INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

SMART STREET LIGHTS USING IOT

Uplanchiwar Raghava [1], Thallapelli Aniketh [2],
Mallela Madhu Babu [3], Dr. Md. Shahbaz Khan[4]
[1,2,3] UG Student, Dept. of ECE, CMR Institute of Technology, Hyderabad
[4] Associate Professor, Dept. of ECE,
CMR Institute of Technology, Hyderabad

ABSTRACT

Imagine walking down a street at night, and suddenly the street lights start to dim to save energy. You may wonder howthis is possible it's all thanks to the smart street light system using Internet of Things (IoT) technology. This advanced system integrates various devices such as sensors and cameras to optimize and automate street lighting, providing an efficient and cost-effective solution by using IoT sensors, street lighting can be remotely monitored and controlled, making it possible to adjust lighting levels dynamically based on traffic patterns and weather conditions. This technology offers numerous benefits, including energy savings,improved public safety, and reduced carbon footprint, making our cities more sustainable and environmentally friendly. Overall, the smart street light system using IoT is a game-changer in urban development. It enhances our infrastructure and promotes sustainable growth, providing a better quality of life for all citizens.

INTRODUCTION

Smart street light systems using IoT technology are the next generation of street lighting systems that offer improved energy efficiency, reduced costs, and better control and management of street lighting. The basic concept of a smart street light system isto incorporate sensors, wireless communication, and intelligent controllers into the street light infrastructure. These smart lights can be programmed to automatically turn on and off based on the surrounding light levels, as well as other factors like pedestrian and vehicular traffic. Additionally, they can be remotely monitored and controlled using IoT technology. IoT technology allows smart street light systems to gather data and feedback on energy consumption, maintenance needs, and other important factors. This data can then be used to optimize the system, improve energy efficiency, and reduce costs. Street lighting is a particularly critical concern for public authorities in developing countries because of its strategic importance for economic and social stability. Inefficient lighting wastes significant financial resources every year, and poor lighting creates unsafe conditions. Energy efficient technologies and design mechanism can reduce cost of the street lighting drastically. Manual control is prone to errors and leads to energy wastage's and manually dimming during mid-night is impracticable. Also, dynamically tracking the light level is manually impracticable. The current trend is the introduction of automation and remote management solutions to control streetlighting

LITERATURE SURVEY

P. P. F. Dheena, G. S. Raj, G. Dutt and S. V. Jinny, "IOT based smart street light

management system" 2017 IEEE International Conference on Circuits and Systems (ICCS), Thiruvananthapuram, India, 2017, pp. 368- 371, doi: 10.1109/ICCS1.2017.8326023.

Our project for developing a smart street light system is reviewed. In this project, the street light system, in which lights on when needed and light-off when not needed. Currently, in the whole world, enormous electric energy is consumed by the street lamps, which are automatically turn on when it becomes dark and automatically turn off when it becomes bright. This is the huge waste of energy in the whole world and should be changed. Our smart street light system consists of a LED light, a brightness sensor, a motion sensor and a short-distance communication network. The lights turn on before pedestrians and vehicles come and turn off or reduce power when there is no one. It will be difficult for pedestrians and drivers of vehicles to distinguish our smart street lamps and the conventional street lights, since our street lamps all turn on before they come. The present status and the future prospects of our smart start light project will be reviewed Currently, in the whole world, enormous electric energy is consumed by the street lights, which are controlled by means of the embedded brightness sensors. They are automatically turn on when it becomes dark and automatically turn off when it becomes bright. This is the huge waste of energy in the whole world and should be changed. There are some attempts, in which the energy wastes of the street lights are reduced. A sensor light, which is controlled by the brightness sensor and the motion sensor, is sometimes used [1]. It only turns on for w while when the motion is detected in front of the light and it is dark. However, it usually is too late to turn the light on when a person or a car comes in front of it. The light should turn on before a person or a car comes. On the other hand, some companies and universities have developed centrally-controlled smart street light systems with the host computers [2,3]. They might be suitable for being applied to a large area or a newly developed area based on the total plan. However, they might not be suitable for being applied to a small area. We propose an autonomous-distributed-controlled light system, in which the lights turn on before pedestrians come and turn off or reduce power when there is no one by means of a distributed-installed sensor network.

PROPOSED SYSTEM

This block diagram describes the working of project 'Smart Street Light System with IoT'. Arduino Nano and NodeMCU Wi-Fi module to the internet with the code specified in the code and the corresponding AT commands. The LDR sensor detects light power and sends value to Arduino that stores data. The IR sensor detects movement and sends Data to the Arduino data storage. When light intensity is low the Arduino has to send a signal to the relay to turn on the LED. If the IR sensors sense movement, then the Arduino has to send a signal to the relay to the LED. The B block is separate from the A module if the Led is not glow then the buzzer will get triggerand send notification on the Blynk app via NodeMCU WiFi Module.

Block diagram
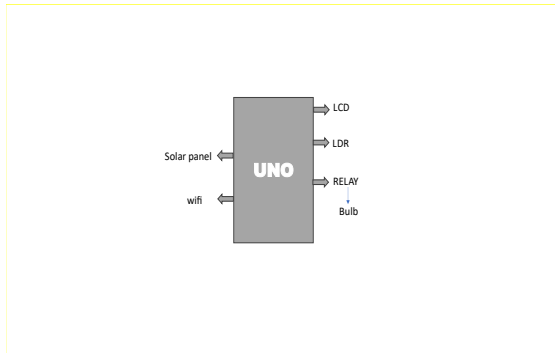
ARDUINO NANO (Micro controller)

Introduction to the Arduino NANO Board

The Arduino Nano, as the name suggests is a compact, complete and bread-board friendly microcontroller board. The Nano board weighs around 7 grams with dimensions of 4.5 cms to 1.8 cms (L to B). This article discusses about the technical specs most importantly the pinout and functions of each and every pin in the Arduino Nano board.

