INTELLIGENT STREET LIGHTING SYSTEM USING IOT

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Abstract -

This project aims for in creating and developing a System of energy and electricity Conservation. The manual system that are used in current system is to be switched ON by the vending before the sunsets and they will get switched OFF if the sufficient light is received to the area. At nights in some areas where there is no need of the lights are getting on unfortunately. The electricity is getting wasted unwantedly. This proposed system will eliminate the manual operation of the lighting system is completely eliminated. The proposed system provides a solution for energy saving. The status of the running street light can be controlled and validate from anywhere.

1. INTRODUCTION

The street lighting investment to the city is getting much larger day by day. This street lighting system via IOT can reduce the expenses of allocating money for municipal up torate of 50% - 70%. An intelligent street lighting system is a type of system which will control the brightness output basedon the consumption and usage. An intelligent street light management proposes the installation of the wireless-based system to remotely track and control.

The exact energy consumption of the street lights and take the total energy consumption reduction measures through power conditioning and control the street light controller should be fitted on the street light poles which is involve withthe sensors, wireless modules and along withmicrocontroller.[2] This operation can be controlled on by two type one is manually and another is automated This system will switch on-off the lights at when it is required or mobility more and can also change the according to the surrounding brightness.

2. PROBLEM STATEMENT

We have noticed that over the number of cities where the street lighting electricity consumption and expenses are more in the areas. Currently implemented manualstreet lighting system will get ON before the sunset, and will get ON even though there is no car mobility, and willget OFF till morning, after sunrise, if someone see.

3. RELATED WORKS

B. K. Subramanyam. K. Bhaskar Reddy, P. Ajay Kumar Reddy proposes Intelligent wireless street light control and monitoring system which aims in controlling the street lights using wireless. Along with they using solar panel at the top of the lamp a post and LDR for controlling the car which will save more power and we can monitor the street lights status using a GUI [1]

Nithya, N. Kayalvizhi proposed Design of Wireless Framework for Energy Efficient Street Light Automation,which is an Intelligent lamp post management system which sends every data regarding the lamp post to the central station through the ZIGBEE wireless communications, where with this system implemented, wecan increase savings in creating the Central system and also helps in the detecting the fault too.[2]

4. EXISTING SYSTEM

The Current system has several disadvantages i.e., It has manual switching ON/OFF which is an very difficult tomonitor and also there is more energy and power consumption in current system. The main point of the systemis it is more expensive along that it need more man power forthe existing system.

5. PROPOSED SYSTEM

In our proposed system, The switching Light ON/OFF is fullyautomated which will work according to the surroundings where it gets on when there is a not a sufficient Sunlight and

releases sufficient sunlight. The Maintenances of this systemis very low and can be done very quickly. And also there is atern called light Pollution which is increasing recently due to technology but this system will reduce the light pollution as it has adaptive brightness technology[3]. And this system status will be monitors wireless Lesly through online. The main need to propose this system is energy saving, where there is reduction in electricity consumption. Finally theManpower for monitoring this system is very less moreover it will work perfectly when there is no manpower for monitoring.

Fig1.1 Proposed Model

6. HARDWARE MODULES

LDR

A Light Dependent Resistor (LDR) is anphotoconductivity based resistor in respect to the incident electromagnetic radiation. Therefore, they are luminous based devices. They are also called as photo conductors, or else it is called as photo conductor cells. These type ofmaterials are made up of high sensitive resistors . These typeof resistors works on the principle of the photoconductivity. This happens like a phenomenon which works on the photoconductivity , where the materials are highly sensitive reduces when light is absorbed by the material.

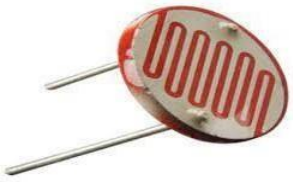

FIG 1.2 *LDR*

IR SENSOR:

It is an electronic instrument that is An opt electriccomponent which are radiosensitive It observes some of thecharacteristics in the surrounding which are lies in the infrared region. It can also detect the motion and and can measure the heat of the object. The IR waves emitted through this are not visible. The infrared waves lies in the Electromagnetic spectrum after the visible light, but it is lesser than the microwaves. The infrared region is approximately noted from the range of 0.75 to 1000µm. IR (infrared) sensors detect infrared light. The IR light will convert the electric current into the digital form[FIG 1.4].

