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AUTOMATIC STREET LIGHT USING IOT

Poovizhi Magendiran[#1], S. Geethashree[#2]

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Abstract —The Internet of Things is inflicting a whirlwind nowadays, upsetting all zones. It is enlivening the sharp enterprise distress. The IoT is a framework it is the way to consolidate everything with the usage of far-off advancement. In all regions, streetlights devour greater outstanding force, and it is essential to avert electricity utilization is relied upon to make metropolitan areas keen. An authoritative purpose of the use of IoT to automate lighting fixture systems is to minimize guide work and without electricity use. Streetlights were via and the giant became on in the evening and killed in the preliminary phase of the day. Energy fees may additionally be avoided in the present circumstance, enabling energy to be set to the facet for another use. "Automated Street Light the use of IoT" could in a similar way be used. The proposed shape uses Light Emitting Diode (LED), which uses very little power consumption than High-Intensity Dischargeable (HID) Lamps, which use a lot of energy. Besides, a Wi-Fi enabling impact, the ESP8266 NodeMCU, is used to shop the information in the cloud. The Light Dependent Resistor (LDR) helps in discovering the intensity. In regards, development progress is diagnosed thru infrared sensors(IR Sensor). In case there is motion, the LEDs will turn on; else, they will continue to be off when there is no motion. Energy utilization can be decreased by way of around 60% to 75% with this proposed technique.

Keywords -LED, ESP8266 NodeMCU, IR Sensors, LDR, Energy consumption, Electricity, Street light.

I. INTRODUCTION

In any region, Automatic street lighting fixtures are essential. Our streets set up lighting fixtures structures count on the normal techniques that necessarily involve guide intervention and consequently do now not utilize the most up-to-date technology. As a result, the present-day paradigm is proven to be unreliable, ensuing in the waste of both manpower and electricity. HID lamps are typically used for road lighting.

Typically, these lamps launch a brilliant deal of warmth and fumes into the atmosphere. Instead of HID lamps, we suggest the usage of LEDs (light-emitting diode) lamps in our device. LED lamps have been nearly 50 times longer in lifestyles than most traditional lamps. LEDs are energy-efficient and cost-effective. Therefore it avoids environmental greenhouse fuel pollution. LED bulbs use only a 1/3rd watt of incandescent illumination. Besides, the strength of the LED lamps can be monitored by the usage of a method that helps to automate the lamp. There will additionally be various other streets in a city the place automobile motion is erratic and the full depth of the street mild is now not necessary. In these situations, automating the road lamp will assist retailers with an extensive quantity of electricity. As a result, we created an Automated street mild system that switches on the manipulate circuit when motion is sensed and turns off the circuit when it is no longer required, depending on the intensity level as shown in figure 9. This reduces the use of electricity and decreases the charge of public street lamps by way of as a good deal as 60% to 75%.

"Automated Street Light Using IoT" is the title of this article. The lighting fixtures are routinely turned on at night time while the IR Sensor detects motion on the street and is became off in the morning the usage of a smart embedded tool that regulates the street light relies on the detection of sunlight. When power is conserved, each energy waste and exertions are minimized. LEDs devour a part of the energy utilized by conventional HID lighting fixtures and enhance protection and safety on the road at nighttime.

The following are the article's structure: The related studies attempt at the Automated Street Light is represented in Section 2. The third segment presents an outline of the system. Section 4 it describes the system's operation. The conclusion is proposed in Section 5.

II. Related Works

Street lighting is significant in urban and rural areas, where everyone used to have such lighting systems.Rana Majumdar et al, Here, The device includes a street light controller (Arduino UNO) which will manage the complete system. The board is related to the Wi-Fi module, Bluetooth module, LDR, DHT-11and exceptional kinds of sensors. The information from the sensing device will assist the Arduino board when turning the LED light on/off. The complete facts will then finally be pass on through the wireless module over to a server. The street lamps can additionally be manually turned on and off if ever needed. There are many benefits of having street lighting in your city [1]."Smart Street Light Management System Using Internet of Things". The intented goal of this design is to lower the electricity wastage and make the city smart with wireless technology and to keep the intensity of the sunlight and weather and to avoid the accident by using buzzers in street lights [2].

