

# IoT Based Smart Street Lighting System

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**Abstract:** *In today's world people prefer to live a complex life everywhere. Scientific and technological advances are growing rapidly to meet the above requirements. With the development of advanced materials, Internet of Things (IoT) plays a major role in automatically automating various areas such as health monitoring, traffic management, agricultural irrigation, street lights, classrooms, etc. the earth and must be changed. In this survey we learned, how IoT is used to improve street lighting in a clever way in our time. It is an important factor in solving energy problems and developing street lights around the world. In addition to the study of intelligent street lighting systems we have analyzed and described the different sensors and components used in the IoT environment.*

Keyword: IoT, Smart System, Energy Saving, Environment, Street Lights, etc.

## I. INTRODUCTION

The Internet of Things plays a very important role in everyday life. It connects the largest devices to the Internet and covers the use of various data points, all of which need protection. IoT is used in surveillance systems that analyze insecure objects, RFID tag in load, chemical industrial sensors, smart homes, military applications, health care, industrial management and environmental diversity.

In particular, street lights play an important role in cities where the main purpose is to improve the roads during the day. Previously, the number of roads in cities and towns was very small but with the growth of urban areas, the number of roads is increasing rapidly with high traffic energy consumption.

## II. BRIEF LITERATURE SURVEY

The project is usually a multi-functional model capable of eliminating the manual operation of old street lightning with an automatic switching technique [1]. It aims to design and implement improved improvements to embedded energy-efficient street lighting systems and their maintenance at a reduced cost with modern development. The Street Lightning system has a feature as two sensors, the Light Dependent Resistor (LDR), are used to mark day/night time and therefore the passive infrared sensor (PIR) to detect movement on the road.

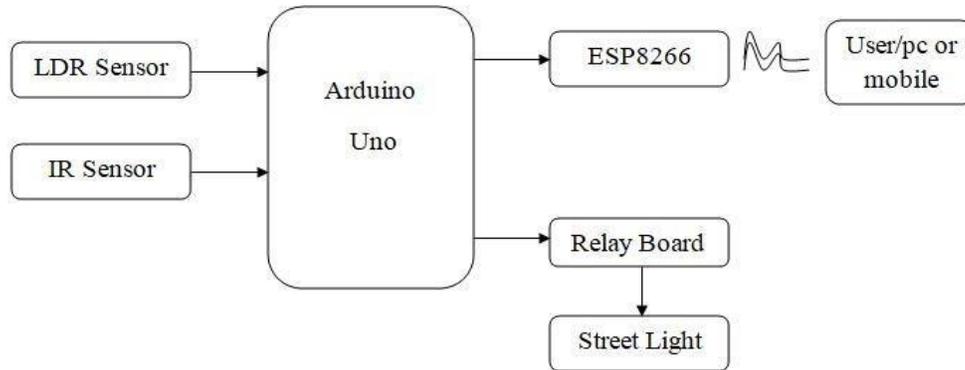
In this IoT context, among all the wi-fi chips included, the ESP8266 is one of the best and is the least expensive wi-fi module. A small 32bit TensilicaXtensa L106 controller is integrated into it. Inside a small RB balun PCB area, a low-noise amplifier, power amplifier, filters and small external power management modules are included in the front module [3].

In [4] Automatic Street Light Control System is not only simple but also powerful. Relay uses automatic switching on this system. It frees up almost 100% manual labor. As soon as sunlight penetrates the visible surface of our eyes this system automatically changes LIGHT lights. The Light Dependent Resistor (LDR) is a type of sensor that performs this function and senses light as does our eyes. As soon as the light from the sun comes on, our eyes automatically turn off the lights. Such a system is also useful in reducing energy consumption.

In [5] this project is designed to detect vehicle movement on highways so that you ONLY turn on the traffic light in front of it and SWITCH off the rear light to save energy. At night all the headlights on the highways are always ON in the car, but a LOT of energy is wasted when there is no car movement on the highways.

Wi-Fi ESP8266 MODULE is used to load important time information in the cloud via the IoT panel [6]. Providing street electricity is one of the most important and costly services of the city. Lightning can account for 10-38% of total energy debt in ordinary cities around the world [7].

