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Automatic Room Light Controller Using PIR Sensor and Arduino

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Abstract: ***The mainstay of the project "Automatic room light controller using PIR Sensor and Ardiuno" is the importance of seismological research around the globe is very clear. 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. 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. It can be used to turn ON and OFF the lighting system of the home automatically by detecting the presence of humans. 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 quickly as per the time delays sets in the program.***
Keywords: Aurdino UNO, PIR sensor, Relay unit, room light.

I. INTRODUCTION

Scientific discoveries delivered us luxury and comforts. Technology has become vital and essential part of our lives. Tremendous advancement in technology is succeeded in last few years. Electrical energy has become an crucial part of human life. In recent years the people are looking forward for the automation in their day to day life, and even now the people are excited to save energy consumed to reduce the expenditures.

People are becoming lazy to switch off the lights while leaving the room, so the large amount of energy is wasted if the light is remain ON in the absence of human being. Generally, in public and private sector companies, offices, school and colleges most of the people are not interested to switch OFF the electronic machines like fan, light, etc.

II. OBJECTIVE

Automatic Room Lights System using Arduino is a very useful project as you need not worry about turning on and off the switches every time you want to turn on the lights. The main components of the Automatic Room Lights project are Arduino, PIR Sensor and the Relay Module. Out of the three components, the PIR Sensor is the one in focus as it is the main device that helps in detecting humans and human motion. In fact, the Automatic Room Lights project can be considered as one major application of the PIR Sensor.

III. LITERATURE SURVEY

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.

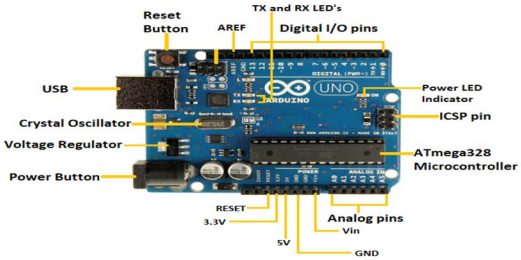
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IV. MODULES

A. Arduino UNO Pin Description

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various development boards (shields) and other circuits. The board has 14 digital I/0 pins (six capable of PWM output), 6 analog I/0 pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable.



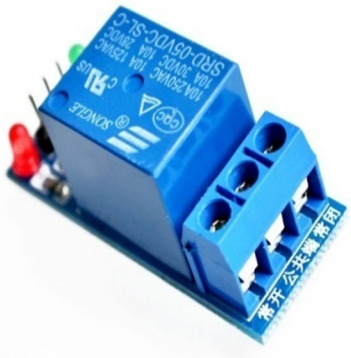
B. PIR Sensor

PIR Sensor is short for passive infrared sensor, which applies for projects that essential to identify human or particle movement in a certain range, and it can also be mentioned as PIR (motion) sensor, or IR sensor. Since its powerful function and low-cost benefits, it has been implemented in tons of projects and widely accepted by the open-source hardware community for projects related to Arduino and raspberry pi. All this can support the beginners to learn about PIR sensor more easily.



C. Relay Module

The Relay module is a distinct hardware device used for remote switching. The Relay module houses two SPDT relays and one wide voltage range, optically isolated input. These are brought out to screw-type terminal blocks for easy field wiring. Relays are switches that open and close circuits electro mechanically or electronically.

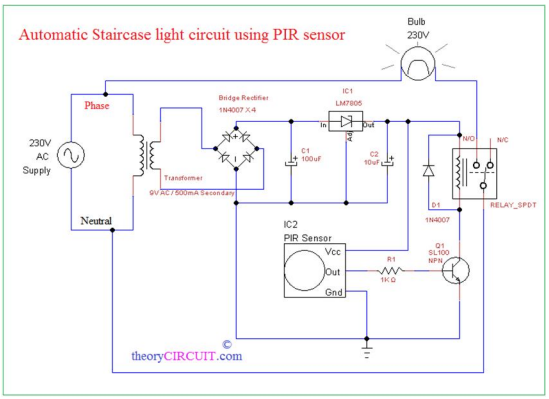


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V. METHODOLOGY OF PROPOSED SYSTEM

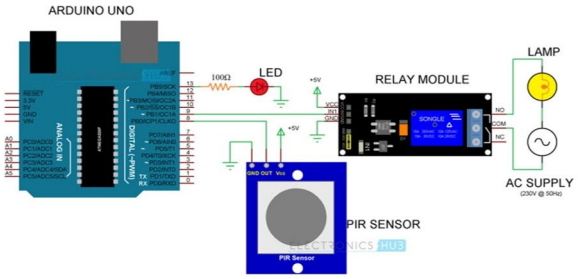
For the proposed system of automatic room light controller for power saving. In the proposed the intensity of light is depending upon the number of persons present in the room The proposed system design is divided into 3 parts, Arduino consisting microcontroller circuit for controlling the entire system, PIR sensor which detect the presence of human and the Relay module for automatic switching.

