

Automatic Room lights Control by Using Arduino and IR

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Abstract

It can be used to turn ON and OFF the lighting system of home automatically by detecting the presence of human. This system can be used in garages, classrooms, staircases, bathrooms, etc. where there is no need of continuous light but only when there is a human. Also, there is no need to worry about electricity bills as the lights get OFF when there is no human and hence one need to pay the bills as per use. The main components used in this system are Arduino Uno, PIR and Relay Module. Out of these components, the operation of system mainly depends on PIR sensor which helps in detecting human presence.

Keywords-Arduino Uno, PIR sensor, Relay, Room light

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1. Introduction

With the rapid development of technology, automation system is developing quickly. It provides occupants the comfort, conveniences, increase the level of life, security all the time. Each device can be linked and controlled remotely by protected channel from outside or within the system. As the need of automation system increases day by day, many industrialist and researchers are working to develop most efficient automatic system to operate and control different machine based on the requirement. With the help of automation the use of electricity become more economical. This paper introduces automation system employed for computer lab of Electrical Engineering Department. The purpose of proposed system is energy saving. A computer lab is a lab whose energy consumption depends on human presence. The main aim of proposed system is that the light and fans of the lab should remain ON in the human presence otherwise should remain OFF. This system is designed using various devices like PIR sensor, Arduino, relay, DC power supply and various electronic component like transistor ,diode etc. The proposed system avoid unnecessary energy consumption and helps in energy saving.

2. Literature Review

There are several journal papers that have been published based on the smart lighting which is the hot topic in the current research. Efforts are made to improve the current approaches for the lighting system for better efficiency and low power consumption with hybrid approach. Richu Sam Alex et al. proposed a system which reduces the power consumption of the street lighting system about 30% compared to conventional design. This system is fully automated. It also uses arduino so that control station can also analyze all the performances of the system.[1]

Daeho Kim et al. worked on smart LED lighting system by using Infrared and Ultrasonic sensors together. Here they proposed a model which continuously tracks the human motion. Output based on the human tracking data which is obtained by these sensors are responsible for determining the On-Off control of the LED lighting. Previously existing system fails in continuously monitoring the motion of an object by using each sensors separately. For the same reason, the efficiency of the existing system is low. By the hardware implementation they developed a model to improve the efficiency which helps in smart lighting. The proposed approach make use of sensors in which IR sensor sends the sensed data to the MCU board which in turn sends the same data to the LED control layer. Depending on the results of the sensed data LED control layer turns on the lighting system. Human presence is detected by IR sensor and continuous tracking is possible by the Ultrasonic (US) sensor. As before the sensed values are sent to the MCU board by US sensor which controls the On-Off of the lighting. US-IR positioning based system has to be studied in future [2]

Raja R et al, worked on the energy saving concepts. Here, smart sensor networks in DC electrical appliances like lighting, helps for monitoring of energy usage. Conventional lamps are powered by AC grid but for LED DC supply is sufficient. Dimming of light can also beachieved by using appropriate protocol helps in energy saving. Replacing the traditional lamp by LED makes 44% energy saving.[3]

Michele Mango et al. proposed a low cost, wireless, adaptable sensor based smart lighting system which makes use of PIR sensors and motion sensors. It is helpful for controlling the light intensity and power consumption using LED light. Dimming of light is achieved using PIR sensor only in presence of obstacles around. Main advantage of this system is energy conservation.[4]

3. OBJECTIVE.

The main aim is to prevent wastage of unwanted electric power in schools, colleges, houses and other working places. This whole process is operated totally automatically by using its sensors. In college time we have seen that the student enter computer lab and do their work and at same time light and fan are ON but many time at the time of leaving computer lab student fails to turn OFF the light and fan due to this lot of energy is wasted.

