A Study on IoT based Smart Street Light Systems

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***Abstract*:- Today's modern world people preferred to live the sophisticated life with all facilities. The science and technological developments 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 survey we studied about, how IoT is used to develop the street lights in the smart way for our modern era. It is an important fact to solve the energy crises and also to develop the street lights to the entire world. In addition with the study on smart street lighting systems we analyzed and described different sensors and components which are used in IoT environment. All the components of this survey are frequently used and very modest but effective to make the unswerving intelligence systems.**

Keywords: Smart street light systems, Internet of Things, Temperature sensor, Weather sensor, Raspberry Pi, Arduino UNO.

I. INTRODUCTION

Internet of Things 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 [1].

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. 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 growths quickly with high traffic concentration [2]. This paper gives the finest resolution for electrical energy consumption.

II. MOTIVATION AND BACKGROUND

Smart Street Light System is a manageable and strong idea, which is utilized to switch ON/OFF of the street lights robotically. Whenever the sunlight is decreased lights were automatically switched ON. The lights are switched OFF by monitoring the luminous level of sunlight in the self-regulating Manner. This work is performed by an LDR sensor which monitors the light absolutely like our eyes [3]. The system itself spots whether there is necessity for light or not. When the progress of darkness is increases to a destined level then street lights were automatically switched ON, otherwise it gets OFF.

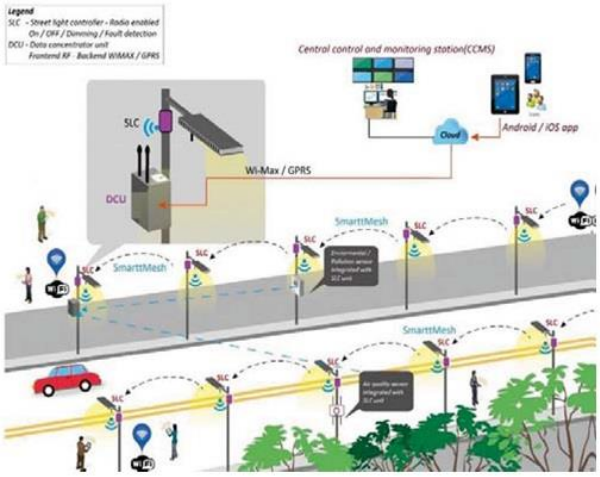

Fig.1 Scenario of an IoT based smart street light system

III. SYSTEMATIC ANALYSIS OF RELATED WORKS

To study about the smart street light system, we have to take an analysis on different aspects anticipated by other researchers. This is a description which is related to the work done on Smart Street Light with various components and by using different algorithms [4]. This was developed and implemented by different aspects in several platforms. On developing the rural area, electricity is the major need. This paper proposes that smart system which can make decision for the bright control.

LDR sensor is used to identify the power of the light and the street lights are controlled by IR sensor. Here solar cell is used as a battery. The notable part of this paper is to sustain the traffic and also watch the entire system over the internet using surveillance camera is fixed on the street light lamps. The ON/OFF of the street lights are accessed through internet. The actions performed on the roads are tracked by a camera which placed on top of the street lights and footages are saved in the server [5]. In case of any emergency or danger the panic button is placed on the pole, when any person caught danger can press this panic button which raises an alarm to the nearby police station.

IV. VARIOUS COMPONENTS USED IN IoT

❖ ***Microcontroller***

A microcontroller may be concerned as a free-standing system with a memory, peripherals and processor. The peripherals, automobiles, appliances and telephones are mostly used microcontrollers and also all the computer systems were embedded in other machineries, so it can be used as the embedded system.

❖ ***Raspberry Pi***

A Raspberry Pi can deliver all the forecast potential that implicit, at a low-power expenditure level. It is an affinity (debit) card-sized computer modeled by the BBC Micro for educational purposes.

❖ ***PIC microcontroller***

Peripheral Interface Controller is a firmed microcomputer developed to control the performance of embedded system like peddling machines, robots, therapeutic devices, portable radios, office machines, home-based purposes, motor vehicles and several additional devices. Microchip Technology assembled a specialized microcontroller (family of chips) in Chandler, Arizona.

❖ ***Arduino UNO***

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 (input or output) pins that may be communicated to various shields (evolution boards) and further circuits. The original STK500 protocol is used to interface.

❖ ***Wi-Fi Module ESP8266***

A microcontroller can access to Wi-Fi network by giving an autonomous SOC (Wi-Fi Module ESP8266) with coherent TCP/IP protocol stack. For providing an application or discharging every Wi-Fi networking operations from one to alternative application processor, the ESP8266 capable is used. With an AT instruction set microcode each ESP8266 modules were preassembled. The ESP8266 module is terrifically worthwhile board with an enormous, and ever flourishing, community.