Block Diagram



VI. WORKING OF THE SYSTEM

Functioning of this project is very simple and is explained here. Initially, when there is no human movement, the PIR Sensor doesn't detect any individual and it's OUT pin stays LOW. As the individual enters the room, the change in infrared radiation in the room is identified 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 develops HIGH, Arduino will trigger 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.



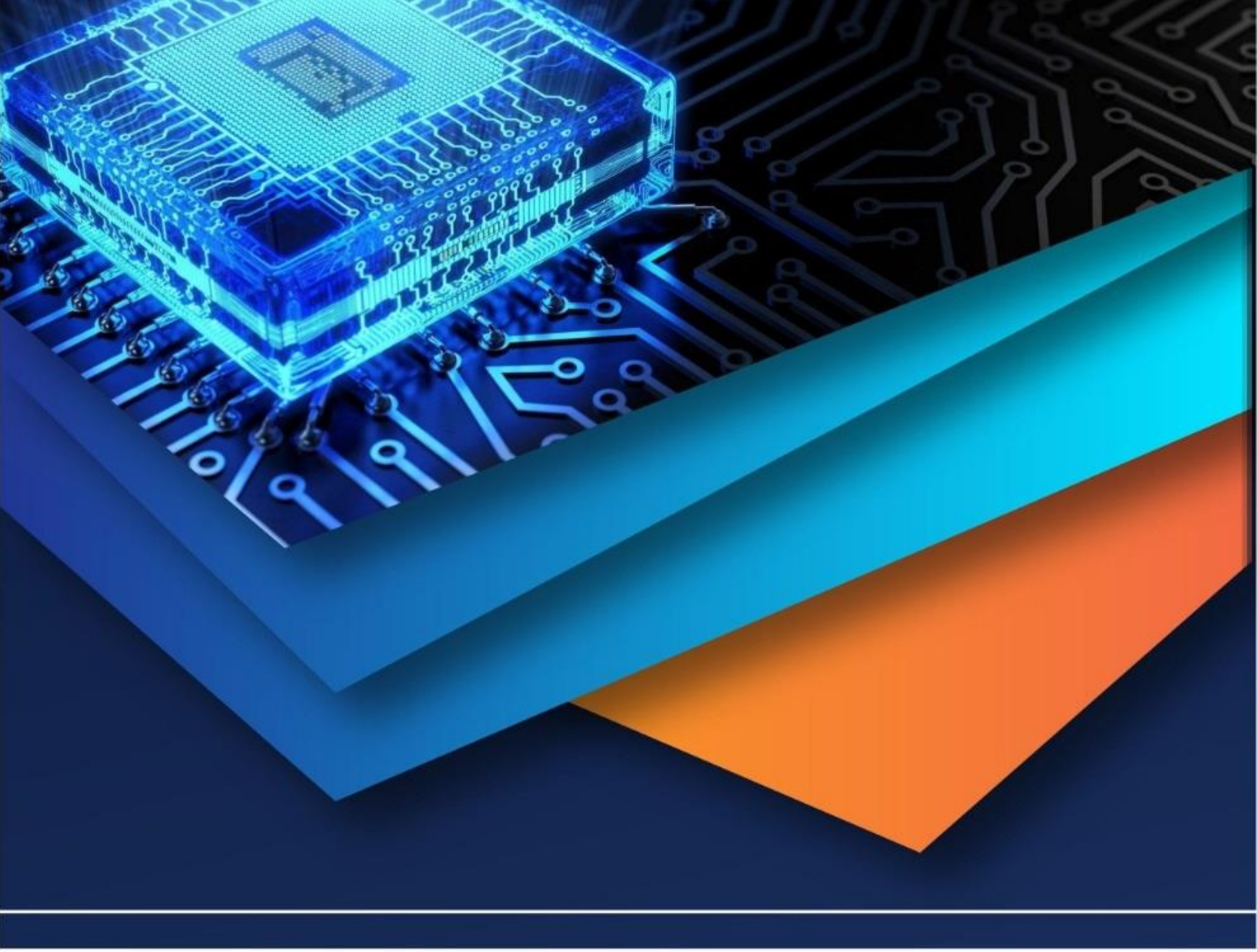
VII. CONCLUSION

From the proposed system we can conclude that an approach is taken to control the room lights using various devices. As nowadays enormous amount of energy is wasted in daily life. With the help of this system the energy wastage can be preserved and can be contribute to large amount of power saving. The total effective cost of system is very less.

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