M.KUMARASAMY
COLLEGE OF ENGINEERING
NAAC Accredited Autonomous Institution
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Thalavapalayam, Karur – 639 113.

SMART STREET LIGHT SYSTEM

A MINOR PROJECT - III REPORT

Submitted by

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BACHELOR OF ENGINEERING

in

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

M.KUMARASAMY COLLEGE OF ENGINEERING

(Autonomous)

KARUR – 639 113

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M.KUMARASAMY COLLEGE OF ENGINEERING, KARUR

BONAFIDE CERTIFICATE

Certified that this **18ECP105L - Minor Project III** report **"SMART STREET LIGHT SYSTEM"** is the bonafide work of "**SHARMILA S (927621BEC197), SURIYA N (927621BEC224), VAISRI S(927621BEC233),VASUKI M (927621BEC236)** who carried out the project work under my supervision in the academic year **2021-2025 - ODD**.

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This report has been submitted for the **18ECP105L – Minor Project-III** final review held

at M. Kumarasamy College of Engineering, Karur on _____

PROJECT COORDINATOR

INSTITUTION VISION AND MISSION

Vision

To emerge as a leader among the top institutions in the field of technical education.

Mission

M1: Produce smart technocrats with empirical knowledge who can surmount the global challenges.

M2: Create a diverse, fully -engaged, learner -centric campus environment to provide quality education to the students.

M3: Maintain mutually beneficial partnerships with our alumni, industry and professional associations

DEPARTMENT VISION, MISSION, PEO, PO AND PSO

Vision

To empower the Electronics and Communication Engineering students with emerging technologies, professionalism, innovative research and social responsibility.

Mission

M1: Attain the academic excellence through innovative teaching learning process, research areas & laboratories and Consultancy projects.

M2: Inculcate the students in problem solving and lifelong learning ability.

M3: Provide entrepreneurial skills and leadership qualities.

M4: Render the technical knowledge and skills of faculty members.

Program Educational Objectives

PEO1: **Core Competence:** Graduates will have a successful career in academia or industry associated with Electronics and Communication Engineering

PEO2: **Professionalism:** Graduates will provide feasible solutions for the challenging problems through comprehensive research and innovation in the allied areas of Electronics and Communication Engineering.

PEO3: **Lifelong Learning:** Graduates will contribute to the social needs through lifelong learning, practicing professional ethics and leadership quality

Program Outcomes

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 considerations.

PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, 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 societal, 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 own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long 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

PSO1: Applying knowledge in various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of Engineering application.

PSO2: Able to solve complex problems in Electronics and Communication Engineering with analytical and managerial skills either independently or in team using latest hardware and software tools to fulfil the industrial expectations.

Abstract	**Matching with POs, PSOs**
Automatically, Saturation, Resistor, Consumption	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12, PSO1, PSO2

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ABSTRACT

The main motive of street lights system is to illuminate the environment during night time in order to prevent the accidents and public safety on roads. These street light systems required huge amount of electricity and man power for the maintenance. India is one of the major developing countries across the world which is facing the power problems due to enormous increase in population. The minimization of power shortage is very challenging issue in this modern era because the natural resources like coals and fossil fuels are diminishing rapidly. Thus, to save the power and road accidents during night times; it is essential to introduce an efficient street light management system which can improve the efficacy. In this work, an Arduino based Smart Street light system has been proposed which uses light dependent resistor for ON/OFF the street lights automatically during night times or cloudy environments. Moreover, a passive infrared sensor has been used for vehicle motion detection during night times. The street light is in OFF position during day time irrespective of the vehicle traffic, whereas; the street light is ON whenever there is a vehicle movement detected by PIR sensor during night times.

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LIST OF ABBREVIATIONS

ACRONYM		ABBREVIATION
LDR	-	Light Dependent Resistor
LED	-	Light Emitting Diode
LCD	-	Liquid Crystal Display
CFL	-	Compact Fluorescent Light
GSM	-	Global System for Mobile Communication
RFID	-	Radio Frequency Identification
HID	-	High Intensity Discharge
AC	-	Alternating Current
DC	-	Direct Current
UNO	-	United Nations Organization

CHAPTER 1
INTRODUCTION

1.1 PROJECT DETAILS

The street lighting is one of the largest energy expenses for a city. An intelligent street lighting system can cut municipal street lighting costs as much as 50% - 70%.The present system is like the lights will be switched on in the evening before the sun sets and they are switched off the next day morning after there is sufficient light on the outside. But the actual timing for these lights to be switched on are when there is absolute darkness. With this, the power will be wasted up to some extent. The manual operation of the lighting system is completely eliminated. The energy consumption in entire world is increasing at the fastest rates due to population growth and economic development and the availability of energy sources remains woefully constrained. Resource augmentation and growth in energy supply has not kept pace with increasing demand and, therefore, continues to face serious energy shortages. Streetlights are an integral part of any developing locality. They are present on all major roadways and in the suburbs too. Every day, streetlights are powered from sunset to sunrise at full strength, even when there is no one around. On a global scale, millions of dollars are spent each day on these street lights to provide the required electrical energy. The maintenance and replacement costs of conventional incandescent bulbs are immense. They consume a lot of electric power to function and their heat emissions are also quite high. All of this contributes to greater demand of electricity production and consequently, more carbon dioxide emissions from powerhouses. So, along with unnecessary light pollution, this practice causes damage to our planet too. A simple and effective solution to this would be dimming the lights during off peak hours. Whenever presence is detected, the lights around it will glow at the normal (bright) mode. This would save a lot of energy and also reduce cost of operation of the streetlights.

