SURVEY ON IOT BASED STREET LIGHT MONITORING SYSTEM

Kuzhalyn Yashvi T T[1], Rosini R[2], Santha Kumar S[3]

[1] *UG Student, Department of Computer Science and Engineering, Sri Ramakrishna Institute of Technology, TamilNadu, India*

[2] *UG Student, Department of Computer Science and Engineering, Sri Ramakrishna Institute of Technology, TamilNadu, India*

[3] *UG Student, Department of Computer Science and Engineering, Sri Ramakrishna Institute of Technology, TamilNadu, India*

ABSTRACT

Internet of things is one of the fastest growing in the real time applications. IOT is a combination of Aurdino, Sensor, Software and other technologies. In this advantaged era where energy is the most concerned one, it is our responsibility to save them. In street light monitoring system IOT plays a vital role in light sensors, Arduino IDE, Microcontrollers, etc… The street light system are automatically ON and OFF according to the situation. These smart light systems automatically detect the movements of the object on the street. In the tradition system IR sensor is used to detect the object. The microcontroller is used to control the process involving in the net.

Keyword: - *Internet of Things, Streetlight Monitoring System, Sensor, Arduino IDE*

1. INTRODUCTION

Streetlights are a significant source of energy consumption. Often, Streetlights still remain on even when there's nobody within the street. With the assistance of this IOT-Based streetlight monitoring system, we will efficiently monitor and optimize the energy consumption of streetlights. In this, streetlights are fitted with LDR sensors that can monitor the movement of humans or vehicles in the street. If the sensor can catch any movement in the street, it signals the microcontroller, which the turns on the streetlight. Similarly, if there's movement in the street, the microcontroller switches the light off. This way, a considerable amount of energy are often saved. The daily lighting system has limited to only two ON and OFF options, and is not effective, this type of operation results in power lose due to continued peak voltage. The diversion of electricity from street lights is therefore one among the apparent power losses, but with the utilization of automation, this leads to many new energy and money savings method. LDR is employed as a sensor during this module. The aim is to provide an efficient and energy-saving lighting system by determining the present lighting condition and changing the lights accordingly. The circuit consists of a sensing component known as LDR, followed by Relay. The input is given from the direct supply and the relay converts them to a required voltage and then the switching on the lights takes place.

2. STREETLIGHT MONITORING SYSTEM

Internet of Things additionally depends upon the gathering of information. The info is then used for observation, domination, and transferring info to a different device via the web. These enable specific actions to be mechanically activated whenever bound things arise. The Street Light Monitoring System is developing for automatic streetlights maintenance and for reducing power consumption. This application is designed in such a way that we place light sensors in all street light circuit, which is responsible to switch on and off automatically. Street lights can be controlled according to reference light sensors or manually from the Save Light servers through GSM / GPRS / Internet networks.

Fig- 1: Streetlight Monitoring System

2.1 SPECIFICATION

The follow specification determines the functionality a street light.

2.1.1 POWER

Power consumption of the lamp. This can be an important factor for reducing total energy costs.

2.1.2 BRIGHTNESS

Brightness is the measure of the amount of light the lamp will be able to provide.

2.1.3 SUPPLY VOLTAGE

Supply voltage is that the voltage equipped to the lamp itself to produce the facility. it's vital to decide on a voltage that's already compatible together with your current infrastructure.

2.1.4 OPERATING TEMPERATURE

The average temperature at that the lamp is meant to operate. This specification is particularly necessary for out of doors lamps.

2.2 CONFIGURATION

Street lights are usually fabricated from corrosion resistant metal like atomic number 13 or a powerful plastic material like high density polythene to be able to stand up to the outside components. Street lightweight are usually pole-mounted, on either dedicated poles or existing utility poles. the first perform of street lights is to illuminate objects or areas that will rather be dark and out of focus in the dark. Street lightweights have confidence light emitting diode (LED), incandescent, air mass atomic number 11, depression atomic number 11, mercury vapor, metal salt, and high intensity discharge (HID) bulb technology to supply the suitable quantity, color, and temperature of sunshine for a particular application. LED street lamps are the foremost consumption, and need negligible maintenance with longer bulb life.

