

# Automatic Light Turn On/Off System

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## ABSTRACT

This project focus on a real time situation where we are wasting the electricity. Because of our carelessness the usage of current is increasing day by day. We are living in an era where so many peoples do not getting electricity properly. Electrical power is now the backbone of modern industrial society. Electricity is at the heart of many modern technologies, being used for electric power where electric current is used to energize equipment, electronics which deals with electrical circuits that involve active electrical components such as vacuum tubes, transistors, diodes and integrated circuits and associated passive interconnection technologies. In order to avoid the lack of electricity due to our carelessness we are implementing the new system that is known as AUTOMATIC TURN ON/OFF SYSTEM. In this project, we are detecting the motion of a person or anything and turn off the electronic equipment's if there is no person. By this we can save the electricity.

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**Keywords:** *iot, PIR sensor, sensor fusion, arduino*

## I. INTRODUCTION

Electricity is all around us, powering technology like our cell phones, computers, lights, soldering irons, and air conditioners. It's tough to escape it in our modern world. Even when you try to escape electricity, it's still at work throughout nature, from the lightning in a thunderstorm to the synapses inside our body. But what exactly is electricity? This is a very complicated question, and as you dig deeper and ask more questions, there really is not a definitive answer, only

abstract representations of how electricity interacts with our surroundings. As we know the usage of electricity is increasing day by day. In order to avoid the wastage of electricity due to our carelessness, we are implementing this idea. In today's world many people find difficult in meeting electrical purposes due to the lack of facilities for providing electricity and the misusing of electricity. Many people often misuse the electricity by, putting on the electrical gadgets in an ON mode even though they are not using it. Thus a large part of this electricity is being wasted. In order to avoid this we introduced a new system named ALT SYSTEM, which enables automatic ON and OFF facility. In this system, there is a PIR SENSOR which senses the infrared rays produced by the human body. The arduino uno is a micro controller the best suit for small projects. It is a n open source module. The codes are free in there website.

## II. Motivation of the project

In the modern world we are wasting lots of electricity in our daily life. To resolve this problem we identified a solution.

This are the main points for motivation of our project

1. Loss of electricity
2. Cost of electricity

Technology has advanced. So why can't we make a device to resolve these problems. So we take a research and done a prototype and find that the above problem can be resolved by help of technologies.

## III. Methodology

Through literature reviews we have formulated some of the existing methodologies and designed our system based on the difficulties faced by the existing authors.

### A. Existing Methodology

As the time paces, home automation is syncing in daily lives of people. It has offered the leisure of mechanization of home processes like lighting, air conditioning, access control and other home processes efficient. The concept is to grant centralized control through connected or integrated devices like desktops, laptops, tablets or mobile phones. Moreover, connected homes have made it possible to cut down on power consumption by different appliances.

In[3] the uses Zigbee [4] technology, it tells that the controlling the light using the sensor as well as visitor counter. When a person enters into the room, an IR beam is obstructed between the IR transmitter and the receiver. This IR obstruction from the sensor gives the corresponding signal to the microcontroller. The microcontroller is programmed in such a way that by the reception of the signal from the sensor it turns on the fans and lights inside the room. Thus, the microcontroller gives command signals to a relay driver which turns the relays such that all these appliances turn on. But the uses extra modules like IR transmitter and receiver. So extra cost and effort is needed. But in our product we use only PIR[2] sensor it is less cost and easy to use. our product is more efficient.

## B. Proposed System

To overcome the drawbacks of the existing system, the proposed system has been evolved. This project aims to provide an efficient way of using the electricity. In this system the PIR sensor senses the infrared rays of the human body and does the required operations and on/off the gadgets when required. When we switch on the device it will automatically calibrate the values. This system helps in saving the electricity.

The main advantage is that it need less amount of current and space. It is portable and efficient. Only required things are used in this device.