FIG 1.3 IR SENSOR

ESP 32:

It is an 32 bit System, which has an inbuilt function and can have lot of application Like RF module, Power amplifier, Bluetooth etc. In this system it contains an chip called ESP32S Chip as shown in fig [1.2] which will work inany condition of the environment. It has an adaptive clock frequency and powered by 2 CPU. Every component connected to this can be controlled by the threshold value with this main board. It has lot of interfacing features like Interfacing the Memory card,

FIG 1.4: *ESP 32*

AC DIMMER:

The AC Dimmer which is voltage controlling dimmer is particular system used to control the AC voltage,which can give maximum output up to 600 Voltage with 5 Amphere. The main use of the ac dimmer is used to for the ON/OFF function using the small current or voltage

Dimmer has mostly used for the home automation for on/off the applications. For example, if the application or the lightto be turned on, this will be help in smooth. The main advantage of the dimmer is it will work fine with also filament app. It's less steady with low-brightness dimmableLED lighting[Fig 1.5], but it'll do a good job with moderateand high-brightness LED lamps. Note that luminescentlamps (gas discharge lamps) do not support dimming.

To prevent excessive current disturbance to a microcontroller,the power element of the dimmer is separated from the control part. Because the logical level is 5V and 3.3V tolerant, it maybe linked to microcontrollers with 5V and 3.3V logic levels.

FIG 1.5 AC DIMMER

***LCD*:**

LCD screen is an electronic component which has the wide range of application with several categories As it is Show in fig 1.6 A 16x2 LCD is a very basic module where it can be attached to the any gadgets. These type of LCD modules will supported more than seven sections and other multi area LEDs. The main advantage of the LCDs are moderate and it is easily programmable;have necessity of bringing up and along the custom characters (in no way like in seven sections), activities, etc. The task for register is to follow the heading rules given to the particular LCD. An ask for is a course given to LCD to complete a predefined errand like appearing, clearing its screen, setting the cursor position, controlling presentation, and so on. The information register that are present in the LCD will stores the data to be showed up on the LCD display. The information is the ASCII estimation of the character to be showed up on the LCD. Snap to get settled with inside structure of a LCD.

FIG 1.6 LCD

TEMPERATURE SENSOR:

This is an electronic componenet which can measure the heat produced or even cold from the system.There are two type of temperature sensor contact and non contact sensors, Contact sensors are the sensors which are the system produced by the system to be contact with sensors but the non contact sensors are the sensors where it will detect heat produced in the aerial surface but the teperature used in this system are non contact sensors which is give in Fig 1.7.

These sensors contains metal element like tungsten or copper they are bonded together and so called as bi- mettalic stripa and this strip itself used as the switch as electrostaic control this

electrostatics matalic strip has anmetal like tungsten and copper will work as metalic stripthis will convert the heat into the resistant analog value and we can detect has analog values through the esp32 microcontroller.

FIG 1.7 TEMPERATURE SENSOR

7. SOFTWARE MODULE

ThingSpeak:

ThingSpeak is an IOT Cloud platform, whis used to move contents or data to the cloud and visualize your data. This MathWorks manages all the thingspeak service.This is free for small and lower end projects cloud based systems.It uses REST data api for getting datas from the sensor and hosting into the web. And also store into the cloud.

Cloud computing is the ondemand availability of computer system resources.Mainly the data storage.

FIG 1.8ThingSpeak

Ardiuno Software:

This is an Open Sourcee IDE Softwareused easliy write code and upload into the workinh board instantly. This work to any board and ESP32

This Software is hosted by GITHUB. And it is mainataind and updataes are given bygithub.