2.3 LDR

Light Dependent resistance (LDR) is associate degree electronic part that is sensitive to lightweight. When light falls upon it, then the resistance changes. Values of the resistance of the LDR could modification over several orders of magnitude the worth of the resistance falling because the level of sunshine will increase. associate degree LDR's resistance will vary from concerning a hundred a hundred within the daylight, to over ten ten in absolute darkness with this variation of resistance being regenerate into a voltage variance. associate degree LDR is formed of only a few electrons that square measure free and ready to move, the overwhelming majority of the electrons square measure fastened into the space lattice and unable to maneuver. Hence, during this state there's a high LDR resistance.

2.4 RELAY

Light Dependent resistance (LDR) is an associate degree electronic part that is sensitive to lightweight. Values of the resistance of LDR can be modified over several orders of magnitude the worth of the resistance falling because the level of sunshine will increase. Associate degree LDR's resistance will vary from concerning a hundred within the daylight to over ten in absolute darkness with this variation of resistance being regenerate into a voltage variance. Associate degree LDR is formed of only a few electrons that square measure free and ready to move, this overwhelming majority of the electrons square measure fastened into the space lattice and unable to maneuver. Hence, during this state, there a high LDR resistance.

2.5 ARDUINO

Arduino consists of both a physical programmable circuit board i.e. often mentioned as a microcontroller and a bit of software, or IDE (Integrated Development Environment) that runs on our computer, wont to write and upload code to the physical board. The Arduino platform has become quite popular with people just starting with electronics, and for good reason.

2.6 LED

A light-emitting diode is a semiconductor device that emits visit light when an electrical current passes through it. It is essentially the opposite of a photovoltaic cell (a device that converts the visible light into electrical current). LEDs are small in size and are highly energy-efficient lighting technology, and have the potential to fundamentally change the future of lighting. They only light up if we align the legs accurately. The long leg is often positive and should connect to a digital pin on the Arduino board. The short leg goes to GND; the bulb of the LED will also mostly have a flat edge on this side.

2.7 WI-FI

Wi-Fi works off a comparable to rule as a totally extraordinary remote gadget – it utilizes radio frequencies to impart signs between gadgets. The radio frequencies square measure completely totally not quite the same as walkie-talkies, vehicle radios, mobile phones, and climate radios. Here, all through this undertaking, the Wi-Fi module is utilized to

get orders from the web and initiate an entire IOT framework. Streetlamps can represent up to 40% of a city's energy cost. Remote streetlamp control can reduce that expense significantly and distant observing can recognize broken lights quickly so a maintenance group can be dispatched before dim. This is the reason urban communities around

the globe are putting billions of dollars into this market. Lower power utilization with shrewd darkening, Automatic disappointment location, Automated diminishing at explicit occasions is the few advantages of keen road lighting. Every streetlamp has a remote association that permits them to be distantly observed and controlled.