1.2 DESCRIPTION

This project aims to design an automatic street lighting that works in both conventional(electrical) as well as non-conventional (solar) energy resources. Using LDR we control the streetlight, when the LDR value falls above the threshold value the lights are switched on and when the value falls below the threshold value the lights are switched off. In order to save and conserve energy in an efficient way an intensity controller, based on movement detection is used. This is done using a pair of sensors(IR transmitter and IR receiver), whenever the value obtained at the receiver is above the previously set threshold value, an obstacle is identified and the LED connected to the receiver will be switched on.

1.2.1 COMPONENTS OF SMART STREETLIGHT SYSTEM

LDR, microcontroller, buzzer, and relay are the main components of an automatic street light controller circuit. “Light-dependent resistor” sensor is used in this project. LDR is used to sense the intensity of light. The output of the LDR sensor is in the format of resistance.

1.2.2 OBSERVATION NETWORKS

It automatically switches ON lights when the sunlight goes below the visible region of our eyes. This is done by a sensor called Light Dependant Resistor (LDR) which senses the light actually like our eyes. It automatically switches OFF lights whenever the sunlight comes, visible to our eyes.

CHAPTER 2

LITERATURE SURVEY

2.1 ENERGY EFFICIENT OF STREETLIGHT SYSTEM

Kavita & Tushar (2015) 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.

2.2 TEMPERATURE LED STREETLIGHT

Devi &Anila (2014) 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.

CHAPTER 3
EXISITING SYSTEM

The assiduity of road lighting systems is growing fleetly and going to complex w ith rapid-fire growth of assiduity and metropolises. Robotization, Power consumpti on and Cost Effectiveness are the important considerations in the present field of el ectronics and electrical affiliated technologies. To control and maintain complex ro ad lighting systems more economically, colourful road light control systems are de veloped.

These systems are developed to control and reduce the energy consumption of a cit y's public lighting system using different technologies. The being work is done usin g HID lights. Presently, the HID is used for civic streetlights grounded on the princ iple of gas discharge, therefore the intensity isn't controlled by any voltage reductio n system as the discharge path is broken. HID lights [20] are a type of electrical gas -discharge beacon which produces light using an electric bow between tungsten ele ctrodes housed inside a translucent or transparent fused quartz or fused alumina bo w tube. This tube is filled with both gas and essence mariners. The gas facilitates th e bow's original strike. Once the bow is started, it heats and evaporates the essence mariners forming tube, which greatly increases the intensity of light produced by th e bow and reduces its power consumption. High-intensity discharge lights are a typ e of bow beacon. Disadvantages of Existing System:

1. HID lamps consume a larger amount of power.
2. The lifespan of the HID lamps is comparatively less.
3. HID lamps cannot be used in all outdoor applications.
4. Brightness of the lights in the rear-view mirrors which causes a problem for drivers in front of your vehicle.

3.1 METHODOLOGY

The present system employs power delivery via a single phase line to the streetlight. The proposed system involves five more components to regulate the power delivery. An Infra -Red Proximity Sensor at the base of the street light detects presence in a small area around the street light. The data from the sensor is sent to the Arduino which forms brain of the circuit. The Arduino then commands to switch between dim and bright modes depending upon the requirement and thus controls the brightness of the street light. A battery eliminator, also powered by the single phase line, is used to supply 5V inputs to the sensors and Arduino.

FIG:3.1 EXISITING SYSTEM

CHAPTER 4
PROPOSED SYSTEM

Since the HID lights are not cost-effective and not dependable, a smart road light system has been overcome by replacing the HID lights with LED. Due to robotization, power consumption and price effectiveness within the present field of electronics and electrical affiliated technologies, the assiduity of road lighting systems is growing fleetly and getting too complex with the rapid-fire growth of as siduity and metropolises. To control and maintain complex road lighting systems more economically, different types of road light control systems are developed.

These systems are developed to reduce the energy consumption of a public light ing system using various technologies which use IR motion detectors to detect the vehicle or pedestrian movement after which the streetlight begins to increase its intensity. As the vehicle moves, the streetlight that was glowing with high intensity reduces its intensity again to low.

