IJRSET JUNE 2017 Volume 4, Issue 6 Pages: 19-22

ISSN 2394-739X

International Journal for Research in Science Engineering and Technology

SMART LIGHTINING SYSTEM AND ENERGY CONSERVATION

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ABSTRACT: Energy is major input sector for economic development of any country. In this paper, it is proposed to develop a Smart Energy Conservation System that will help various organizations to play an effective role in saving electrical energy. The major area which consumes maximum amount of electricity is observed to be the educational institutions. They are used nearly 70% of the time by students and faculties. A simple action of switching OFF the electric consumables when not in use will save lot of energy. In order to conserve energy, automated lighting system using microcontroller that monitors the electrical lighting and the running of the fans and air conditioners in halls is proposed and power stage monitors electrical lighting in street lights is pro posed.

Keywords: [Electrical Consumables, Energy Conservation, Automated Lighting, Smart System.]

1. INTRODUCTION

To deliver a sustained economic growth rate of 8% to 9% through 2031-32 and to meet life time energy needs of all citizens, India needs to increase its primary energy supply by 3 to 4 times and electricity generation capacity about 6 times. As a result energy service demand growth rates will keep on increasing because of accelerated industrialization, urbanization, and an emerging consumer society. The cost of generating electricity will only go up to keep up with the costs of inflation. In such a scenario, it is very clear that consumers will be paying more prices per unit of electricity consumed, in the years to come. The simplest technique to save power and consequently the costs is when we switch off the lights and fans as soon as we leave the room. However, this is not a second nature to many of us. The idea is to automate, by creating a device that monitors "changes" in the environment and respond to the situation. By switching off lights and fans in a timely manner, we stand to save costs on electricity bill by at least 30% to 40% even by conservative estimates .Wastage of electricity is one of the main problems which we are facing nowadays. In our home, school, colleges or industry we seen that fan/lights are kept on even if there are nobody in the room or area/passage. This happens due to negligence or because we forgot to turn lights

off or when we are in hurry. This project shows how the automatic room light controller keeps track of how many people entered or exit the room

2. AUTOMATIC ROOM LIGHT CONTROLLER WITH VISITOR COUNTER

This project has two modules, first one is known as “digital visitor counter” and second module is known as “automatic room light ccontoller”. Main concept behind this project is known as “visitor counter” which measures the number of persons entering in any room like seminar hall, conference room, class room. This function is implemented using a pair of infra-red sensors. LCD display placed outside the room displays the value of person count. This person count will be incremented if somebody enters inside the room and at that time the lights are turned on. And in reverse way, person count will be decremented if somebody leaves the room. When the number of persons inside the room is zero, lights inside the room are turned off using a relay interface. In this way relay does the operation of “automatic room light controller”. Since this project uses two infra-red sensors, it can be used as Bi-directional person counter as well

3. IMPLEMENTATION IN A MARRIAGE HALL

There are two transmitters and receivers placed in front of each other. Swap any object (like mobile) or your fingers (not single finger) in front of those sensors. Then microcontroller will increment or decrement the counter. Once the counter is non-zero, the room light is turnerd on using relay. Now swap object in reverse direction to decrement the count. And room light is turned off once the count becomes zero. This System needs no manual operation for switching ON / OFF when a person enters or exits from a room. The PIR Sensors with the IR transmitter and receiver are placed at the entrance of the room doors in such a way that the sensor senses a person entering / exiting the room. This can also be done by using a laser. A Microcontroller is a circuit which helps in controlling the lights and fans in a room and keeps track of number of persons / visitors entered or exit from the room. When a person enters into the room then the counter is incremented by one and the lights in the room will be switched ON and when a person leaves the room then the counter is decremented by one. The lights will only be switched OFF until all the persons in the room go out and the room is unoccupied. A display also shows the total number of persons inside the room. But the limitation is that the room doors should not be wide enough as two or more people should not be allowed to enter at the same time. overview of the system The objective of conserving energy using vacancy Sensor allows direct replacement of standard wall switches. Using passive infrared technology (PIR), these sensors combine occupancy detection and voltage switching in a single package. These units automatically turn off lights after a room or an area is vacant for 5 - 10 minutes. The ceiling mount sensors also use passive infrared technology which detects vacancy and turn OFF lights automatically. These sensors are mounted to the ceiling. They have a 180 degree and a 360 degree field of view and can cover up to 1000 square feet of area. But sensor technology also comes withdrawbacks. For instance, sensors are more expensive and are likely to break. Moreover, sensors can sense objects /people to a limited range i.e. one sensor might not cover a full room and also it requires lot of additional wiring in case of wired sensors. We also depict a new system of energy saving and control of street lights. This application is built onhandling the streetlights more economically and can be operated without any difficulty. Instead of using the usual ON/ OFF system, a default light intensity level of 50% is maintained for the lamps by using a digitally controlled power regulator circuit. Traffic is sensed at each pole and a signal is sent to the master control station, which in turn sends command signal to the local pole circuit and the light intensity level is raised to 100% only in the section of the road where traffic is sensed. Thus, a considerable amount of energy is saved, without compromising the lighting requirement and can be maintained with ease. The system is based on the Zigbee networking technology. This systemagain

uses a sensor which is placed near each streetlight. The hardware of the sensor allows it to detect the trafficintensity level and thereby direct the information to the Zigbee end device which is again unique for every lamp pole.The proposed controller gives fast, reliable, and power efficient street lamp switching based on seasonal variations.