FIG 1.9 Ardiuno Software

8. SYSTEM ARCHITECTURE

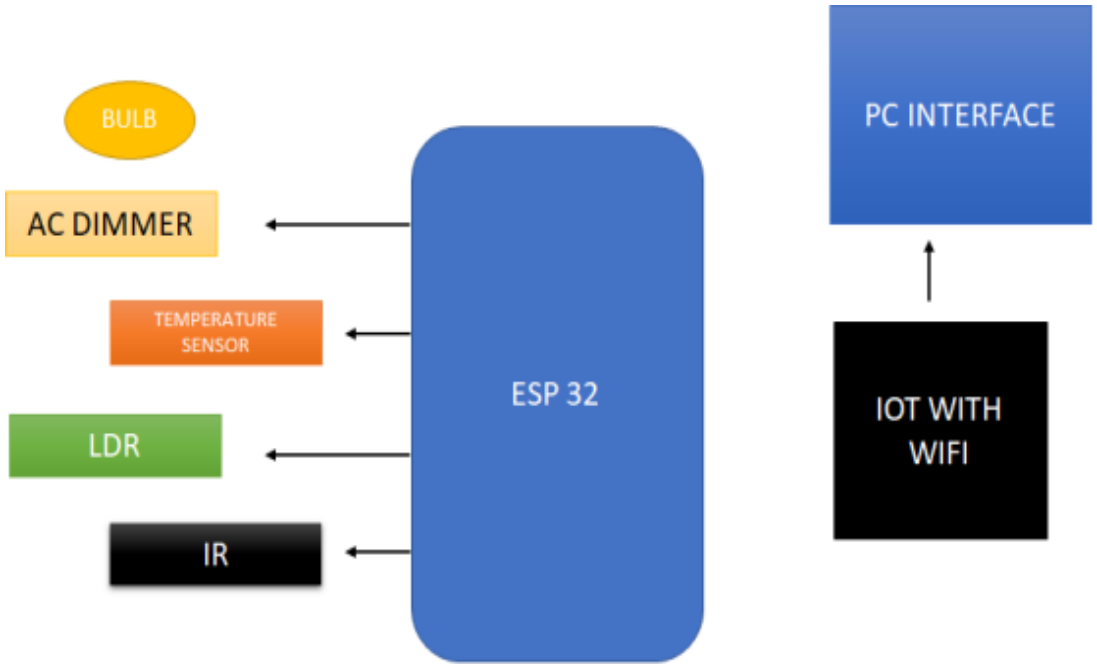

FIG 2. System Architecture

AC Dimmer: this component will be controlled through the PWM i.e., pulse width modulation according to that the output voltage will differ inrespect to the Input voltage.

Temperature sensor: this temperature sensor in this system will detect the temperature created

orthe cold created and present in the surrounding.

LDR: This light dependent resistor will measurethe luminous that getting into it. If there is moreluminous then it will have less resistance. Less luminous more resistance.

IR: this electric component will detect the obstacleThat are crossing that IR wave or it can be explained by, if an obstacle disturbs the IR wave created it will emit the Digital signal.

ESP32: this is the main brain of the system whichwill control every process and this will transfer tothingspeak through WIFI

1. WORKING

The system architecture of the intelligent street light system consists of IR sensors, Arduino unomicrocontroller, AC DIMMER, UART and WIFI Module. In a first step the IR Sensor will watch for the motion by emitting the IR waves.[4] If the waves where disturbed by an obstacle it will send a digital signal Output as 1 to the ESP 32 and Now ESP 32 will get Signal form LDR Usingthe ADC if the Lighting is very LOW then the ESP 32 willsend a PWM Signal to the AC Dimmer so that according to that the BULB will glow with Sufficient Brightness, Now the Real Time data is sent to the Thingspeak IOT Cloud and update the status given in Fig 2.3. Incase if the obstacle is not there are crossed out of the IR Range the Light will get Suddenly OFF. We can ON Continuously ifthe Traffic is more on a a particular area. If the Light is Very High the BULB brightness should be get reduced according to the light, through the PWM.