*Corresponding author:E-mail:[1]poomca@gmail.com, [2]geethasrishekar@gmail.com

[1]Assistant Professor, PG Department of Computer Science, Sacred Heart College (Autonomous) Tirupattur, 635601.

[2]PG Department of Computer Science, Sacred Heart College (Autonomous) (Affiliated to Thiruvalluvar University, Vellore), Tirupattur, 635601.

T. Santhi Sri et al, Smart road lights when there is the car it turns ON the light otherwise it stays OFF. It is used to reduce the manual strength and they used solar power to increase the road lights, to join them with the photovoltaic panels like photovoltaic panels (PV). To accumulate the energy from photovoltaic PV panels are used. These panels are built-in with a crew of batteries and additionally with a cost controller. In the intensity of daytime the energy that is determined from the sun can be saved to these batteries for electrical energy. At the time of the evening, the gathered electricity can be made accessiblewith the assist of batteries during the whole night [3].

The streetlamp framework would consequently turn on and off if the light force in the climate falls or transcends a predetermined temperature. The dampness and the temperature sensor are utilized to distinguish the temperature and moistness of the environmental factors so the shade of the road can be changed to give better observable under some predefined climate conditions. The entire framework can be fueled by some artificial force source, like sunlight-based boards [4].

A project has been undertaken to present an environmentally friendly street lighting device with reduced power blasting. This is a cost-effective, practical, or the most secure behavior after optimizing the use of street lighting. The LEDs are prompts within the focused time while in that location may also play a role [5] [6].

The proposed technique utilizes an energy- compelling methodology that controls the streetlamps by mechanically exchanging them when there are people around the setup when it is dull. The keen street lighting framework is so adaptable and it comprises a scope of sensors and a regulator which make it a diligent street lights methodology. In this manner, it beats the dangers of the ordinary Street Lighting System [7][8].

The study of street lighting fixtures that has the dimming functionality to decrease the electricity consumption. The LED mild will illuminate when an object is detected. Raspberry Pi and Pi dig cam modules have been used to manage the dimming of the LED lights. Furthermore, it has the functionality of detecting objects like human beings on foot in the streets. Object detection was once made feasible via figuring out humans from other objects through the use of the pc vision technique. The dimming capability of streetlights has been tested that it can minimize electricity consumption of electricity [9].

B.Abinaya et al, The project is mainly used to alert the crimes taking place on the road the use of a panic button, and to prevent strength improvidence. Whenever the sunlight is detected the mild will be mechanically made OFF and the equal information can be accessed through the internet, which can be made ON/OFF the usage of IoT. The road light (ON/OFF Status) can be accessed from any time, anywhere through the net-primarily based on the real-time system [10].

The framework will function as versatile street lighting. Lights will be darkened when no activity is identified and will illuminate when some movement is recognized. For the present circumstance, the lighting structure isn't equivalent to an older style, static edification, or dimmable streetlamps that reduces at pre-chosen conditions. Extreme lighting can be prohibited via a focus on the darkening of zones of the city, streets, or individual illuminators. As indicated by traffic and group, the light force will be controlled. This paper additionally involves light sensors that will be helpful in a blustery climate [11]. The number of streetlamps will be constrained by the purchaser at a distant spot. The total contraption will chip away at RTC where lights will run at 100% profundity in top site guests' time and with decreased power after top traffic time [12].

In this paper, we consider the meaning of CCT based brightening and recommend a novel reconciliation of public climate records mindfulness, ZigBee-based Wi-Fi correspondence, and a unique online organization framework for the condition of craftsmanship brilliant LED streetlamp device applicable to the more astute city. Specifically, we graph a focal networker that can get climate data and constant sensor data from each LED streetlamps and presents a dynamic and bendy web interface for authorized clients [13].

Revathy.M et al, In the Design framework, focused energy release lights are changed via LED's which can modify their power depends on the need. The development of vehicles is detected utilizing LDR (Light Dependent Resistor) and the force of the streetlamp is diminished when not being used. The gadget additionally identifies a flaw in the gadget and shows to the base station the utilization of GSM (Global System for Mobile correspondence) science via sending SMS (short message administration) [14].