2.8 CIRCUIT DIAGRAM OF STREET LIGHT SYSTEM

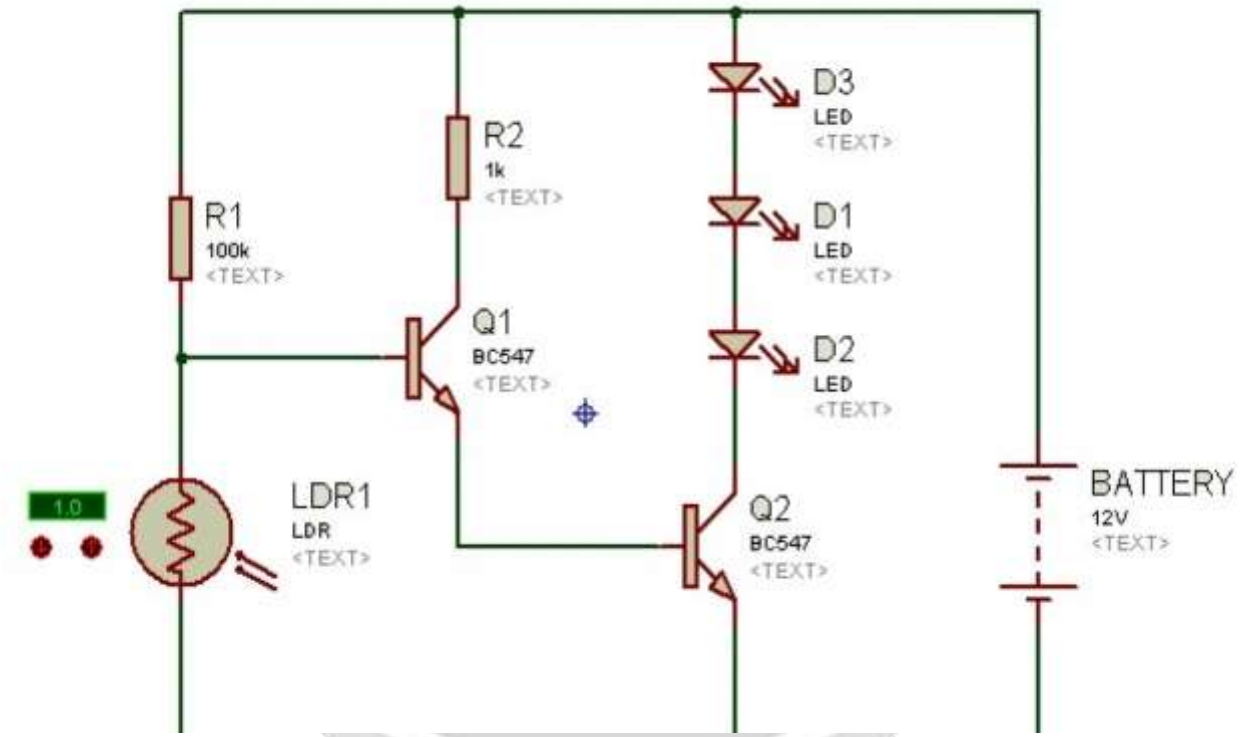

Fig – 2: Circuit diagram of street light system

3. SENSOR

A sensor is a device that detects and responds to some type of input from a physical environment.

3.1 IR SENSOR

An infrared sensor is an electronic instrument that is used to identify certain credits of its ecological factors by either releasing is/or recognizing infrared radiation. It is also fit for assessing the glow of a thing and recognizing development. Infrared waves are not clear to the characteristic eye. In the electromagnetic reach, infrared radiation is the region having frequencies longer than clear light recurrence, anyway more restricted than microwaves. The infrared locale is around separated from 0.75 to 1000µm. IR (infrared) sensors separate infrared light. The IR light is

changed into an electric stream, and this is perceived by a voltage or amperage locater.

3.2 CURRENT SENSOR

A current sensor is a gadget that identifies current (AC or DC) in a wire and produces a sign relative to it. The produced signs could be simple voltage or current or even advanced yield. It very well may be at that point used to show the deliberate current in an ammeter or can be put away for additional examination in an information securing framework or can be used for control purposes.

4. LITERATURE REVIEW

In this paper [1] the author experimented, the energy reducing system by automatically switching ON and OFF the street lights. Where there is an object movement, the sensor will capture it and make it automatically ON and OFF. These systems are more energy-efficient, reliable, and reduce cost. This architecture is to sense the object and to act accordingly. The sensor used to sense the object is an IR sensor, IR LED is used to transmit infrared rays and is made of gallium arsenide. Wi-Fi is used to provide high-speed internet and network connection. The implementation includes that light that comes from LED is triggered by multi-sensor captures the objects and turns ON the light.

In this paper [2] the author experimented, an energy-efficient Zig Bee-based outdoor light monitoring and control system which can monitor and control the outdoor lights more efficiently. These laps regularly monitor the intensity of the sunlight by using a sensor and based on it, the MCU decides ON or OFF lamps. The microcontroller used here has Wi-Fi, programmed like any other GPIO, SPI, 12C, UART, 12S, and 802.11b/g/n. The light sensors are connected to MCU through the 12C interface and observe light status. It measures the brightness of sunlight and acts accordingly. Based on sunlight intensity, MCU drives lamps to maintain the same level of illumination, which is horizontal and vertical illuminance of 15 lux and 50 lux respectively. The design and operation include when voltage is supplied to the primary circuit, current flows through a coil to ground. As the magnetic field builds, it pulls together the switch contact in the secondary circuit, hence supplying current to the component being operated. The magnetic field is removed when the relay is switched OFF and the spring plate returns the switch to an open circuit position, thus switching OFF the power.