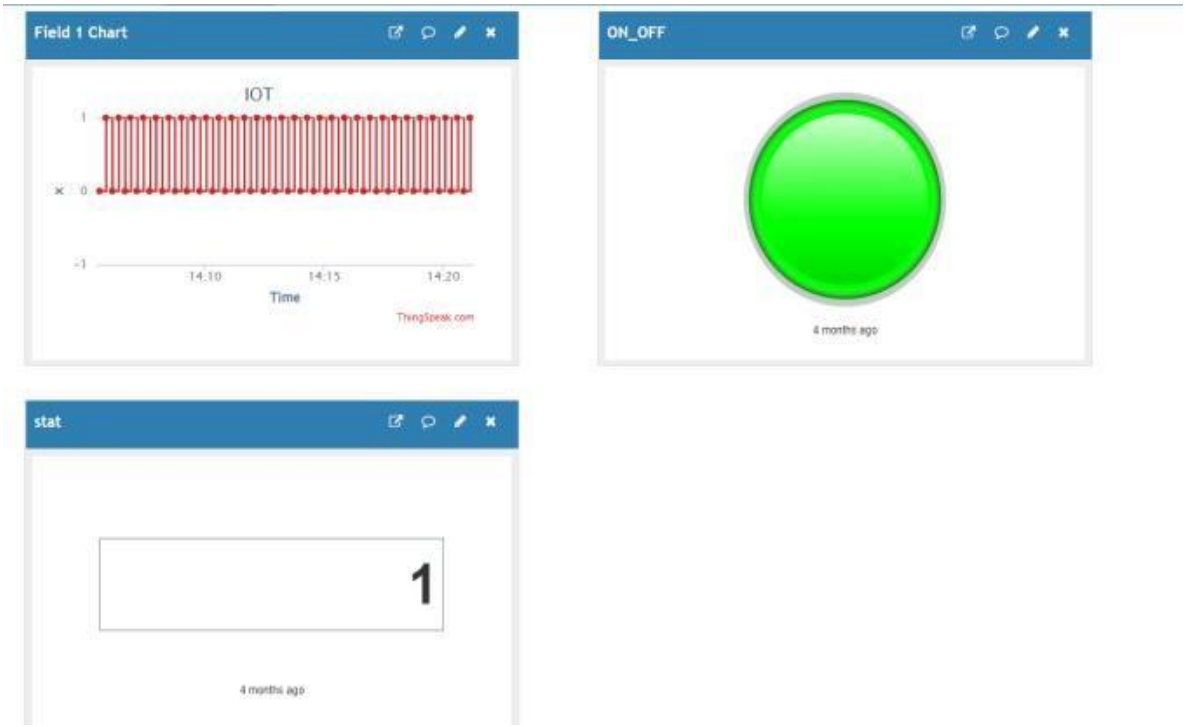

FIG 2.1 Working Model

2. RESULT

This Project shown an efficient output of the given system. Through WIFI the status of the lights of the are Processed ON time and it is Eco Friendly to Use and It is an Safest way of saving Energy Consumption and can be Monitored Anywhere from any place and the only need is Internet. It helps in resolving the problem that is faced by today i.e. thesaving of energy as it is Adaptive brightness. And works very efficient.

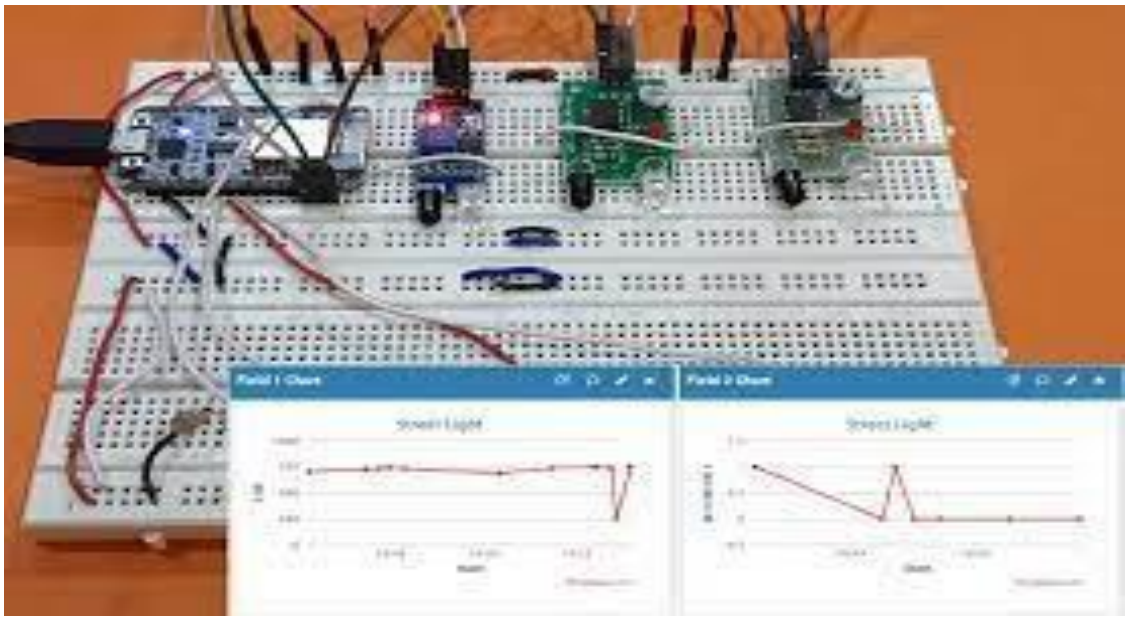

FIG 2.2 Demo kit

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