This smart light device automatically detects the movements of the object on the street. In the regular system, an IR sensor is used to discover the object. The microcontroller is used to manage the procedure involve the net. This paper is targeted at the controlling depth of the light thinking about the object movement near the light. This Smart mild machine is used to minimize power consumption.

The PIR sensor and LDR sensors are used to experience the human being and mild intensity of a precise area and transmit the statistics in wireless to the EB section. This smart system is finely relevant for street lamps in far-flung rural and urban areas the place the traffic is very low [15].

This paper proposes the usage of sunlight effectively through an automated asphalt

lighting framework with regulator support. The essential point is to make paving lighting frameworks liberated from the customized activity so there is no wastage of light. The activity makes use of regulator, extraordinary sensors for recognizing splendor, people, and the number of cars and a bunch of Light Emitting Diodes. . The information/yield of sensors will choose the ON/OFF development of the LEDs. The microcontroller controls the frameworks and subsequently exchanging movement is right and over use of light is dispensed with. With this proposed framework around 65%-70%, power utilization is decreased [16].

The streetlamp regulator should be followed through on the shaft lights which incorporate of microcontroller close by novel sensors and distant modules. The streetlamp regulator added into the city light shaft will control LED streetlamps depending upon the movement stream, bring data between every streetlamp. This mission is executed with the penetrating inserted framework which controls the streetlamps principally dependent on the location of vehicles or some other limits in the city. At whatever point the obstruction is recognized in the city inside a specific time the gentle will get precisely ON/OFF as per the impediment location and the indistinguishable realities can be gotten to through the web. The continuous records of the road gentle (ON/OFF Status) can be gotten to whenever, some place through the web [17].

This paper presents a certifiable demonstrated answer for dynamic streetlamp control and the executives which depends on an open and adaptable Internet of Things engineering. The proposed dynamic light control arrangement allows an energy saving of about 56% contrasted with traditional static, time-sensitive streetlamp control [18].

The Project proposes, They recommend a contraption that precisely turns off the light for the pieces of the roads having no development recognition and turns on the light for the pieces of roads the spot movement is identified when it is dim. The savvy street lighting apparatuses moreover control the iridescence of light-dependent on the activity and perform computerized gentle darkening which is a part that serves to limit strength utilization [19].

Y M Jagadeesh et al, This recently evolved thought will permit the street lights to change precisely dependent on the continuous guest's conditions and substitute in agreement to naturalistic specifications (Full moon). This paper is associated with the turn of events and execution of Low-cost Sensor-based Street Lights with a unique which in flip lessens energy utilization and

CO_2 outflow. It comprises an IR sensor, PIR sensors, a modest inserted regulator, and a capacity gadget [20].

This paper presents the field testing of a road lighting observing and control framework. The framework depends on a WSN organization of the enormous scope type that empowers the controller of street lighting lights. The engineering utilizes coordinated Doppler sensors that take into consideration vehicle recognition and finishes the force effectiveness objective [21].

Andrea Zanella and Lorenzo Vangelista, IoT will be in a situation to involve straightforwardly and consistently a goliath scope of explicit and heterogeneous stop frameworks. Building a typical construction for the IoT is an exceptionally convoluted undertaking. This paper manages the cost of an exhaustive study of the empowering advancements, conventions, and designs for a metropolitan IoT. It will introduce and examine the specialized arrangements and best-practice rules embraced in the places Smart City mission [22][23].

The plan of another reasonable street light control contraption does now not exclusively acquire energy-saving strength yet additionally expands the supplier life of lights gear. Additionally, it is controllable,

simplicity of upkeep. Simultaneously, it is helpful to feature the bubbly and various attributes, and at last make the road gentle organization, knowledge, mankind, and workmanship. A best in class setup is accounted for. At long last, the results of the output are gotten that: when an engine is shut to 15 meters, LED lights are on naturally. While people passed, the distance is closeness 10 meters [24][25].

NoriakiYoshiura et al, The essential purpose of smart road light systems is that lights flip on when wished and the light turns off when now not needed. Moreover, the smart street light system in this paper behaves like regular road lights that flip on all night. The lights flip on before pedestrians and automobiles come and turn off or limit brightness when there is no one [26][27].