4. METHODOLOGY AND PROPOSED SYSTEM.

The Automatic Room Lights using Arduino and PIR Sensor is a simple project, where the lights in the room will automatically turn on upon detecting a human motion and stay turned on until the person has left or there is no motion. Working of this project is very simple and is explained here. Initially, when there is no human movement, the PIR Sensor doesn't detect any person and its OUT pin stays LOW. As the person enters the room, the change in infrared radiation in the room is detected by the PIR Sensor. As a result, the output of the PIR Sensor becomes HIGH. Since the Data OUT of the PIR Sensor is connected to Digital Pin 8 of Arduino,

whenever it becomes HIGH, Arduino will activate the relay by making the relay pin LOW (as the relay module is an active LOW module). This will turn the Light ON. The light stays turned ON as long as there is movement in front of the sensor. If the person takes a nap or leaves the room, the IR Radiation will become stable (there will be no change) and hence, the Data OUT of the PIR Sensor will become LOW. This in turn will make the Arduino to turn OFF the relay (make the relay pin HIGH) and the room light will be turned OFF.

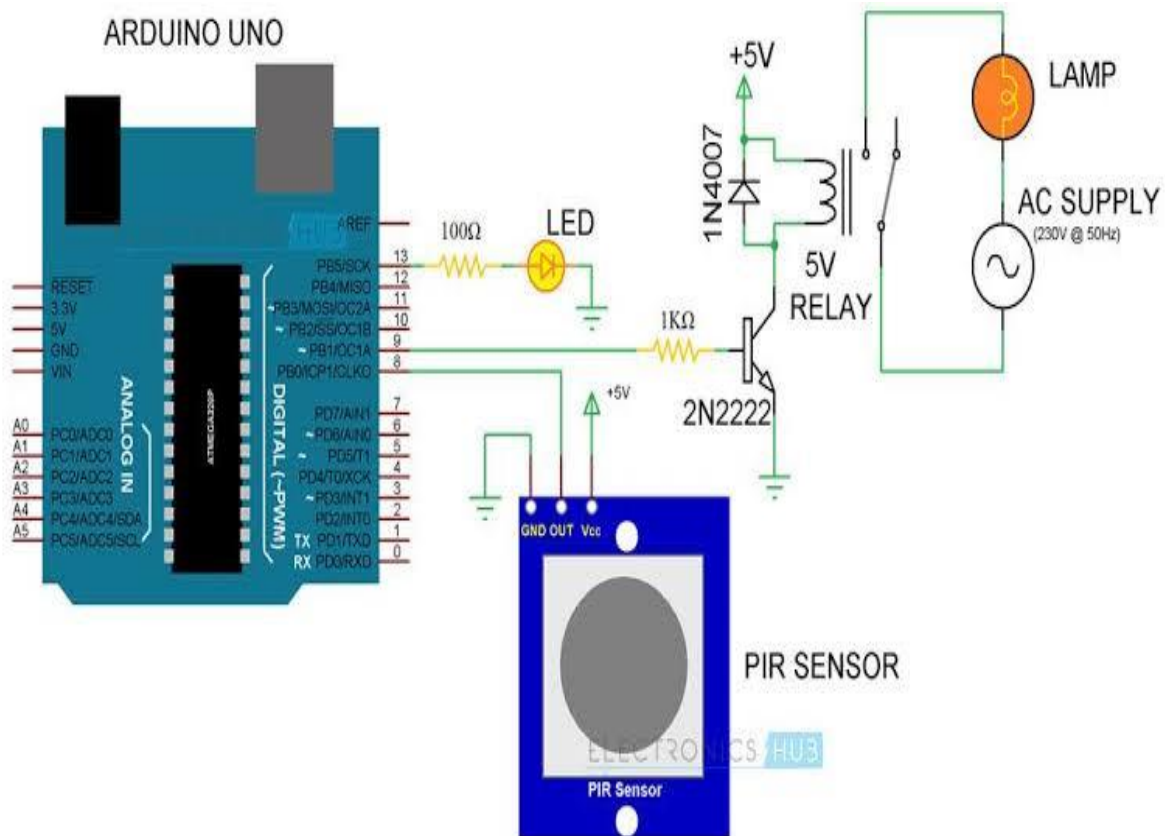
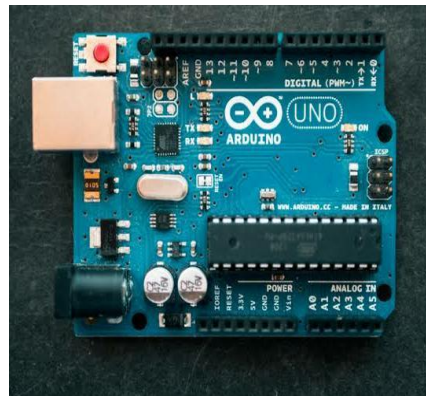