❖ ***Sensors***

For a prolonged time, different kinds of sensors have been used in various industries and organizations but the IoT (Internet of Things) innovation of has taken the growth of sensors to the extreme level .Using different sensors, IoT provides various type of data and intelligence. They serve to collect data, push data and share data with an entire network of combined devices.

❖ ***Temperature sensor***

A quantity of heat energy is measured using a device called Temperature Sensor. It allows to diagnose a natural action in temperature from a specific source and transforms the data for a device or user.

❖ ***Proximity sensor***

A proximity senor senses occurrence of an adjacent object, or properties of that object, and translates it into signal which can be simply read by user or an electronic device without getting in contact with them.

❖ ***Photoelectric sensor***

Photoelectric sensor is made by light sensitive parts and uses a beam of light to sense the occurrence of an object. It is an idyllic alternative of inductive sensors.

❖ ***Ultrasonic sensor***

Ultrasonic sensors are also used to sense the occurrence or to compute the distance of targets similar to sonar or radar. This makes a consistent resolution for harsh and demanding conditions

❖ ***LDR Sensor***

An LDR (Light Dependent Resistor) is also called a photo resistor. These devices are light dependent. The resistance will be decreases, when the light drops on the LDR, now the resistance level is low. If LDR is placed in the dark region, then the resistance increases here its resistance level is high.

❖ ***Infrared sensor***

An infrared sensor is a sensor which the convinced characteristics of its neighbors are sensed either by releasing or spotting infrared radiation. Accomplishment of computing the heat is discharged by an object.

❖ ***PIR sensor***

A motion detector is a device which is used to sense the physical movement (motion) in an assumed area and it converts motion into a signal. Motion detective sensor theatres a major role in the refuge industry.

❖ ***Optical sensor***

A sensor, which senses the number of light rays and translate it into electrical motion which can be effortlessly readable by user or an electronic instrument/device is called optical sensor

❖ ***Pressure sensor***

A pressure sensor is used to senses a pressure and translates it into an electronic signal. Here, the quantity depends upon the level of pressure applied.

❖ ***Humidity sensor***

A humidity senor is used to sense both air temperature and moisture. While viewing for relief, Relative humidity becomes an imperative factor.

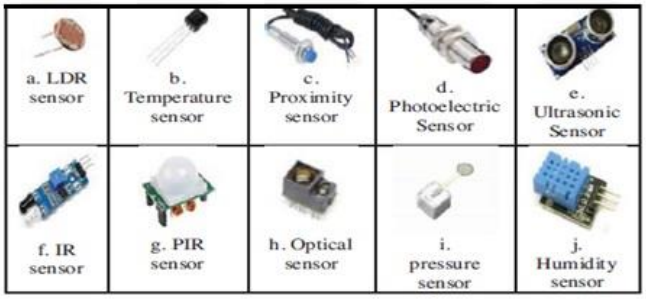

Fig.2 Various sensor used in smart street light system

5. OTHER COMPONENTS

➢ ***CCTV***

Closed Circuit Television is a television system and its signals are not visibly distributed

- ***LED***

A Light Emitting Diode is a light source that releases light when current drifts through it. It recombines an electron in the semiconductor with electron holes, liberating power in the mode of photons.

- ***Solar panel***

A Solar panel intended to engage the sun's emissions as a basis of dynamism for producing power.

- ***Relay***

A relay is a gadget that is activated by a current. Relays are used in numerous applications because of their extended life, relative easiness and the consistency level is proven.

- ***Rechargeable battery***

A rechargeable battery is a kind of electrical battery and recharged several times, as divergent to a throwaway or primary battery, which is provided entirely charged and discarded later use.

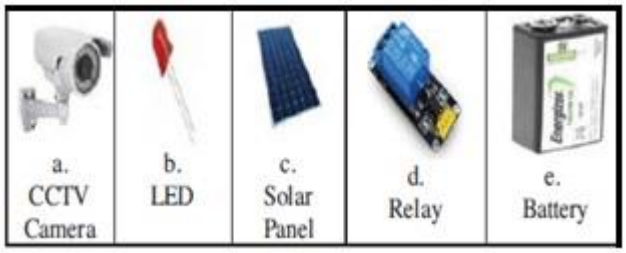

Fig.3 Components used in smart street light system

6. CONCLUSIONS

In this survey, we analyze that IoT has groomed rabidly 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 were used 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 helpful in making our city as the Smart City.

7. REFERENCES

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