Despite the truth that a range of jurisdictions have one-of-a-kind street lighting fixtures schemes and take various methods to their administration, there are several issues that they all face. Several trillion kWh are spent on road lighting each year round the world. High consumption leads to a high stage of produced electricity, which outcomes in noxious emissions. There are challenges associated with system management. The bills that cities need to pay are imprecise and established on measurements. Street lighting is frequently recognized as an "unmetered load".Almost all of these problems, of course, have solutions. For example, modern-day LED-based lamps use half the strength and ultimate twice as long as normal HPS or HID lamps, which addresses the problem of high consumption. The photoelectric sensors would make sure that the lamps only turn on at night.

III. AUTOMATED STREET LIGHT USING IOT

The Internet of Things (IoT) has risen into one of the most massive systems for data collection and analysis. The majority of areas have completely automated Street lights that can detect day and night and switch on and off based on the time of day and night. This project is being advanced by introducing a new constraint to turn on the road lights if there is darkness and everyone is walking down the lane. The term "Automated Street Light" refers to street lighting that assumes the role of traditional street lighting and additional features are designed to increase its efficiency, productivity and services. The automated street lighting system also known as an intelligent street lighting system, is a street lighting control system that reacts to the movement of cyclists and vehicles. In otherwords, an intelligent street lighting system refers to an adaptive street lighting system that cannot light up when no activity is detected, but becomes brighter when the sensor detects motion. The primary goal of this mission is to reduce electricity consumption by only using the road mild when necessary.

1. ESP8266NodeMCU

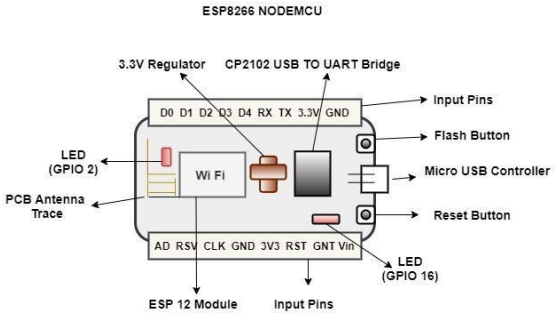


Figure 1: ESP8266NodeMCU

The ESP8266 NodeMCU framework is a free and open-source IoT platform. Which is an Espressif System with low-cost Wi-Fi enabled Wi-Fi Socket and hardware-based totally on the ESP-12 module. It has SPI, GPIO, ADC, I2C, UART, and PWM pinsfor monitoring and connecting with different peripherals as shown in figure 1. The CP2102 IC onboard the NodeMCU provides USB to TTL functionality.

2. IR Sensor

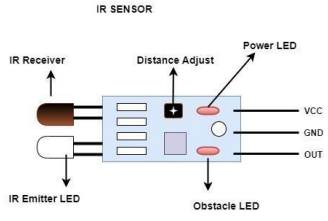


Figure 2: IR Sensor

An infrared sensor is a digital issue that detects objects through detecting infrared radiation emitted with the aid of them. It primarily consists of an IR LED transmitter and a photodiode receiver as shown in figure. It measures infrared radiation with wavelengths ranging from 700 nanometres to one millimeter. The IR rays are transmitted as a positive wonderful voltage is applied throughout the transmitter LED. If these rays penetrate an object, the object returns the IR rays to the receiver photodiode, where the receiver photodiode absorbs. The voltage produced through the terminals of the receiver diode is proportional to the quantity of mild mirrored via the object. In general, IR receiver LEDs are darker (black), whilst IR transmitter LEDs are translucent.

2. LDR and it'sWorking

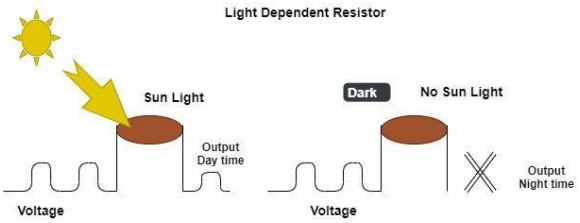


Figure 3: LDR

Light Dependent Resistor, or photo-resistor, is a type of resistor that is to light. The LDR is light-sensitive, and its tolerance varies depending on how vibrant the light is. When the sunlight falls in the LDR it sends the data as day time when there is no sunlight it represents that it is night time as shown in figure 3. It's made of a high-resistance semiconductor, which increases resistance in darkness and reduces resistance in the lamp. When mild falls the LDR above a positive threshold, the photons are absorbed, allowing electrons to enter the conduction band. LDR produces a variable resistance that is proportional to the quantity of mild it receives. It's mostly used in electric- powered circuits such as traffic lamps, alarm clocks, and automated brightness and contrast monitoring, among other items.