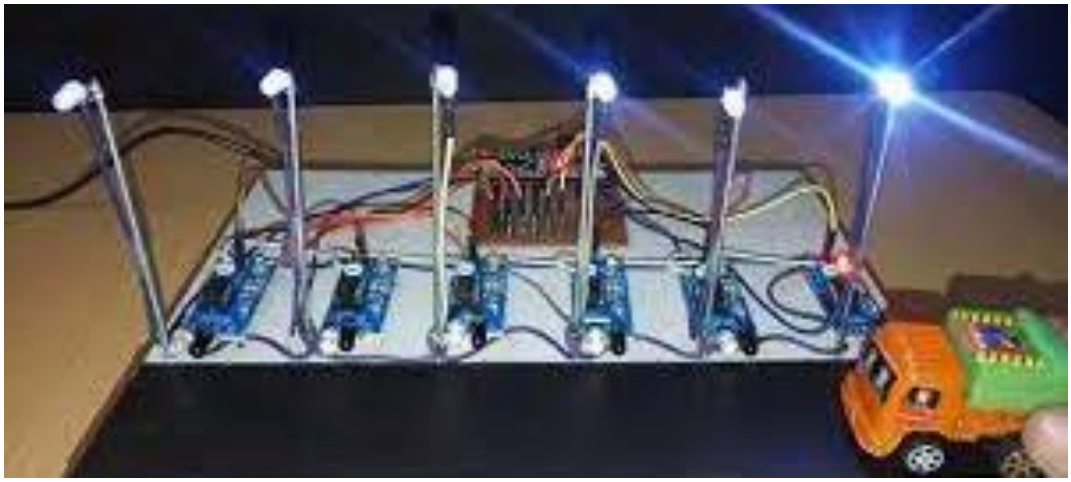


FIG 4.1 PROPOSED SYSTEM

CHAPTER 5
BLOCK DIAGRAM

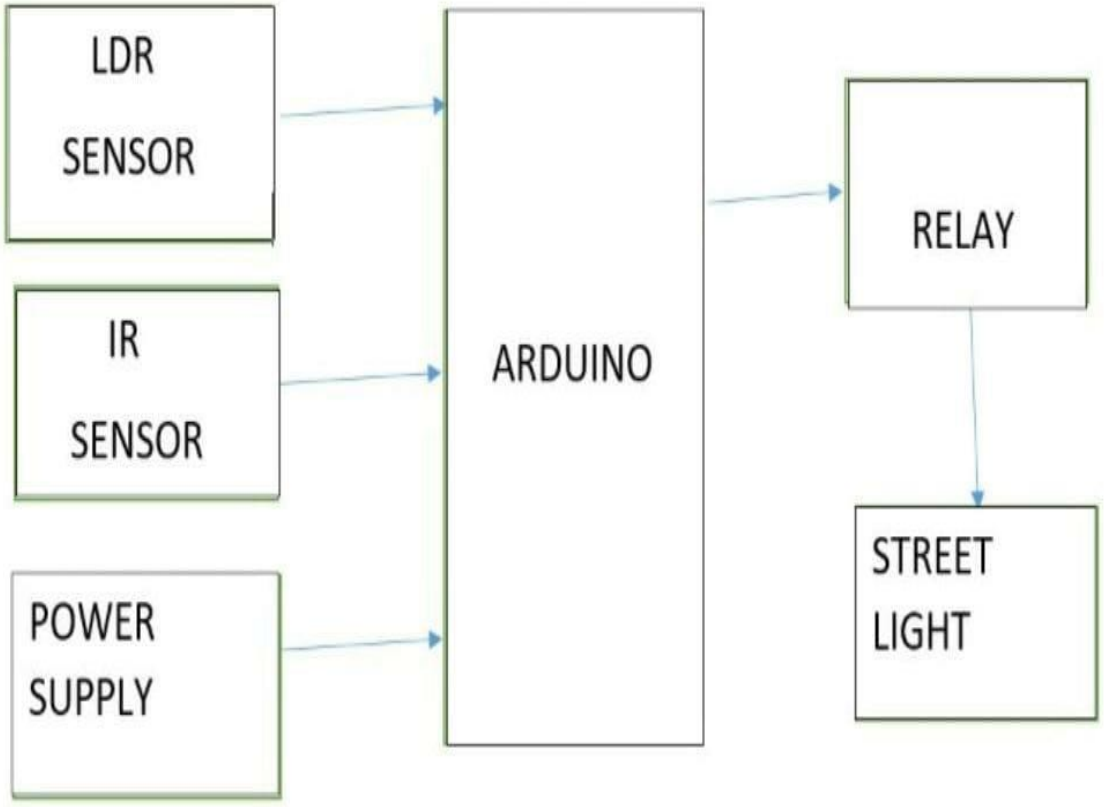


FIG 5.1 BLOCK DIAGRAM

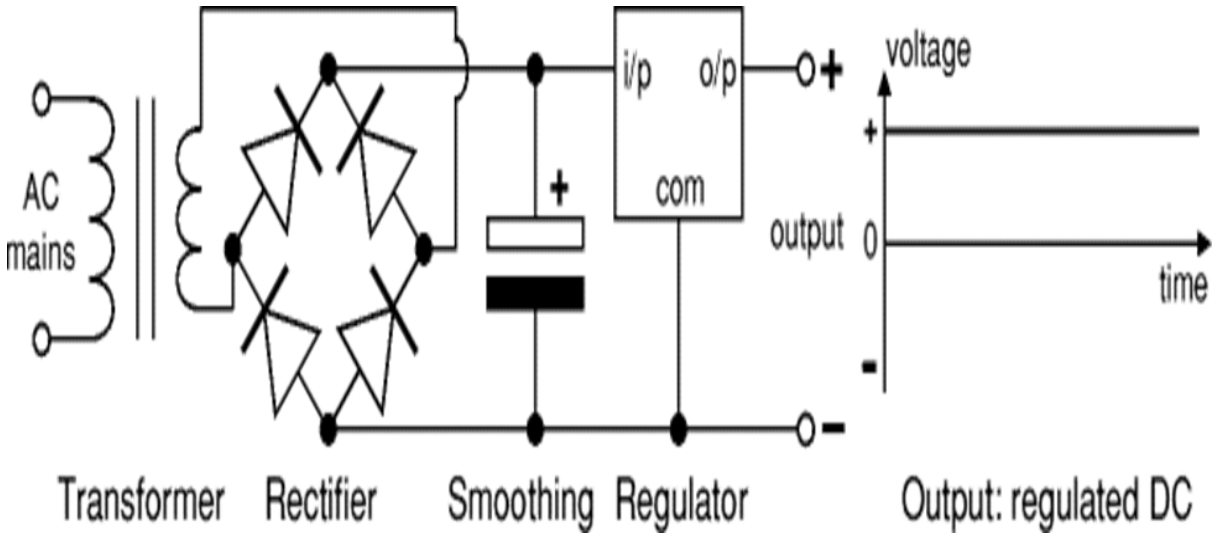
CHAPTER 6
TOOLS USED

HARDWARE REQUIREMENT

- POWER SUPPLY
- RELAY
- ARDUINO UNO
- LDR SENSOR
- IR SENSOR
- STREET LIGHT

6.1 POWER SUPPLY

The operation of power supply circuits built using filters, rectifiers and then voltage regulators. Starting with an AC voltage, a steady DC voltage is obtained by rectifying the AC voltage, then filtering to a DC level, and finally regulating to obtain a desired fixed DC voltage. The regulation is usually obtained from an IC voltage regulatorunit, which remain the same if the input DC voltage varies or the output load connectedto DC voltage changes. A diode rectifier that provides a full-wave rectified voltage that isinitially filtered by a simple capacitor filter to produce a DC voltage. A regulated circuit can use this DC inputs to provide a DC voltage that not only has much less ripple voltage but also remains the same DC value even if the input DC voltage varies somewhat or the load connected to the output DC voltage changes this voltage regulation is usuallyobtained using one of a number of popular voltage regulation IC unit.



POWER SUPPLY

FIG 6.1POWER SUPPLY

6.2 RELAY

A relay is an electro-magnetic switch which is useful to switch a low voltage to switch on and off a light bulb (or anything else) connected to the 220v mains supply. Relay and pump motors operating voltage is 12v dc supply. Relay is nothing but it is the electromagnetic switch. Relay allows one circuit to switch another circuit while they are separated. Relay is used when we want to use a low voltage circuit to turn ON and OFF the device which required high voltage for its operation. For example, 5V supply connected to the relay is sufficient to drive the