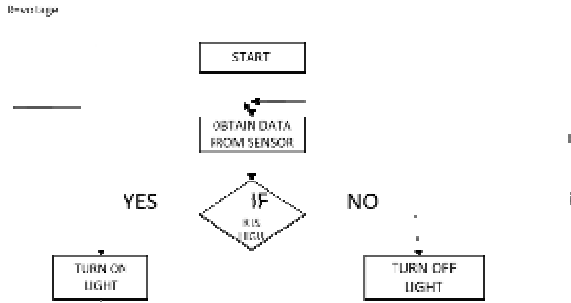


Fig.1. Flow Chart of alt system

Working flowchart is shown in Figure 1. The user will switch on the device. After every each time gap the PIR sensor will sense IR radiation in the room. Once the user enter to the room, Corresponding value is converted to voltage and send to arduino module. The voltage is analyzed by the arduino. If the voltage is higher than a threshold value the arduino send a signal to relay unit and it will switch on the lights. Otherwise the lights will be turned off. This process continues forever until the user switch off the device.

### ➤ Algorithm

1. START
2. Obtain data from sensor
3. If the voltage is high the go to step 5 else continue
4. Switch off the light and go to step 3
5. Switch on the light and go to step 3

The algorithm is very simple and easy. The user switch on the device and the device start to work . After every each time gap the PIR sensor will sense IR radiation in the room. Once the user enter to the room, Corresponding value is converted to voltage and send to arduino module. The voltage is analyzed by the arduino. If the voltage is higher than a threshold value the arduino send a signal to relay unit and it will switch on the lights. Otherwise the lights will be turned off. This process continues forever until the user switch off the device. We have a specially designed Moving part attached to the bottom part of our Robot which help it to move across all terrains. Also included many safety features like ABS and Pedestrian & Signal Detection also have manual mode (When Autopilot Mode Off) using power of A.I and CV

## IV. SYSTEM REQUIREMENT

### A. Modules

We are using different modules for this project. It includes

#### Arduino uno r3

The Arduino UNO [1] 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 expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0.

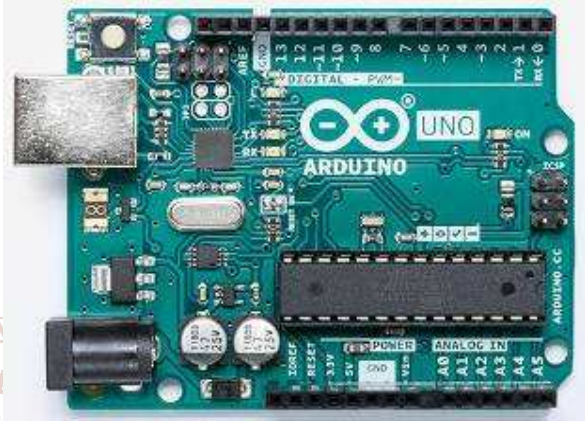


Figure2: Arduino uno r3

#### K49 DSP AVR Display

Regulating Relays. Automatic Voltage Regulating Relay(AVR) is used to Regulate the secondary voltage of Power and Distribution Transformers via On-Load Tap Changer (OLTC). The Equipped with high-current relay, AC250V 10A;DC30V 10A. It has a configuration of 5V 4-Channel Relay interface board, and each one needs 50-60mA Driver Current. Application Supports all MCU control, The industrial field, PLC control, Smart home control. The module comply with international safety standard.it designed on control and load area independently.

The PCB board designed with double FR4 substrate, more safe and stable. The module could directly control various devices and load. Can be full open or Fully closed. Point to point control and Cycle control. The power supply is 5V