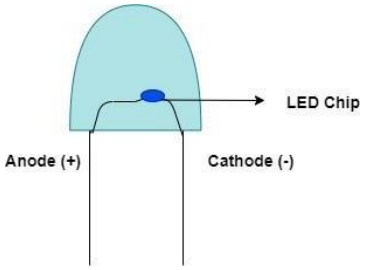
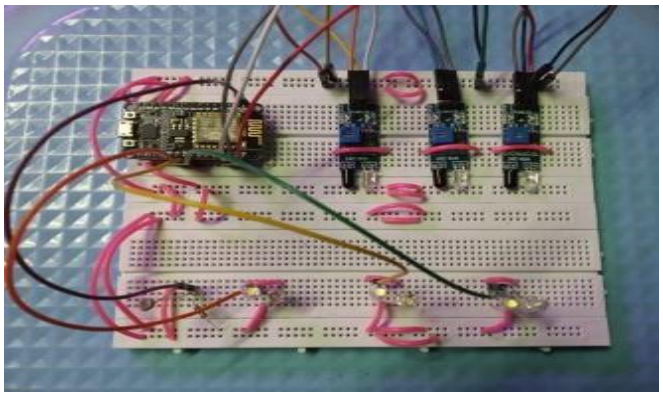


Figure 4: LEDs

The LEDs are used as street lights and using this as an example, we can quickly illustrate how they work and we manage them using the hardware requirements ioned above.

Using jumper wires, we can connect all of the components with the LED Anode (+) and Cathode (-) as shown in Figure 4.

Overall Connection Looks like:



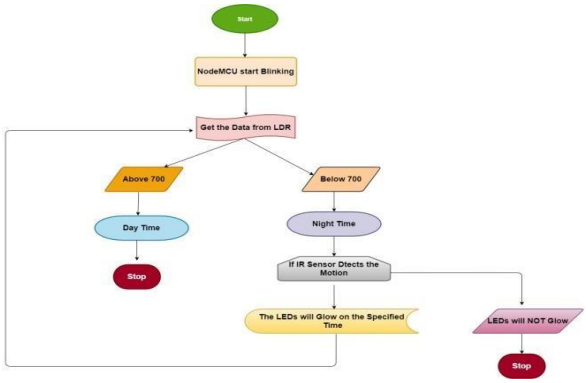


Figure 5: Full Connection

IV. METHODOLOGY

A working method for IoT-enabled Automated Street Lights, The proposal is that cutting-edge road lights would be replaced via LED smart lights, resulting in a discount in electricity usage. The LDR sensor can observe the surrounding areas. When LDR senses a lower light degree in the area, the LED will turn on as shown in figure 3, otherwise when the mild intensity is excessively high, the LED will flip off. The LDR is used to decide the depth of the nearby environment, and it receives its facts from sunlight; when the intensity is high, it suggests that it is daytime; when the depth is low, it suggests that it is night time; and the Nodemcu receives the data from the LDR, The NodeMCU module is the system's main brain as shown in Figure 1, linking thedevice to its different elements. When the electricity is low, signaling nighttime, it sends a sign to the IR sensor, which is a laptop that senses the presence of an obstacle the use of an IR light passes on beside any direct bodily interaction as shown in figure 8. When a car is detected, it sends a signal to Nodemcu, and then sends the facts to IR, which turns on the switch as shown in figure9.

