a boot loader and allows easy access to input-output pins and makes uploading or burning of the program very easy. Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller.

The Arduino Uno comes with USB interface, 6 analog input pins, 14 I/O digital ports that are used to connect with external electronic circuits. Out of 14 I/O ports, 6 pins can be used for PWM output. It allows the designers to control and sense the external electronic devices in the real world. The software used for Arduino devices is called IDE (Integrated Development Environment) which is free to use and required some basic skills to learn it. It can be programmed using C and C++ language.

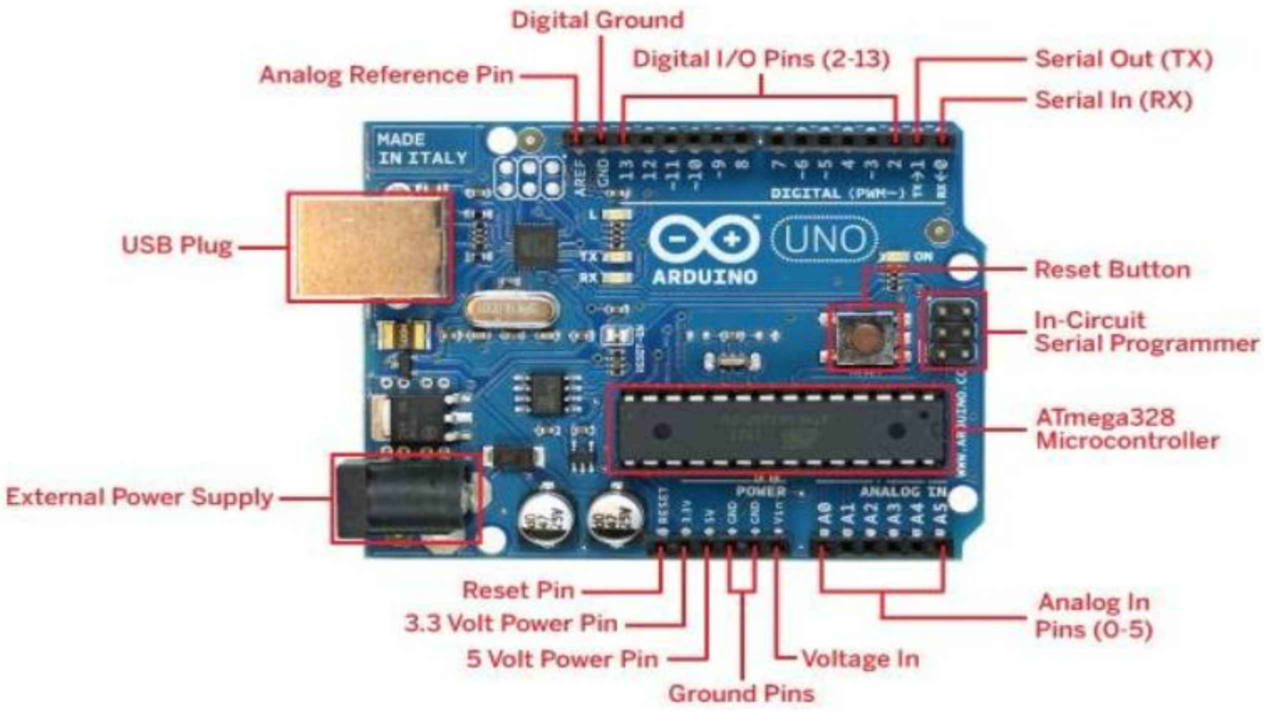

Fig 5.2.1 Arduino Uno

LDR SENSOR

A Light Dependent Resistor (LDR), also known as a photoresistor, is a sensor that detects changes in light intensity. Its resistance decreases with increasing light intensity, making it an ideal component for applications like automatic lighting systems. LDRs are made from materials such as cadmium sulfide, which exhibit photoconductivity. In bright conditions, the resistance is low, allowing more current to flow through the circuit, while in darkness, the resistance increases, reducing the current flow. This characteristic enables the LDR to act as a switch in systems like street light controllers, where it triggers lights to turn on at dusk and off at dawn. LDRs are cost-effective, easy to use, and reliable, making them widely used in various light-sensitive applications. However, they may require calibration to account for environmental factors like temperature and are less responsive to rapid changes in light compared to other light sensors like photodiodes.