bulb operated on 230V AC mains. Relays are available in various configurations of operating voltages like 6V, 9V, 12V, 24V andso on. Relay is divided into two parts, one is input and other is output. Input side is nothing but a coil which generate magnetic field when small input voltage is given to it. Relay having three contactors: Normally closed (NC), Normally opened (NO) and common (COM). By using the proper combinations of the contactors electrical appliances may turn ON or OFF. The red colour wire denotes the + VE supply, black colour wire

denotes the – VE supply in the diagram. NO is directly supplied with 12 volt dc supply and NC is connected with –VE supply (GND).The current needed to operate the relay coil is more than can be supplied by most chips (op. amps Etc), so a transistor is usually needed. In our project we use relay driver to switch the pumps and motors. Pump and motors operates on 12v dc, but the output of the IOT module will be5v dc. So to switch the lamp, fan and water heater using that low voltage dc, relay driver is used.

6.3 ARDUINO UNO

Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.The purpose of Arduino UNO is When vehicle passes by a particular IR sensor it senses the position of vehicle and gives its signal to the arduino board and it will turn on the LED's.

6.4 IR SENSORS

The infrared sensors are placed on each side of the road that are used to detect the vehicle movement and send the logic signals to a microcontroller (AT89S52 series) to turn on/ off the LEDs for a specific distance. Therefore, this way of dynamically switching ON and OFF the street lights helps in reducing the power consumption. An infrared sensor is an electronic instrument that is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. It is also capable of measuring heat of an object and detecting motion. Infrared waves are not visible to the human eye.