The simulated results are also verified experimentally by using a Light Dependent Resistor (LDR) which senses the light. LDR is used as the replacement for the seasonal variation. This paper confirms that theproposed PLC based street lighting control system has great potential to revolutionize street lighting which in turn saves large amount of power.

P proposed System

Automated lighting system using microcontroller is a flexible system which reduces electricity bills and carbon emissions. The conserved energy can be generated in the electrical grid and this energy can be used by another individual for a different purpose. The microcontroller is interfaced with a power stage, since the current driven by the controller will only be in 20mA, we need a Darlington transistor and a relay to amplify the current produced by controller in order to drive the lights and fans in a hall.

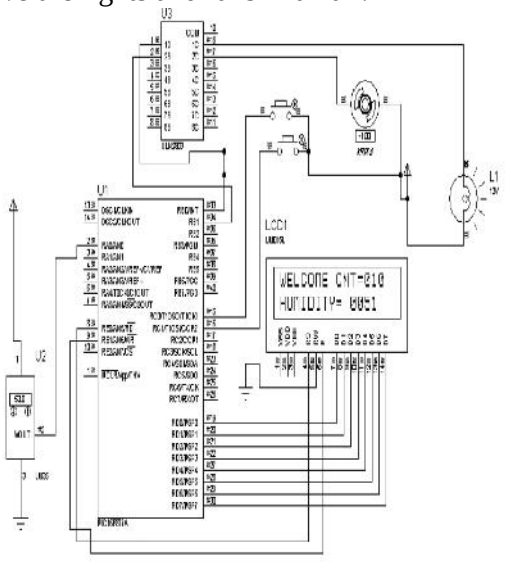

Figure. 1 circuit diagram of proposed system

In this system the humidity sensor is designed in such a way that only when the humidity is greater than or equal to the normal temperature and also the number of persons entering the room should be greater than or equal to 10 then the corresponding light and fan will be switched on.

Advantages of the Proposed System

Main advantage of this project is that it helps in energy conservation. Because when there is nobody inside the room the lights are automatically turned off. Human efforts to count the number of persons is eliminated. Since this project does the automatic person counting with the help of two two sensors installed on door frame.

Hardware Description 5V Power Supply

In most of our electronic products or projects we need a power supply for converting mains AC voltage to a regulated DC voltage. .Here 5V power supply is being used

PIC Microcontroller

PIC is a family of Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1640. Originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "Programmable Interface Controller". PICs are popular with both industrial developers and hobbyists alike due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming (and re-programming with flash memory) capability.

4. HUMIDITY SENSOR

Humidity is the amount of water vapor in the air. A humidity sensor senses relative humidity. This means that it measures both air temperature and moisture. Relative humidity, expressed as a percent, is the ratio of actual moisture in the air to the highest amount of moisture air at that temperature can hold. The warmer the air is, the more moisture it can hold, so relative humidity changes with fluctuations in temperature.

5. MIR SENSOR

Infrared imaging is used extensively for military and civilian purposes. Military applications include target acquisition, surveillance, night vision, homing and

tracking. Non-military uses include thermal efficiency analysis, remote temperature sensing, short-ranged wireless communication, spectroscopy, and weather forecasting. Infrared astronomy uses sensor-equipped telescopes to penetrate dusty regions of space, such as molecular clouds; detect cool objects such as planets, and to view highly red-shifted objects from the early days of the universe.

A. LDR

Light dependent resistors or LDRs are often used in circuits where it is necessary to detect the presence or the level of light. They can be described by a variety of names from light dependent resistor, LDR, photo resistor,or even photo cell (photocell) or photoconductor.

Although other devices such as photodiodes or photo-transistor can also be used, LDRs are a particularly convenient electronics component to use. They provide large change in resistance for changes in light level.In view of their low cost, ease of manufacture, and ease of use LDRs have been used in a variety of different applications. At one time LDRs were used in photographic light meters, and even now they are still used in a variety of applications where it is necessary to detect light levels

6. FUTURE WORK

Today the energy meter which is placed in our home/office collects the data of the energy consumed and displays it on either a number dial or digital display. At the end of every billing cycle the person from service provider has to visit the place where the meter is placed to get the reading and either note it down or takes an image of energy meter for further data processing (i.e. for generating the bill). The proposed system automatically reads the energy meter data and sends it to the service provider on reception of a specific message from service provider. It uses a GSM modem for this purpose. The system can also provide the facility to disconnect the supply of a customer in case of any payment related issue.

CONCLUSION

The automatic lighting system turns OFF lights in the room when unoccupied. The average electric units consumed inthe classroom before installing the system has been recorded with 2.7 units per day for 8 days and the average electricunits consumed in the classroom after installing the system has been recorded with 1.5 units per day for 8 days. The main objective was to conserve energy and hence this has been achieved by saving 1.2 electric units for one classroom. The classroom was consuming 64% of electricity before deploying the system and after the deployment of the system we found that the consumption was reduced to 36%. It can be inferred from this that 50% of energy is conserved.

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