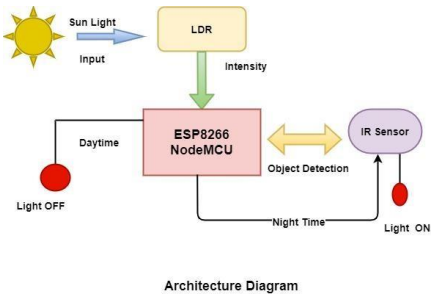


Figure 6: Architecture Diagram

Process of System:

Step 1: To begin with ESP8266 NodeMCU it startBlinking

Step 2: Then it Get the Data from LDR

Step 3: If the value is less than 700 it is Night Time

Step 4: And the IR Sensor Detects the Motion

Step 5: If there is a Motion, The LEDs will glow on the Road

Step 6: Again the Process is Continues, until the value becomes above 700

Step 7: If the LDR value is above 700 its Day Time

Step 8: The LEDs will not Glow Step 9: Then it Stop the Process.

Step 9: Then it Stop the Process.

Circuit Diagram:

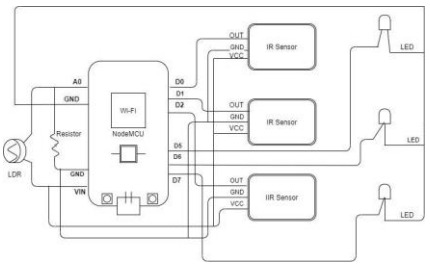


Figure 7: Circuit Diagram

The circuit graph depicts the connection of an Automatic Street Light, which comprises strikingly of an ESP8266, LDR sensor, IR sensor, and LEDs.The LDR sensor's one-stop is associated with 5V, while the thing that matters is associated with a fixed opposition, which is then identified with the earth. As seen, the ADC pin (A0) on the NodeMCU is associated with the factor between repaired opposition and one give of the LDR sensor. Because of the variable opposition of the LDR sensor, the variable voltage will be created at A0 in an offer to the amount of light falling on the LDR.

The IR sensor has three pins: two for VCC and field, and one for yield. At the point when an article is identified, the IR sensor's general exhibition increments. This pin is associated with the NodeMCU's GPIO pin, setting off the Street gentle if the IR sensor detects everyone strolling down the road. And afterward the LED would flip on. What's more, the LEDs are associated with the ESP8266 Nodemcu with D5, D6, D7 Digital pins on one quit and GND on the other as shown in figure 7. Accordingly, the road gently network has beenconnected.

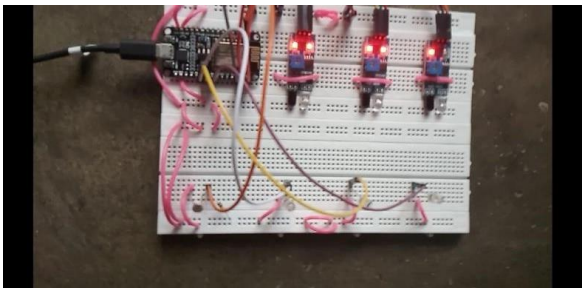


Figure 8: Output1

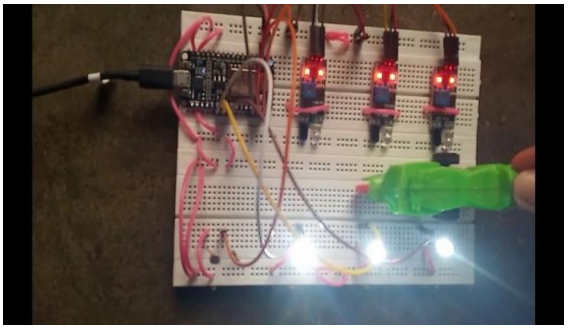


Figure 9: Output2

V. CONCLUSION

The significant purpose of this device is to cut consumption of energy from older lamps and replace it with LED lamps to save energy and the unused energy can be used for some other purpose. This is the most cost-effective, realistic, environmentally sustainable, and secures method of maximizing the use of streetlights. Since this is a computerized device, no human-made difficulties with shutting off the lights. LEDs are having a long life span, it emits cool light, incorporate and there is no any dangerous materials, and it can be switched quickly and automatically within the specified time. The energy saving strategy and the use of a wireless connection module to achieve greater energy efficiency and the use of renewableenergy.

VII. FUTUREENHANCEMENT

In the future, LEDs will be replaced by solar panels, which canconveniently store electricity and be powered by a rechargeable battery. It will be applied in two directions, allowing the device more versatile and effective on rainy days and throughout the winter season. And it is pollution free and we can save the energytoo.

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