Fig. 3.1 Block Diagram

5. Components Description

5.1 Arduino Uno

We have a tendency to be victimization Arduino Uno as a controller that controls all the operations. The Arduino Uno that could be a microcontroller board supported the ATmega328 .as we all know "Uno" suggests that one in Italian thus named to mark the coming unleash of Arduino one.0. It's in turn fourteen digital input/output pins, six analog inputs, A16 M.C. ceramic resonator, A USB affiliation, an influence jack, associate degree ICSP header and a push button.



5.2 PIR Sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. They work entirely by detecting infrared radiation (radiant heat) emitted by or reflected from objects.

5.3 Relay Module

It works on the principle of an electromagnetic attraction. When the circuit of the relay senses the fault current, it energizes the electromagnetic field which produces the temporary magnetic field. The current flows through the coil produces the magnetic field around it.



6. RESULTS

The lights in the room will automatically turn ON detecting a human motion and stay turned ON until the person has left or there is no motion. Initially, when there is no human movement, the PIR Sensor doesn't detect any person and its OUT pin stays LOW. As the person enters the room, the change in infrared radiation in the room is detected by the PIR Sensor. This will turn the Light ON. The light stays turned ON as long as there is movement in front of the sensor. PIR sensor detects a human being moving around within approximately range is between 5m and 12m.

CONCLUSIONS

This project gives us an idea to detect the motion. This project can be used anywhere either at home or offices. It is very much cost efficient and can be used easily and efficiently. This system is designed using various devices like PIR sensor, Arduino, relay, DC power supply and various electronic component like transistor, diode etc. The proposed system avoid unnecessary energy consumption and helps in energy saving.

REFERENCES

- [1] Richu Sam Alex, R Narciss Starbell "Energy efficient Intelligent Street Lighting System using Sensors", International Journal of Engineering and Advanced Technology (IJEAT), Vol-3, Issue 4, April 2014
- [2] Daeho Kim, Junghoon Lee, Yeongmin Jang and Jaesang Cha. "Smart LED lighting system implementation using Human tracking US/IR sensor" 2011 IEEE (ICTC 2011).
- [3] Raja R, Dr. K. Udhaya kumar "Development in Smart Sensor Network for Energy Saving" International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 3, Special Issue 2, April 2014.
- [4] Michale Mango, Tommaso Poloneli, Luca Benini "A Low Cost, Highly Scalable Wireless Sensor Network Solution to Achieve Smart LED Light Control for Green Buildings" IEEE Sensors Journal, vol. 15, no. 5, May 2015.
- [5] B. Iyer, N. P. Pathak and D. Ghosh, "Dual-Input Dual-Output RF Sensor for Indoor Human Occupancy and Position Monitoring," in IEEE Sensors Journal, vol. 15, no. 7, pp. 3959-3966, July 2015, doi: 10.1109/JSEN.2015.2404437.
- [6] Iyer, B., Patil, N. IoT enabled tracking and monitoring sensor for military applications. Int J Syst Assur Eng Manag 9, 1294–1301 (2018). <https://doi.org/10.1007/s13198-018-0727-8>
- [7] Iyer, B., Pathak, N.P. & Ghosh, D. RF sensor for smart home application. Int J Syst Assur Eng Manag 9, 52–57 (2018). <https://doi.org/10.1007/s13198-016-0468-5>
- [8] "The electromechanical relay of Joseph Henry". GeorgiDalakov.
- [9] "How Infrared motion detector components work". Noncommercial research page. Glolab Corporation



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