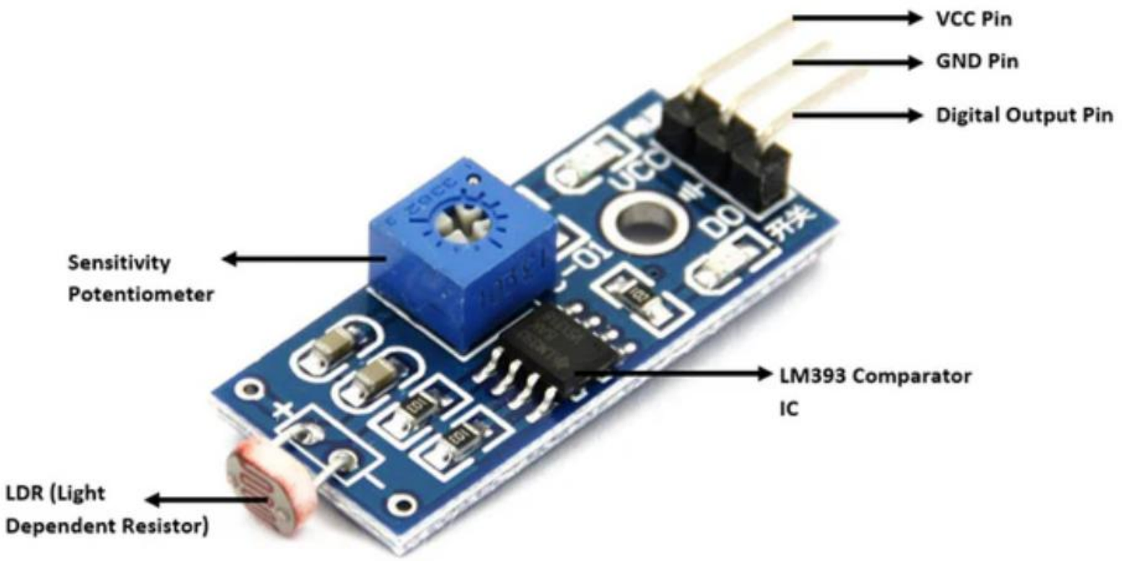

Fig 5.2.2 LDR SENSOR

Ambient light sensing is a significant part of many applications like automatic street lights, solar panels charging controller, automatic irrigations systems where humidity and ambient light determine if the planet needs to be irrigated or not. We usually use a simple Light Dependent Resistor (LDR) as it changes its resistance with the amount of light falling over it, which gives us an idea about the light intensity in the surrounding. But in some cases, we want to know if the light is beyond certain threshold to trigger certain processes in which case this Photosensitive Light Detection sensor module which gives digital output and whose sensitivity can be adjusted with the onboard potentiometer is a great module to use. It has onboard LM393 comparator IC to convert analog signals coming from LDR to the Digital Signals that can be used to connect with the microcontroller or development board you are using this.

REGISTER

A register is a small, high-speed storage location within a computer's processor used to temporarily hold data, instructions, or addresses during processing. Registers play a critical role in ensuring efficient execution of tasks, as they are directly accessible by the CPU, significantly faster than accessing main memory.

Fig 5.2.3 REGISTOR

They can store operands for arithmetic and logic operations, intermediate results, or memory addresses for data retrieval. Registers are typically categorized based on their function, such as general-purpose registers, which are used for various computations, and special-purpose registers, like instruction registers, which hold the current instruction being executed. The size of a register, measured in bits, determines the amount of data it can handle, directly influencing the processor's capability (e.g., 32-bit or 64-bit processors). Registers are essential for the smooth operation of a CPU, enabling rapid and efficient processing of instructions.

LED(Light emitting Diode)

A Light Emitting Diode (LED) is a semiconductor device that emits light when an electric current passes through it. LEDs are highly energy-efficient and long-lasting, making them a popular choice for various lighting applications, from household use to industrial and street lighting. They produce light through electroluminescence, where electrons recombine with holes in the semiconductor material, releasing energy in the form of photons.

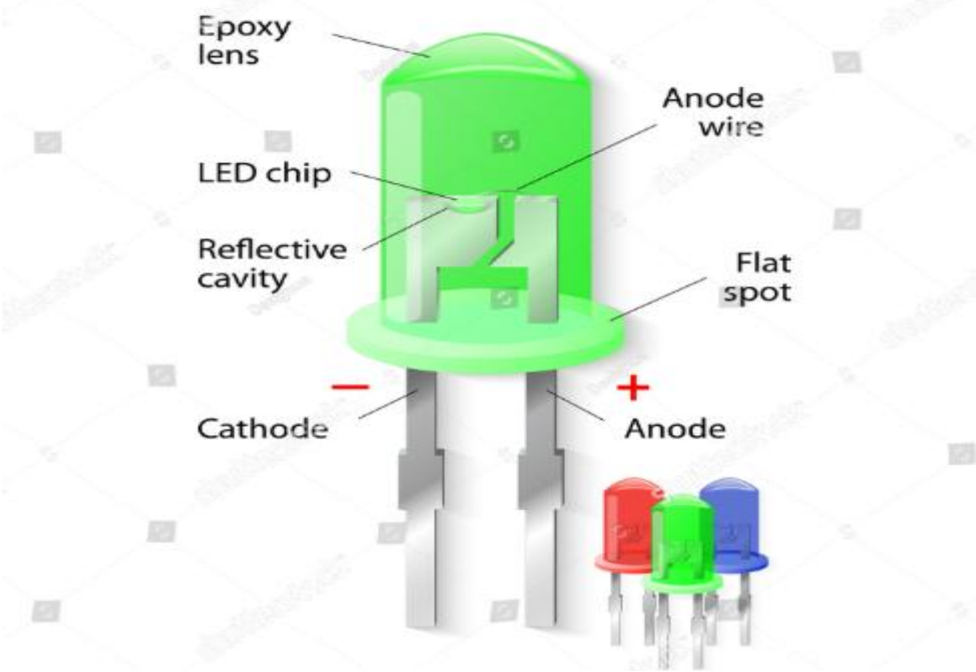

Fig 5.2.4 LED(Light Emitting Diode)

