

Smart Light Using PIR Sensor

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Abstract: Conservation of energy is a vital topic within the current analysis. Lighting system places its very important role in homes, offices, industrial sectors, urban and rural areas. For extended potency and to cut back the power consumption, several ways are developed. They have already installed lighting of various methodology that are out-of-date and energy inefficient. For sensible lighting and to cut back the energy storage demand, light emitting diodes (LED) and hybrid installation will be used. Here, this paper offers a review on the obtainable smart lighting systems and it additionally offers the thought to develop low price, adaptable, simple to put in, wireless sensing element based on sensible lighting system that mechanically modifies the intensity of light for energy saving that satisfies the user.

Index Terms: Lighting system, light emitting diode(LED), Sensors, Arduino, Energy saving.

I. INTRODUCTION

Nowadays, energy consumption is large in residential and business areas. It's due to the inefficient usage of electrical loads like heating systems, lighting systems etc. Among these, the lighting system is one in all the biggest energy overwhelming units of any building & structure. It's thus crucial to use the good lighting system by automatically switch on/off or dim the lights when required without troubling the conventional operation of the working atmosphere. Nowadays, energy consumption is large in residential and business areas. It's due to the inefficient usage of electrical loads like heating systems, lighting systems etc. Among these, the lighting system is one in all the biggest energy overwhelming units of any building & structure. It's thus crucial to use the good and efficient lighting system by automatically switch on/off or dim the lights when required without troubling the conventional operation of the working atmosphere.

Different fields of lighting are business, residential, industrial and outside lighting. Each of the sector has its own desires and necessities of lighting using completely different sensors. Residential sector wants to low power therefore low price easy solution will be used by using ambient sensors. Industrial lighting in retailers and offices uses bit high power, so they will create use of passive infrared sensors or super sonic sensors to cover massive areas. Outside and Industrial sectors will create use of Pyroelectric Infrared(PIR), light and motion sensors so as to manage the light in a very safety and value effective manner.

II. LITERATURE REVIEW

Literature review is nothing but the study of the previously existing system and also collection of the information need to improve our task. It will help to understand recent approaches, methods and also theories regarding the topic. It provides new platform to develop our new ideas and concepts. There are several journal papers that have been published based on smart light which is the hot topic in the current research. Efforts are made to improve the approaches for the lighting system for better efficiency and low power consumption with hybrid approaches.

Soyoung Hwang et al.[1] proposed a remote monitoring and control system which is based on Zigbee network. Real time monitoring is implemented with JMF. It is multimedia extension API of Java.

Richu Sam Alex et al.[2] proposed a system which reduces the power consumption of the street light system about 30% compared to older design. This system is fully automated. It also uses Zigbee so that control station also analyzes all the performance of the system.

Daeho Kim et al.[3] worked on smart LED light system by using Infrared and Ultrasonic sensor. They proposed a model which continuously tracks human motion. Output based on human tracking data which is obtained by these sensors are responsible for determining the On-Off control of the LED light. Existing system fails in continuously monitoring the motion of object by using each sensor separately. For the same reason, the efficiency of existing system is low. By the hardware implementation they developed a model to improve the efficiency which helps in smart light. The proposed approach makes use of sensors in which PIR sensor sends the sensed data to the MCU board which in turn sends the same data to the LED control layer.

B. K. Subramanyam et al.[4] have developed a model which provides smart light system on street which is mainly solar based system. The people work late nights and also most of the criminal activities occur during nights. Under these circumstances, to provide security, controlling and also for monitoring of street light is developed together with GUI. Even the usage of solar panel is helpful for saving power and money. At the PC side, graphical user interface takes part in controlling the street lighting. For monitoring and controlling the lights on streets, Zigbee technology is used. More power and energy will be saved by using LDR

and IS sensors. Basically this proposed model works on the two operational modes. They are auto and manual modes. In auto mode On-Off of the lighting are done by using LDR which measures the intensity of light. Controlling is by use of relay.