6.5 LDR SENSOR

First is Light Dependent Resistor (LDR) that is used for switching ON or switching OFF the LEDs during day and night times by detecting the intensity of

light. Secondary, there is infrared sensor for detecting the presence of any vehicle passing the street. A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance. A light dependent resistor works on the principle of photo conductivity.

6.6 STREET LIGHT

Smart Street Light provides a solution for energy saving which is achieved by sensing an approaching vehicle using the IR sensors and then switching ON a block of street lights ahead of the vehicle with high intensity. As the vehicle passes by, the trailing lights turn dim automatically. Thus, we save a lot of energy.

CHAPTER 7
EXPERIMENT PROCESS

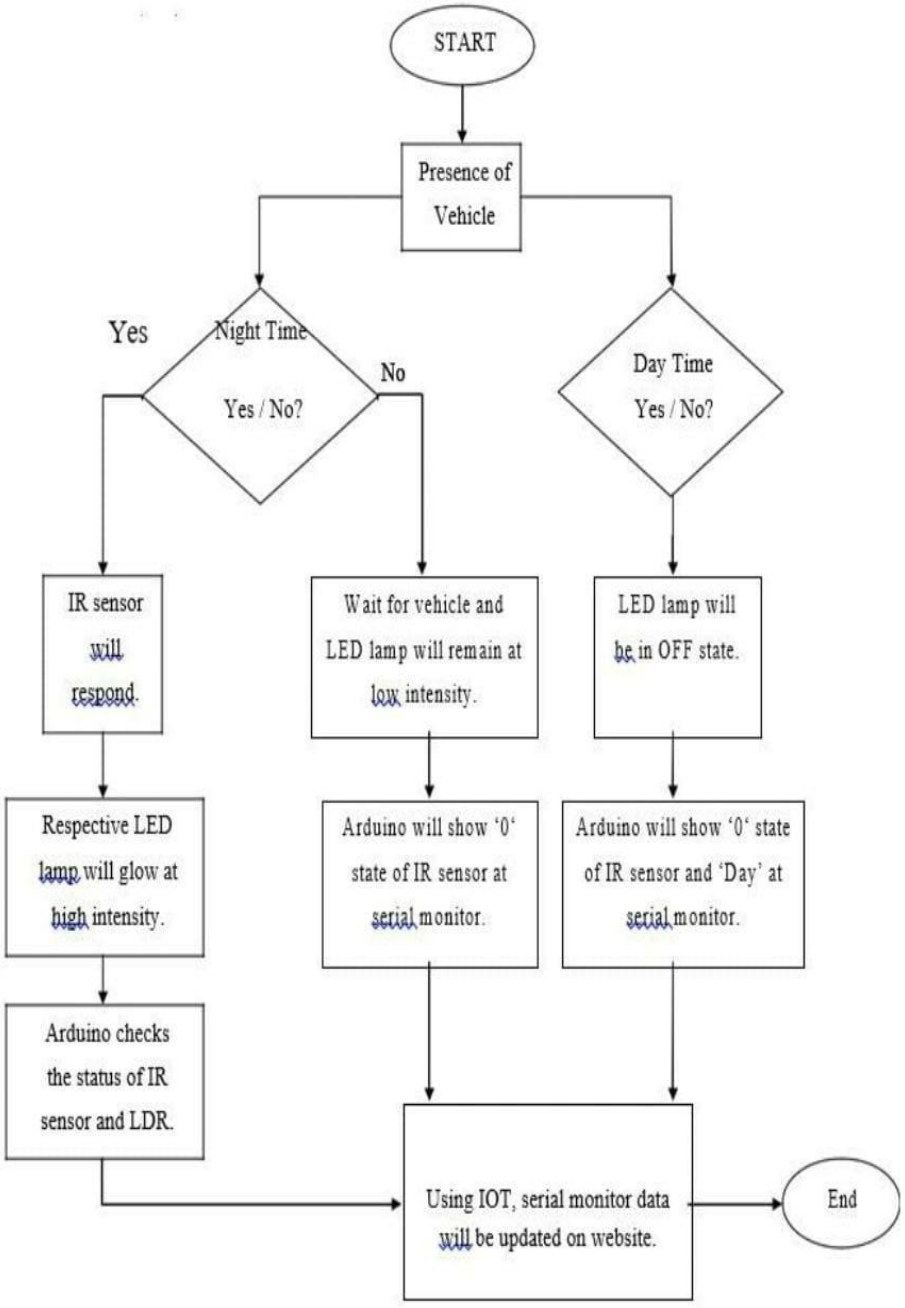


FIG 7.1 EXPERIMENT PROCESS

CHAPTER 8
RESULT AND DISCUSSION

Smart home technology allows homeowners to control smart devices with a cellphone or other networked device, providing security, comfort, flexibility, and cost savings. Smart home systems and devices that are parts of the Internet of Things (IOT) often collaborate, sharing customer use data and automated actions based on the choices of the residents. Smart TVs utilize the internet to access applications that provide information like as on movies and music. On certain smart TVs, speech and gesture recognition is also available. Smarter light fixtures, like Phillips Light Holding B.V.'s Aura, can sense when people are present and adjust lighting accordingly, as well as be controlled remotely and Customised. The brightness of clever light bulbs may also be adjusted based on the quantity of daylight available. Smart thermometers with built-in Wi-Fi, like as the Nest from Nest Labs Inc., allow users to control, monitor, and manage home temperatures remotely. These devices also learn from the behaviors of their users and modify settings automatically to provide the best possible comfort and efficiency to their occupants. Smart thermostats may also measure energy use and alert users when filters need to be replaced, among other things. Users may allow or restrict entrance to guests using Garage door openers and smart locks when residents approach, smart locks detect their presence and automatically open the doors. Smart security cameras allow residents to keeping an eye on their