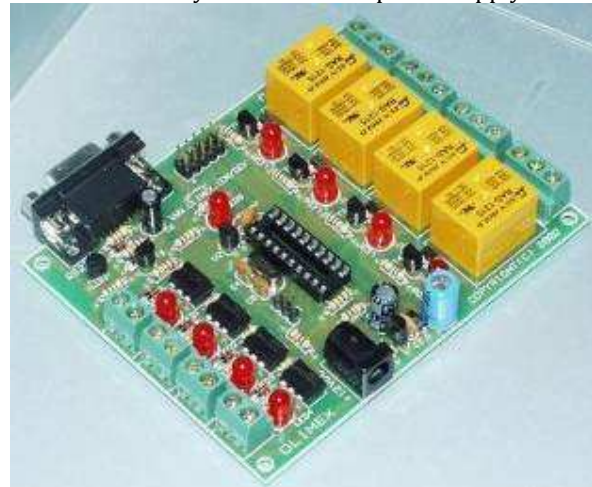


Figure 3:K49 DSP AVR Display

#### SR501 PIR SENSOR

A PIR-based motion detector is used to sense movement of people, animals, or other objects. They are commonly used in

burglar alarms and automatically-activated lighting systems. They are commonly called simply "PIR", or sometimes "PID", for "passive infrared detector". An individual PIR sensor detects changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the objects in front of the sensor

The 2D model is also given in the figure below

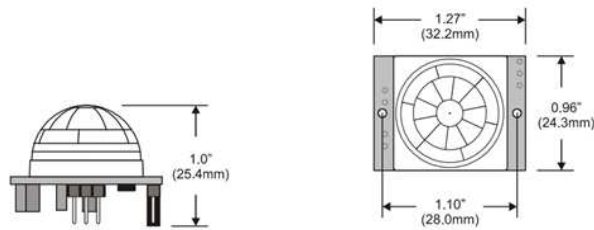


Figure4: Block diagram of SR501 PIR sensor



Figure5: SR501 PIR sensor

## V. SYSTEM DEVELOPMENT

### A. Module Description

The user will enter the room. The PIR sensor detects the IR radiation and converts it into voltage and passes it to the Arduino. The Arduino checks the input voltage with the threshold value. If the value is found to be greater than it, it sends a signal to the relay module, and the relay module will switch on the light.

## VI. IMPLEMENTATION AND TESTING

### A. Implementation

The language used for coding the project is C/C++. The program is implemented on a system by transferring the appropriate folder in which the program exists to the user's computer.

The program is written using Arduino Software (IDE) on a Linux and Windows PC respectively. Before implementing the code, the code was tested and analyzed by all members of the group and made sharper and more efficient.

### B. Testing

The folder in which the program is stored is transferred onto the testing circuit. The testing PC was a normal PC with average technical specifications. A human body is entered into the room and put him for the inspection by the module. The system works perfectly after some doing some calibration.

## VII. RESULT AND DISCUSSION

The working model produced from our work is working perfectly. The working model is shown in figure 6 below. The device will start working when the user switches on the device. After switching on the device, it will automatically calibrate the sensor and start detecting the IR radiation. If any person

enters into the room, the sensor detects the IR radiation emitted by the human body and sends the value (voltage) to the microcontroller. The microcontroller (Arduino Uno) analyzes the value, and corresponding actions are performed. If the value is greater than the value of the threshold, then a signal is sent to the relay unit (K49 DSP). The relay unit will switch on the lights until a negative signal reaches. The process continues until the user switches off the device.

By doing this project, we can learn new things and technologies. It was so useful. We made lots of errors and mistakes, but after all, we came to a successful project. Smart cities are going to adapt this technique in the future only because of its advantages, such as easy fault detection, fast retaliation, and energy efficiency.



Figure6: Automatic light turn on/off system model

## VIII. Outcome expected

1. Security Measures
2. Less power needed
3. Efficient
4. Authenticate user

## IX. Acknowledgment

This is an opportunity to express my sincere gratitude to all. At the very outset, we express our thanks to the almighty God for all the blessings endowed on us. The report is submitted in regard with the project done as a part of the fourth semester curriculum. We acknowledge our Sahrdaya College of Engineering and Technology for giving us the opportunity to do our project.

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- [3] Automatic Room Light Controller with Visitor Counter and Zigbee Technology <https://www.elprocus.com/know-about-working-of-automatic-room-light-controller-and-applications/>
- [4] White Paper On Wireless Communication through Zigbee Technology <https://www.elprocus.com/wireless-communication-zigbee-technology/>