Raja R et al,[5] worked on energy saving concepts. Smart sensor networks in DC electrical appliances like light, helps for monitoring of energy usage. Conventional lamp are powered by AC grid but for LED DC supply is sufficient to provide power. Dimming of light can also be achieved by using appropriate protocol helps in energy and power saving. Replacing the conventional lamp by LED makes 44% energy saving.

Michele Mango et al.[6] proposed low cost, wireless, adaptable sensor based smart lighting system which makes use of PIR sensor and motion sensor. It is helpful for controlling the light intensities and power consumption using LED lighting. Dimming of light will be achieved using PIR sensor only in presence of obstacles around it. Main advantage of this system is energy and power conservation.

III. EXISTING SYSTEM

This section will describe about the most common used lighting control system used in buildings. Since this method is going to use wireless sensor it is mandatory to know the operation of existing light control system. It shall be decided that energy loss is occurred with a lighting system when the lighting system illuminate a light which is an area which is not being used currently on that particular time or when it illuminate a light even though sufficient lighting is available for work. The most commonly used lighting system is detailed below.

In this method user has to switch ON and OFF the required lights in the room . Since the user can switch on and off the lights as per their preferences there is a chance of keeping the light in on state even though it was not need during on that time. This may occur due to carelessness of user and large amount of power is wasted.

IV. PROPOSED SYSTEM

The system basically consists of LDR, power supply, relay and ArduinoPro Mini. The pictorial representation of system is given below:

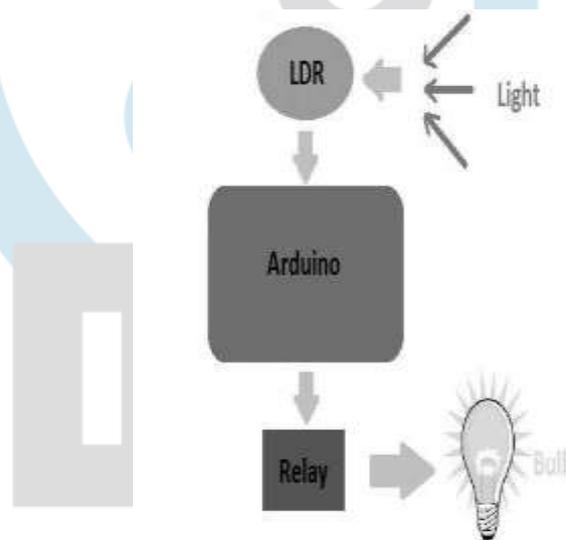


Figure 1. Pictorial representation of system

The LDR senses the lighting and sends the data to Arduino. The Arduino analyze the data and gives its response to the LEDs through the relay mechanism. The ArduinoPro Mini is programmed in such a way that automatically adjusts the lights to give most accurate result possible.

V. MODULES

PIR Sensor

PIR sensor enable you to sense motion occurred, nearly always used to find whether an individual's has enraptured in or out of sensors range. They are little, cheap, low power, simple to use and do not wear out. For that reason they are usually found in appliances and gadgets utilized in homes or industries. They are usually noted as PIR, " PassiveInfrared ", "Pyro electric", or " IRmotion " sensors. PIRs are mainly made using a pyroelectric sensing element (which will|you will|you will be able to} see below because t spherical metal can with a rectangular crystal within the center), which might detects level of infrared radiation. Everything emit some low level radiations, and also the hotter something is in the range, the additional radiation will be emitted. The sensing element in motion detector is really split in into two halves inside the system. The reason for that

is that we are looking to find motion (changes) not average IR levels. the two halves will be wired up so they can cancel one another out. If one half see more or less IR radiations than the opposite , the output may swing high or low.



