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# IoT Based Intelligent Street Lighting System Using Arduino

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**ABSTRACT:** Today's modern world people preferred to live the sophisticated life with all facilities. The science and technological development are growing rapidly to meet the above requirements. With advanced innovations, Internet of Things (IoT) plays a major role to automate different areas like health monitoring, traffic management, agricultural irrigation, street lights, class rooms, etc.,. Currently we use manual system to operate the street lights, this leads to the enormous energy waste in all over the world and it should be changed. In this project, IoT is used to develop the street lights in the smart way for our modern area. It is an important fact to solve the energy crises and also to develop the street lights to the entire world. The proposed project is designed and executed the IoT systems for energy saving of street lights.

## I.INTRODUCTION

Internet of Things (IoT) plays a most important role in our everyday life. It connects enormous devices to the internet and involves the use of various data points, all of which need to be secured.

The IoT is used in various applications like surveillance systems that analyze abnormalities in security, RFID tags in luggage, sensors in chemical industries, smart homes, military applications, healthcare, industrial management and diverse environments. Predominantly, street lights play's the vital role in the urban areas where the main purpose is to improve the streets throughout shady periods of the daytime[1].

Before hand, the quantity of streets in the cities and towns were very fewer but by the growth of urban areas, the quantity of streets grows quickly with high traffic concentration. This project gives the finest resolution for electrical energy consumption.

## II.LITERATURE REVIEW

A Study on IoT based Smart Street Light Systems. IoT based smart street light system was studied using Raspberry Pi and Arduino UNO controllers [1]. Smart Street Light System is a manageable and strong idea, which is utilized to switch ON/OFF of the street lights robotically.

An Intelligent Dimming Algorithm of streetlight Based on Fuzzy Neural Network [2]. In this paper, an intelligent dimming algorithm of street light based on fuzzy neural network is designed. To solve the problem of streetlight brightness adjustment by using the data obtain from the sensing layer effectively.

IoT Based Intelligent Street Lighting System for Smart City [3]. IoT based Smart Street Intelligent Lighting System for Smart City project is cost adequate, practical, ecofriendly.

Street light control and air quality monitoring system [4]. The proposed work is design and executed the IoT systems for energy saving of street lights and Air quality monitoring.

Smart and adaptive street lighting system using IoT [5]. The smart and adaptive street lighting system is developed with automating switching of street lights with reduction of manpower.

### III. EXISTING SYSTEM

The existing system the street light systems are automatically ON and OFF according to the situation. In the traditional system IR sensor is used to detect the object. The microcontroller is used to control the process involve the net. Once if the sun light goes under the visible region then this system automatically switches ON light. As sun light is visible the automatically switch OFF lights. This smart system is used reduce energy and avoid unnecessary usage of electricity. In smart system the system used some of the sensors.

### IV. PROPOSED SYSTEM

The street light controller should be installed on the pole lights which consist of microcontroller along with various sensor and wireless module. The control system will switch on-off the lights at required timings and can also vary the intensity of the street light according to requirement. Here we propose a system to detect day or night at any particular area in the street which will allow to monitor and check like light switches on as well as automatic alert with actuation.

#### PROPOSED ARCHITECTURE:

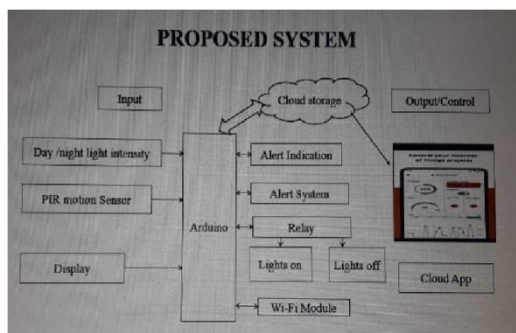


Figure 4.1: Proposed Architecture

#### SYSTEM DESCRIPTIONS:

##### ARDUINO

The Arduino UNO is Microchip ATmega328P based on an unsecured source microcontroller board. The board is furnished with a bunch of analog and digital I/O pins that may be communicated to various shields (evolution boards) and further circuits. The original STK500 protocol is used to interface.



Figure4.2 Arduino

##### PIR SENSOR

A Passive Infrared sensor is an electronic sensor that measures Infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications.



Figure 4.3 PIR Sensor

## IR SENSOR

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. IR is invisible to the human eye, as its wavelength is longer than that of visible light. This radiation hits the objects nearby and bounces back to the receiver of the device.



Figure 4.4 IR Sensor

## WI-FI MODULE

The ESP8266 module enables microcontrollers to connect to 2.4 GHz Wi-Fi, using IEEE 802.11 bgn. It can be used with ESP-AT firmware to provide Wi-Fi connectivity to external host MCUs, or it can be used as a self-sufficient MCU by running an RTOS-based SDK.



Figure 4.5 WI-FI Module

## LDR SENSOR

A photo resistor or light-dependent resistor (LDR) or photocell is a light-controlled variable resistor. The resistance of a photo resistor decreases with increasing incident light intensity. In other words, it exhibits photoconductivity.



Figure 4.6 LDR Sensor

## LCD DISPLAY

Liquid Crystal Displays (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome. A change in voltage applied to liquid crystals changes the transmittance of the panel including the two polarizing plates, and thus changes the quantity of light that passes from the backlight to the front surface of the display.



Figure 4.7 LCD Display

## RELAY MODULE

Relay is switching device which can turn ON or OFF any external circuit. It is an electrically operated switch and consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals.



Figure 4.8 Relay Module

## V. RESULTS AND DISCUSSION

The proposed system represents the stand alone Wi-Fi board and the components are connected to this board using relays and smartphone interacts with the Arduino through Wi-Fi. This can be attained by using a smartphone application by which we can turn ON or OFF the street lights from the place. It operates both in AC and DC sources. The PIC16F877 microcontroller is used to control the process

.Each street light pole is installed with the LDR sensor, Wi-Fi module and the lamp or light. Whenever a signal is received the bulb turns ON or OFF. The overall process of the system is maintained by the smartphone application through a Wi-Fi connection from the place.



Figure 5.1 Results of OFF State

When the Wi-Fi module connected to the smartphone application is in OFF condition, the LCD display will show that the lights are in OFF condition and the light does not glow.



Figure 5.2 Results of ON State

## VI. CONCLUSION

The proposed system is energy saving and highly efficient. Already established street light controlling system use conventional, line communication, Bluetooth etc. A cost effective technique was to utilize ESP8266 Wi-Fi modules to create a network and get connected to a LAN or router to reach the concept of IoT. The challenge of a street light system is long range communication. Range extension from Wi-Fi modules has been attained in the proposed system. The future scope of this system expands into speed detection and customizable areas of illumination and so the power consumption is drastically reduced.

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