Compared to traditional incandescent or fluorescent lights, LEDs consume significantly less power, generate minimal heat, and have a lifespan of up to 50,000 hours or more. They are available in various colors and can even produce white light by combining different wavelengths or using a phosphor coating. LEDs are also environmentally friendly as they do not contain hazardous substances like mercury and are fully recyclable.

With advancements in technology, LEDs now support dimming and smart control features, making them ideal for applications such as automatic street light systems, where energy efficiency and durability are critical. Their small size and robust nature allow for versatile designs, enabling integration into a wide range of devices and systems.

5.3 SOFTWARE REQUIREMENTS

1. Arduino IDE
2. Serial monitor for debugging

CHAPTER-6

6.1 FUTURE SCOPE.

1. Dynamic Lighting Control:Adjust lighting intensity based on real-time traffic, weather, and pedestrian activity.Enhance safety and reduce energy consumption with adaptive lighting.

2. Renewable Energy Integration:Increased adoption of solar-powered streetlights with automatic controllers.Support for hybrid systems combining solar energy and battery storage for sustainable operations.

3. Energy Efficiency:Use advanced sensors and algorithms to achieve significant energy savings.Implement dimming and motion-based lighting features for further conservation.

4. Emergency Adaptation: Adapt lighting in emergencies, such as brightening pathways during accidents or natural disasters.

5. Smart City Compatibility:Communicate with autonomous vehicles for safer navigation.Share data with other urban infrastructure for better city management.

6. Cost Reduction:Decrease energy bills and maintenance costs with more efficient and reliable systems.

CHAPTER-7

CONCLUSION:

The implementation of an automatic street light controller presents a practical, efficient, and sustainable solution to managing street lighting. By automating the process based on environmental conditions, such as daylight intensity or movement detection, this system minimizes energy consumption, reduces human intervention, and lowers maintenance costs.Energy Efficiency: Lights are activated only when necessary, significantly cutting down energy waste.Cost-Effectiveness: Reduced electricity bills and maintenance overhead.Environmental Impact: Contributes to energy conservation, supporting global sustainability goals.Safety and Convenience: Ensures adequate lighting in low-visibility conditions, enhancing road safety for pedestrians and vehicles.

With further advancements, integrating smart technologies such as IoT and AI can enhance functionality, enabling remote monitoring, fault detection, and predictive maintenance. This positions the automatic street light controller as a key component in the development of smart cities.

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Subject Code: BEC586

COURSE OUTCOMES:

CO1: Understand the relevance and complexity of recent trends in the particular field of Engineering through literature survey.

CO2: Able to communicate effectively.

CO3: Understand the concept, application and demonstrate the Project implementation.

CO4: Acquire the management skills like budgeting and finance, planning, team works and leadership qualities.

PROGRAM OUTCOMES (POs) AS DEFINED BY NBA

Engineering graduates will be able to:

PO 1: Engineering Knowledge: Apply the Knowledge of Mathematics, Science, Engineering Fundamentals, and an Engineering specialization to the solution of complex Engineering problems.

PO 2: Problem Analysis: Identify, Formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of Mathematics, natural sciences and engineering sciences.

PO 3: Design/Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental conditions.

PO 4: Conduct investigations on complex problems: Use research-based knowledge and research methods including design of Experiments, analysis and interpretation of data, and synthesis of Information to provide valid conclusions

PO 5: Modern tool usage: Create, select, and apply appropriate technique, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess society, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Lifelong learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOS)

PSO 1: To exhibit the ability to design and implement complex systems in the areas of Communication, VLSI, Embedded Systems, Signal Processing and Programming.

PSO 2: To exhibit the knowledge in inter-disciplinary and multi-disciplinary areas such as Computer Architecture, Artificial Intelligence, Renewable Energy Resources, Image Processing. Environmental Protection and Management, etc., and to demonstrate skills in multitude domains.

PSO 3: To exhibit the ability to solve complex Electronics and Communication Engineering problems using modern tools to have a successful career, and to become entrepreneurs with social and environmental responsibilities.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												

CO-PSO MAPPING

	PSO1	PSO2	PSO3
CO1			
CO2			
CO3			
CO4			

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Signature of the guide
Prof. Kiran veergoudar
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Signature of the HOD
Prof. Sriram K V
Assistant Professor and Head,
Dept. of ECE, AITM