Arduino Nano has similar functionalities as Arduino Duemilanove but with a different package. The Nano is inbuilt with the ATmega328P microcontroller, same as the Arduino UNO. The main difference between them is that the UNO board is presented in PDIP (Plastic Dual-In-line Package) form with 30 pins and Nano is available in TQFP (plastic quad flat pack)

with 32 pins. The extra 2 pins of Arduino Nano serve for the ADC functionalities, while UNO has 6 ADC ports but Nano has 8 ADC ports. The Nano board doesn't have a DC power jack as other Arduino boards, but instead has a mini-USB port. This port is used for both programming and serial monitoring. The fascinating feature in Nano is that it will choose the strongest power source with its potential difference, and the power source selecting jumper is invalid.

CONLUSION

Improved visibility and safety: Adequate Street lighting helps improve visibility on the road, reduces accidents, and enhances overall safety for drivers, pedestrians, and cyclists. Reduced crime good street lighting is known to deter criminal activity and make neighborhoods safer. Energy savings: The use of energy-efficient LED bulbs can reduce the energy consumption and maintenance costs of street lighting systems. Environmental benefits lower energy consumption translates to a lower carbon footprint and contributes to a more sustainable environment. Increased economic activity: Well-lit streets can enhance the aesthetic appeal of an area, making it more attractive for businesses to operate and encouraging economic activity. In conclusion, street lighting systems are an essential infrastructure that plays a critical role in enhancing safety, security, and quality of life in urban areas. An efficiently designed and wellmaintained street lighting system can deliver significant benefits to both the community and the environment. By using

Smart Street light, one can save surplus amount of energy which is done by Replacing sodium vapor lamps by LED and adding an additional feature for security purposes. It prevents unnecessary wastage of electricity, caused due to manual switching of streetlights when it's not required. It provides an efficient and smart automatic streetlight control system with the help of IR sensors. It can reduce the energy consumption and maintains the cost. The system is versatile, extendable and totally adjustable to user needs.

REFERENCES

[1]. P. P. F. Dheena, G. S. Raj, G. Dutt and S. V. Jinny, "IOT based smart street light management system" 2017 IEEE International Conference on Circuits and Systems (ICCS), Thiruvananthapuram, India, 2017, pp. 368- 371, doi: 10.1109/ICCS1.2017.8326023.

[2]. O. Rudrawar, S. Daga, J. R. Chadha and P. S. Kulkami, "Smart Street lighting system with light intensity control using power electronics," 2018 Technologies for Smart-City Energy Security and Power (ICSESP), Bhubaneswar, India, 2018, pp. 1-5, doi: 10.1109/ICSESP.2018.8376692.

[3]. P. Arjun, S. Stephenraj, N. N. Kumar and K. N. Kumar, "A Study on IoT based Smart Street Light Systems," 2019 IEEE International Conference on System, Computation, Automation and Networking (ICSCAN), Pondicherry, India, 2019, pp. 1-7, doi: 10.1109/ICSCAN.2019.8878770.

[4]. Vaishali Gupta, Krutika Thakur, Ritesh Thakur, "Based Smart Street Lights" International Journal of Research (IJR), Volume 2, Issue 10, October Volume 2, Issue 10, October 2015.

[5]. Snehal Bhosale, Komal Gaware, Pradnya Phalke, Dipali Wadekar, Pallavi Ahire,"IoT based Dynamic Control of Street Lights for Smart City",International Research Journal of Engineering and Technology (IRJET), Vol. 4, No. 5, 2017, pp.1181-1183

[6] Karne, R. K. ., & Sreeja, T. K. . (2023). PMLC- Predictions of Mobility and Transmission in a Lane-Based Cluster VANET Validated on Machine Learning. International Journal on Recent and Innovation Trends in Computing and Communication, 11(5s), 477–483. https://doi.org/10.17762/ijritcc.v11i5s.7109

[7] Radha Krishna Karne and Dr. T. K. Sreeja (2022), A Novel Approach for Dynamic Stable Clustering in VANET Using Deep Learning (LSTM) Model. IJEER 10(4), 1092-1098. DOI: 10.37391/IJEER.100454.

[8] Reddy, Kallem Niranjan, and Pappu Venkata Yasoda Jayasree. "Low Power Strain and Dimension Aware SRAM Cell Design Using a New Tunnel FET and Domino

Independent Logic." International Journal of Intelligent Engineering & Systems 11, no. 4 (2018).

[9] Reddy, K. Niranjan, and P. V. Y. Jayasree. "Design of a Dual Doping Less Double Gate Tfet and Its Material Optimization Analysis on a 6t Sram Cells."

[10] Reddy, K. Niranjan, and P. V. Y. Jayasree. "Low power process, voltage, and temperature (PVT) variations aware improved tunnel FET on 6T SRAM cells." Sustainable Computing: Informatics and Systems 21 (2019): 143-153.

[11] Reddy, K. Niranjan, and P. V. Y. Jayasree. "Survey on improvement of PVT aware variations in tunnel FET on SRAM cells." In 2017 International Conference on Current Trends in Computer, Electrical, Electronics and Communication (CTCEEC), pp. 703-705. IEEE, 2017.