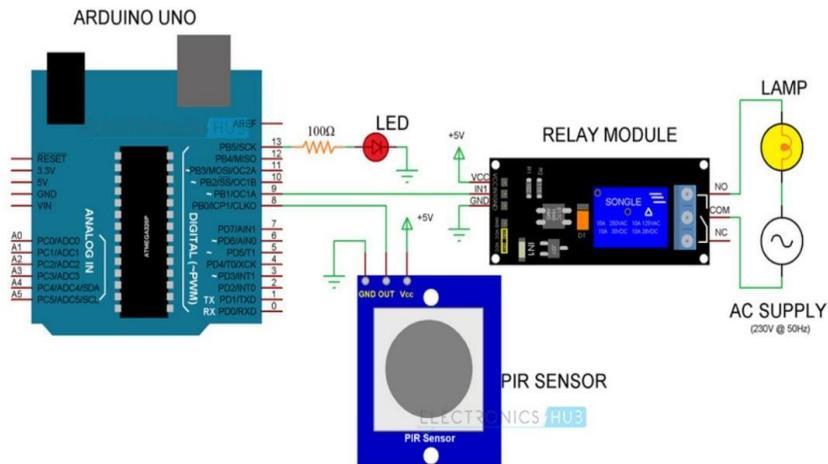
III. PROPOSED METHODOLOGY



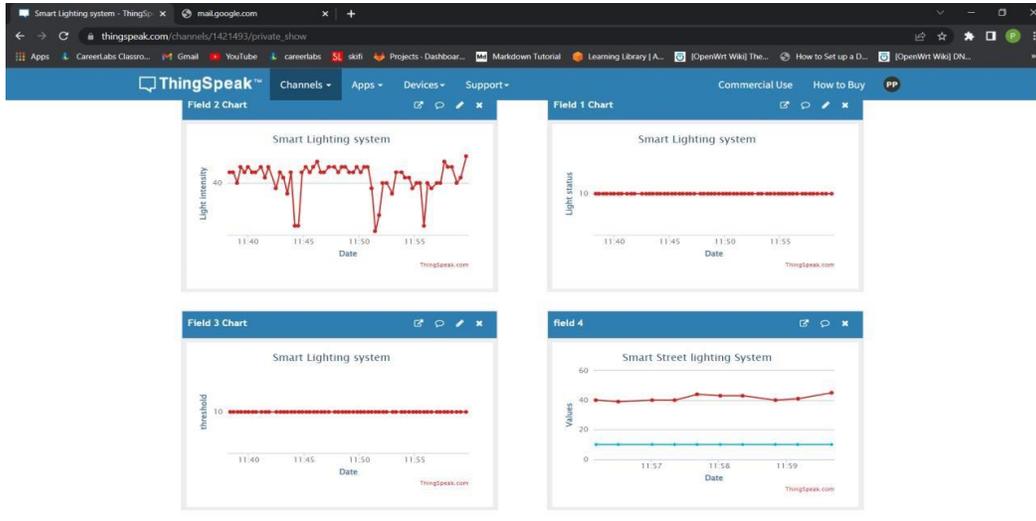
This block diagram describes the working of project ‘Smart Street Light System with IoT’.

- Arduino Connects the Esp8266 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 PIR 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 PIR sensors sense movement, then the Arduino has to send a signal to the relay to the LED.
- Arduino sends all this activity to thing speak cloud via Esp8266 Wi-Fi module using AT Commands
- The serial monitor data of Arduino is now displayed on web browser using IoT. This whole working in details in shown below using flowchart.

IV. HARDWARE IMPLEMENTATION



### V. SOFTWARE IMPLEMENTATION



THE SOFTWARE WAS IMPLEMENTED USING ARDUINO IDE  
NOTEPAD DOCUMENT LINK OF THE CODE: [HTTPS://DRIVE.GOOGLE.COM/FILE/D/1D2XKS12ATVOH8OCDFAWSAY0R2JM2CU7L/VIEW?USP=SHARING](https://drive.google.com/file/d/1D2XKS12ATVOH8OCDFAWSAY0R2JM2CU7L/view?usp=sharing)  
THE DATA WAS SUCCESSFULLY TRANSFERRED TO THE CLOUD AS YOU CAN SEE IN THE ABOVE PICTURE.

### VI. RESULTS AND CONCLUSION

In this survey, we analyze that IoT has groomed rapidly with our day-to-day life. Smart Street light System is one of the major parts which use IoT concepts. Smart Street Lighting System clearly tackles the major problems like Energy wastage, Crime detection, disposal of incandescent lamps, maintenance cost etc., This system ensures traffic safety and the security to the people which can stop from women annoyance, burglaries and further intimidations. The Energy crises occur in the cities may be reduced because 50 to 60 percent of electricity is saved and these energies we reused in other important purposes. This system is entirely adaptable to the requirements of users and creates safe environment. This approach requires minimum hardware with simple software. To control street light decisions were taken by the system; it is possible to avoid negligence factors by human operatives. It will also help fulminating our city as the Smart City.

The proposed system is easy to setup and implement and it doesn't require extra maintenance compared to the already existing system. This system can be further enhanced by writing logic into the code and that can be able to retrieve information of the time of sunset and sunrise from a reliable weather reporting source and automate the process completely by turn ON the street light at the time of sunset and turn it OFF by sunrise. This further eliminates human intervention and a manual visit to the location of the street lights will be required only in case of a malfunction. The efficiency of automated systems is more than the manual systems. We can also reprogram these devices with respect to our needs. The generated data is stored in Thing speak database which we can use for future references.

### VII. FUTURE SCOPE

The above project i.e., Solar Smart Street Light System with IoT can be powered from a battery, which can be charged during day time by harvesting the solar energy through a solar cell. The solar energy harvested from sunlight can be stored, inverted from DC voltages to AC voltage using sun tie converter.

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 useful and advantageous. With this project, we can even add smart parking of vehicle and it is even useful for driverless cars.

This project has a bright future not only to save power but also reduced the calamities and even reduced the crime rate.

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