In this paper [3] the author experimented, a circuit contains a sensing component known as LDR, followed by Relay, the input is given from the direct supply and the relay converts them to a required voltage and then the switching ON the street lights takes place. As per the analysis, Street lights are On from 6:30 pm to 7:00amand hence there occurs a wastage of energy. The bulb used here includes 150w and the power consumed per day is 39kwhr. Hence, the bill generated per month is 3150. The smart system includes, 0% utilization state from 7 am to 7 pm and 55% utilization as a result of the diminishing procedure utilized state from 2 am to 6 am. The main aim is to preserve the consumption of power that is being used in normal streetlights.

In this paper [4] the author experimented, a wireless control monitoring system each street light must be equipped with different types of sensors that are connected to a microcontroller to monitor its environment with regards to its working needs like light intensity, current capacity, voltage load and temperature which are collected and transferred by the means of ratio frequency communication. The system has a transmitter and a receiver, where the transmitter is almost placed 500m away from the receiver so that first the transmitter detects the presence of road user and sends data to receiver then light will ON and in case transmitter fails to detect the road, the receiver detects the road user by itself and the light will be ON. Then the light will go to the OFF position when no road users are using the road. The transmitter side of the street light system is constructed using Raspberry pi, LoRauart module, and ultra sensor. The receiver side of the street light system is constructed using Raspberry pi, LoRauart module, Lidar Lite V3, PIR sensor, and a LED light. The Arduino tends to make the light ON at the proper time.

In this paper [5] the author experimented, the solution for energy saving is intelligent lighting. Control and energy management system in public lighting management. It recognizes remote ON/OFF and dimming of light, by using the light-dependent resistor. LEDs will only light up if you align the legs accurately. The long leg is often positive and connected to a digital pin on the Arduino board. The short led is GND. Arduino structures and creates single-

board microcontrollers and microcontroller units for building advanced gadgets and aggregate items that can detect and control. First, we make ground and 3.3v pin of Arduino has common using breadboard so that connecting LEO's and IR sensor. IR sensor's VCC pin is connected to 3.3v of Arduino, ground of IR sensor to ground of Arduino and output pin of IR sensor to A1 of Arduino board. Now LED is connected by a positive pin of LED to digital pin 3 of Arduino and negative to the ground of Arduino. LED's long leg is connected to 5 of Arduino and the other pin of LDR is connected to analog A1 pin of Arduino. Then after the connection, the code is run in Arduino software, and results are seen. Thus, the working model of the smart street light system has successfully avoided the wastage of electricity.

5. CONCLUSION

The Internet of Things involves connected devices and sensors that are generally non-intrusive, clear, and invisible. To enrich our daily life with IOT, the use and necessity of technological systems are very important to establish a smart city. Because we believe, the more research and development of IOT, the more development and establishment of smart cities will be observed. The LEDs have a long life, emit coo light, donors have any toxic material, and can be used for fast switching. New IOT devices and protocols square measure additional doubtless to contain potential vulnerabilities, catching additional efforts to resolve these issues.

6. REFERENCES

[1]. Ms. M. Kokilavani, Dr. A. Malathi "Smart Street Lighting System using IOT" Government Arts College, Coimbatore, Tamilnadu.

[2]. K.Tamilselvan, K.S. Deepika, A.Gobinath, S.Harhini, S.Gokhulraj "IOT Based Street Light Monitoring System" Nandha Engineering College, Erode, Tamilnadu.

[3]. Nithyashree CM, Vinutha TS, M. Dakshayini, P. Jayarekha "IOT-Smart Street Light System" BMSCE, Bengaluru, Karnataka, India

[4]. Jessin Mathew, Riya Rajan, Rangit Varghese "IOT Based Street Light Monitoring & Control With loRa/LoRaWAn Network" Mount Zion College of Engineering, Kadammanitta, Kerela, India.

[5]. Dr.A.S.C.S.Sastry, K.A.S.K.Bhargav, K.Surya Pavan, M.Narendra "Smart Street Light System using IOT" K L E F, Andhra Pradesh, India.

.