Figure.2.PIR Sensor

Arduino Pro Mini

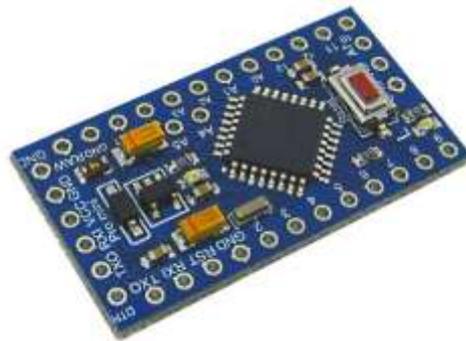


Figure.3 Arduino Pro Mini

The Arduino pro mini could be a micro controller board supported by ATmega328 . It has fourteen digital input/output pin (out of that six will be used as PWM output), six analog input, an onboard resonator, push button, and holes for mounting the pin headers. A six pin header are connected to an FTDI cable or Sparkfun breakout board to supply USB power and communication transferred to the board. The Arduino pro mini is meant for semi-permanent installation in object or exhibition. The board comes without pre mounted headers, permitting the use of various forms of connectors or direct soldering of wire. The pin layout is compatible with the Arduino mini. There are 2 version of the pro mini. One runs at 3V and eight megahertz, the other at 5V and sixteen megahertz . The Arduino promini was designed and is factory made by Sparkgun natural philosophy.

Relay

A relay is electrically operated switching of main voltages. It means it will be turned on or off allowing the current to undergo or not . Controlling relay with the Arduino is as easy as controlling the output like an LEDs. 5V Active relay module is used in this system .It can control many appliances with large current flow.



Figure 4 Relay

LEDs

Light emitting diode (LED) is a PN junction diode , which emit light when it is activated. When we apply voltage across its leads ,then electrons are able to recombine with holes inside the LED, releasing energy in the form of photon which gives the lighting . Hence it is two-lead semi-conductor lighting source. Light emitting diodes represent our light system and the amount of lighting emitted by it is directly related to the amount of lighting in the environment that is when outside light is less than the light given by LED is high and vice versa.

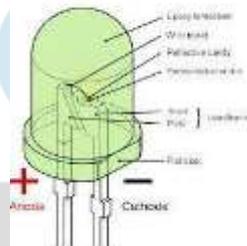
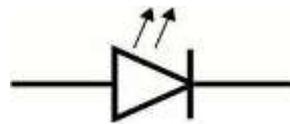


Figure.5 .LED

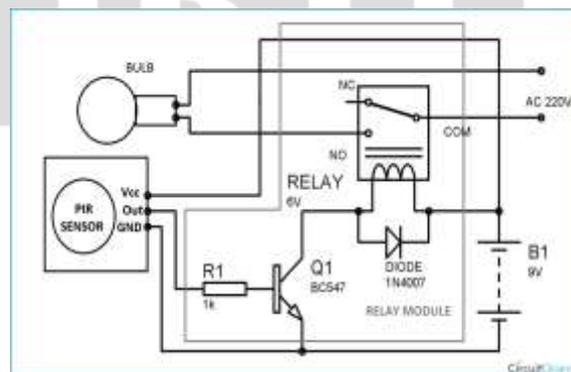


Figure.6..Circuit Diagram

VI. FUTURE SCOPE

In this system we are taking decision based on Human presence but we can also interface LDR (Light Dependent Resistor) Sensor and Temperature sensor for better working of the system for energy saving. This system can be also interfaced with the Bluetooth module so that, we can control the whole system from the mobile phone itself. Applications of our device are mentioned below

1. It can be used in colleges , schools and Businesses (Turn of lights and fans when no one is there)
2. It can also be used for home security purpose that we can fit at the main door of the house.

VII. CONCLUSION

It is not easy task to design this system using PIR sensors where PIR is generally used for the motion detection. We have done coding in such a way that little movement of the human body is detected by the sensor. We have made some time delay and adjusted the sampling period for the sensor output for the precise detection for this system.

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