homes when they are away or on vacation. Modern motion sensors can tell the difference among residents, visitors, pets, and burglars, and can inform authorities if they notice strange behavior. Pet care might be mechanized with networked feeds. The usage of connected timers may be used to water houseplants and lawns. Smart coffee maker which can brew you a fresh cup as soon as your alarms sets off; smart refrigerators that keeps track of expiration

dates, prepare shop lists, and even design recipes based on ingredients already on hand; slowed cooks and toasters; and laundry washers and dryers are also available.

CHAPTER 9
CONCLUSION

Using this smart project,we can also estimate the speed of the vehicle, recognizing the number plate,recognizing the accidents took place on roads etc,. This Smart Street light project not only helps in rural areas but also beneficial in urban areas too.As we are moving towards more advancement we require more power so use of renewable resources is is useful and advantageous. With this project, we can even add smart parking of vehicle and it is even useful for driverless cars.

With the advances in technology and good resource planning the cost of the project can be cut down and also with the use of good equipment the maintenance can also be reduced in terms of periodic checks. The LEDs have long life, emit cool light, donor have any toxic material and can be used for fast switching. For these reasons our project presents far more advantages which can over shadow the present limitations. Keeping in view the long term benefits and the initial cost would never be a problem as the investment return time is very less. The project has scope in various other applications like for providing lighting in industries, campuses and parking lots of huge shopping malls. This can also be used for surveillance in corporate campuses and industries. This project “IoT Based Smart Intelligent Lighting System for Smart City “ is a cost effective, practical, eco-friendly and the safest way to save energy and this system the light status information can be accessed from anytime and anywhere. It clearly tackles the two problems that world is facing today, saving of energy and also disposal of incandescent lamps, very efficiently.

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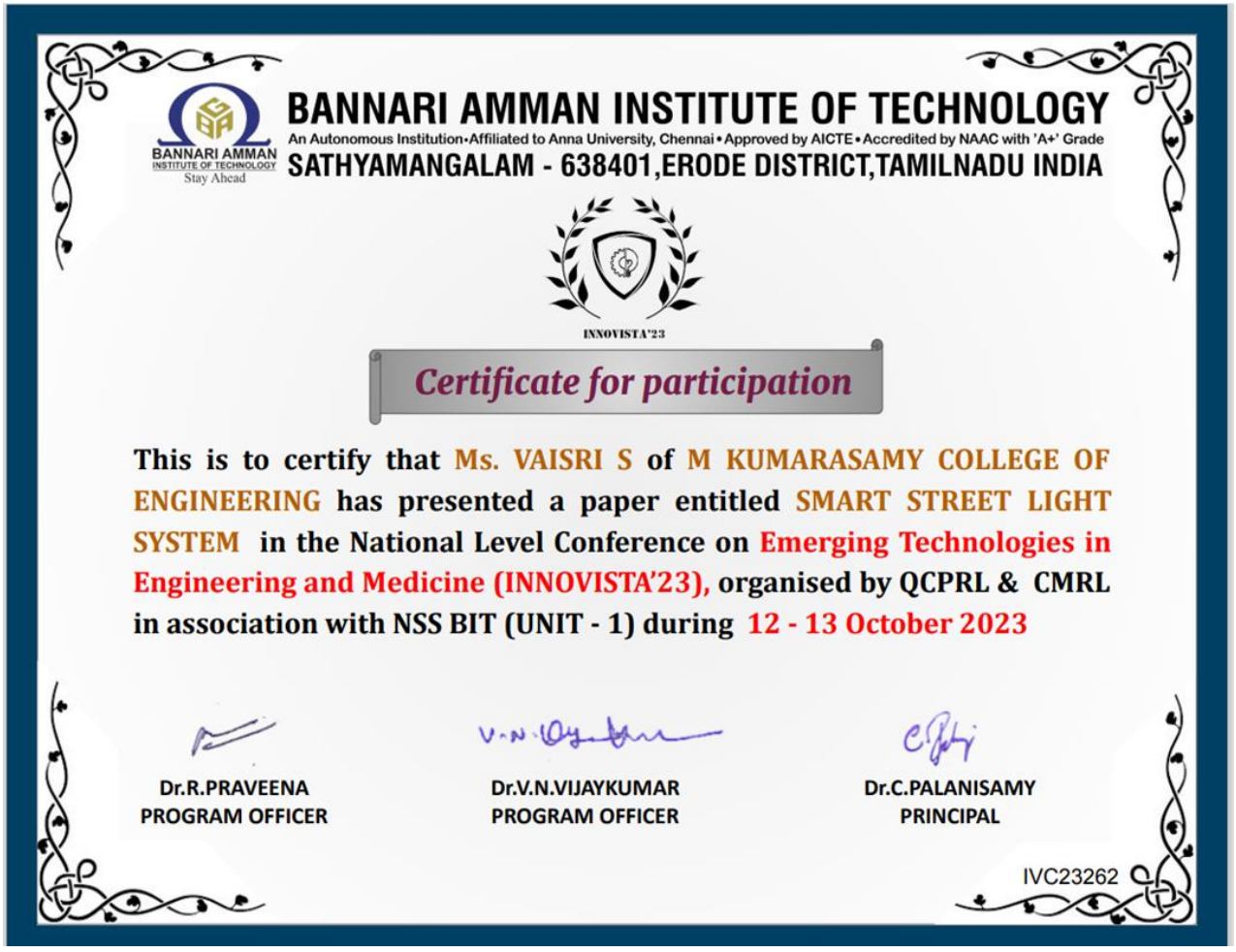

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INNOVISTA'23

Certificate for participation

This is to certify that Ms. VAISRI S of M KUMARASAMY COLLEGE OF ENGINEERING has presented a paper entitled SMART STREET LIGHT SYSTEM in the National Level Conference on Emerging Technologies in Engineering and Medicine (INNOVISTA'23), organised by QCPRL & CMRL in association with NSS BIT (UNIT - 1) during 12 - 13 October 2023

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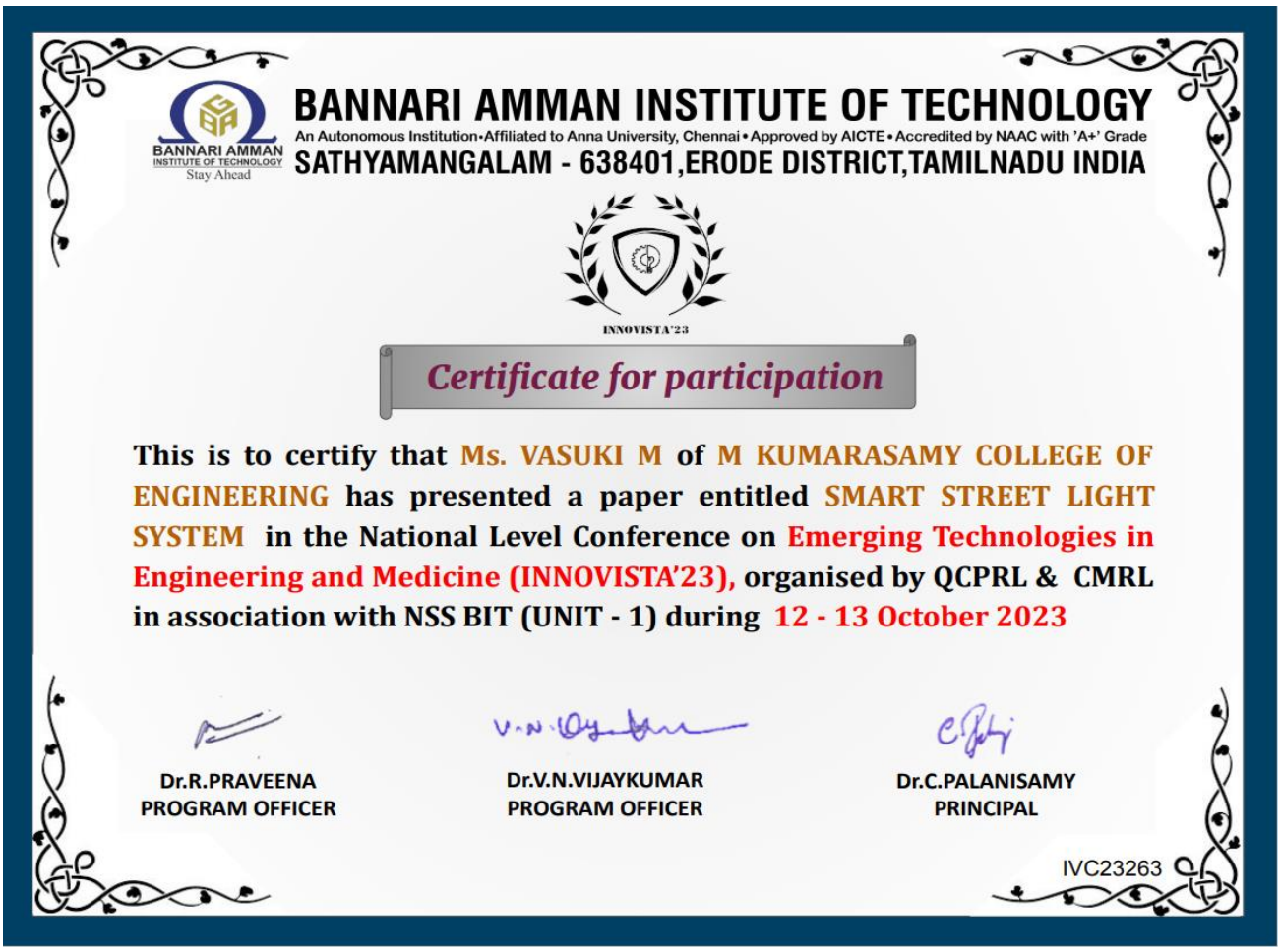
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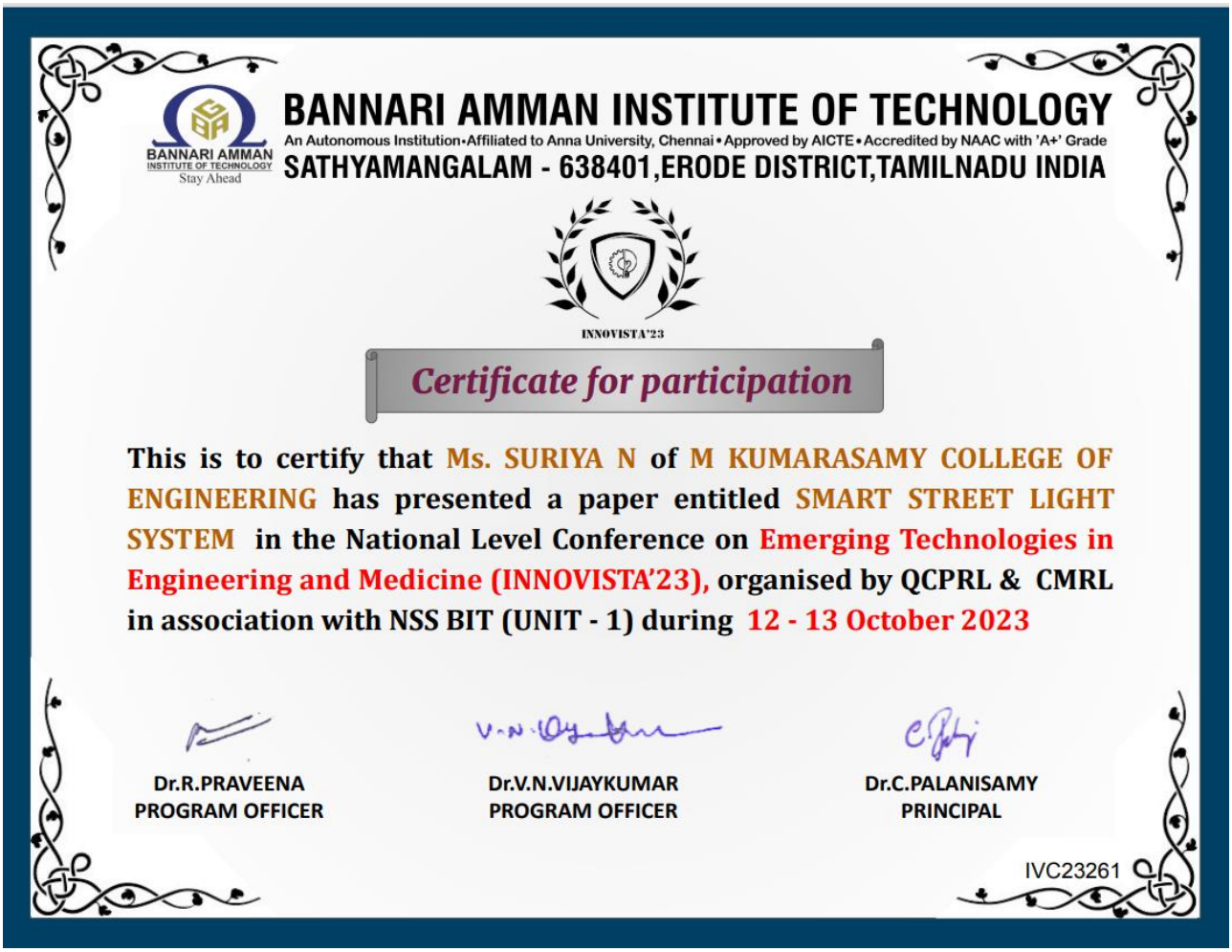

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BANNARI AMMAN INSTITUTE OF TECHNOLOGY
Stay Ahead
INNOVISTA'23
Certificate for participation
This is to certify that Ms. SHARMILA S of M KUMARASAMY COLLEGE OF ENGINEERING has presented a paper entitled SMART STREET LIGHT SYSTEM in the National Level Conference on Emerging Technologies in Engineering and Medicine (INNOVISTA'23), organised by QCPRL & CMRL in association with NSS BIT (UNIT - 1) during 12 - 13 October 2023
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