



Automatic Stairlight Control using Arduino

¹Siddharth Tripathi, ²Tanya Srivastava, ³Km Sapna, ⁴Smriti Singh, ⁵Mahesh Kumar Singh

¹UG Student, ²UG Student, ³UG Student, ⁴UG Student, ⁵Assistant Professor

¹Department of Electronics and Communication Engineering,

¹Buddha Institute of Technology Gida, Gorakhpur, India

ABSTRACT :

The Smart Staircase system is a lighting control system where the lights are automated according to the presence of people using the staircase. It has been further extended with a stoner interface on mobile bias. This stoner interface, in the form of an android operation will cover the status of the lights and be suitable to modify the color and intensity of lights being used on the staircase. With this design, we will successfully produce a system where lighting control will be purely grounded on mortal presence and hence barring the need for homemade switching. In order to apply this technology, we first need to survey the colorful styles available for seeing data and controlling the lighting grounded on residency of the area. Likewise, the colorful styles and their perpetration has been banded about.

INTRODUCTION

The two biggest issues in today's globe are electricity shading and power scarcity. The power shortage graph is rising quickly day by day. In this case, the power wastage has a significant impact on the energy infrastructure. Power is wasted in a variety of ways, such as when people simply forget to turn off the lights before leaving, and in some situations, power waste should be prevented by employing low-efficiency appliances. When movement is detected, an automatic Lighting system will turn the lights ON: when motion is detected and, on the other hand, when no motion is detected, lights turn OFF [1-2].

During this time, stair lighting (Figure 1) is required to illuminate the passage away. Climb the stairs, caused by countless accidents. Too bad or no lighting on the stairs,

Have experienced such accidents several times and inflicted permanent injury to people, including bone fracture. In some cases, resulting in permanent disability, Property damage only the stair lighting should be on when needed. Of course, they are only needed to save energy and energy costs. Stair lighting is very important from a safety point of view. Dark spots and shadows along the stair can pose a safety hazard. For this reason, it is necessary in advance.

Installation of stair lighting system. Lighting glare built-ins and windows should be minimized. There is a difference classes of lighting schemes i.e., Direct lighting, indirect lighting illumination, semi-direct, semi-indirect, and general diffuse light systems. A well-constructed lighting scheme is the right thing to do. Ensure proper lighting to avoid glare and discomfort shades and ensure a sufficiently even distribution of light. The entire working plane (The raja and the raja 2002) of the traditional method of controlling stair light was used bi-directional circuit. Modern stair lighting exists as a simple circuit using a Motion/Human detector, or automatically turn off/ on sensor/electrical system stair lighting, etc. Transistor, LED, Passive infrared (PIR) sensors, etc.

Can be used to build an automatable light sensor on when motion is detected or off, when motion is not detected (Ayush,2015) [3].

The sensor itself is changed in quantity, event, or execute an action and generate a corresponding output signal. There are various types of sensors including but not limited to: analog and digital sensors. Different types of sensors include Temperature sensor, Gas sensor, Fire sensor, Smoke sensor, Pyroelectric sensor, Passive infrared (PIR) sensor, Infrared (IR) sensors, etc. With these sensors, Motion-controlled circuit Or power Switches Detector Stair lighting system installed Automatically controlled, in contrast to the old Traditional methods uses a two-way line.

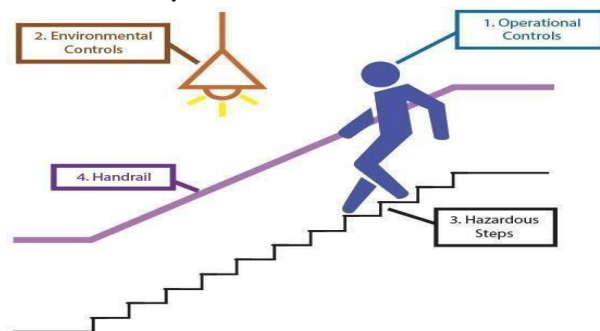


Figure 1. Dependent elements on safer stairs and steps

I have two classes of Sensor-based person detection for stairwells. Passive sensor and Active sensor using different technologies, detects the movement of the atrium. Passive occupancy sensor or not. It dissipates energy, but reads the energy change stairwell. Active for the sensor to detect movement he emits one of three types of energy. Stairs; infrared microwave radiation or sound waves (Safewise,2013). List of Active sensors used for various automations.

LITERATURE SURVEY

Materials/Component used: Materials used in the construction of the sensor based human detector for lighting purpose on the stair-case is shown in table1.

Table1. Table showing material used.

S/N	Components	Quantity	Value
1.	Arduino uno	1	At Mega 283P
2.	5pin Relay	8	12V
3.	Ultrasonic Sensor	2	HC-SR04
4.	LED	12	12V
5.	Resistor	12	10K
6.	Power Supply	2	5V, 12V

A block diagram is shown in Figure 2, respectively.

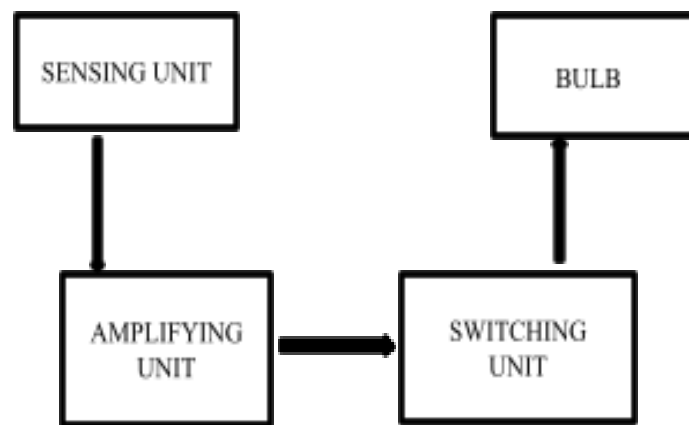


Figure 2. Block diagram of a sensor-based people detector for lighting.

Methods: DC power is supplied to the PIR sensor. If there is motion in the area of the sensor, 5V is given as Exit. Resistor connected between sensors acts as a current limiting device. The transistor connects so that reverse current does not flow. The temperature difference is detected by a PIR sensor and the output is given to a transistor and then to a relay. The circuits work as a switch. Normally closed and he has two ports, normally open.

Relay ground is connected normally open to close the circuit, fluorescent lamps are. If there is no motion, there is no input to PIR. Since it is sensor, the output is 0V and the common of the relay the circuit remains open because it remains connected to the normally closed contact Fluorescent light.

Save power with this not used.

Circuit layout: Using listed components and circuit elements, sensor-based people detector for lighting built on stairs. These components first check the workability by arranging them on a breadboard. Circuit layout of sensor-based people detector for lighting. The purpose of the stairs is shown in figure 3.

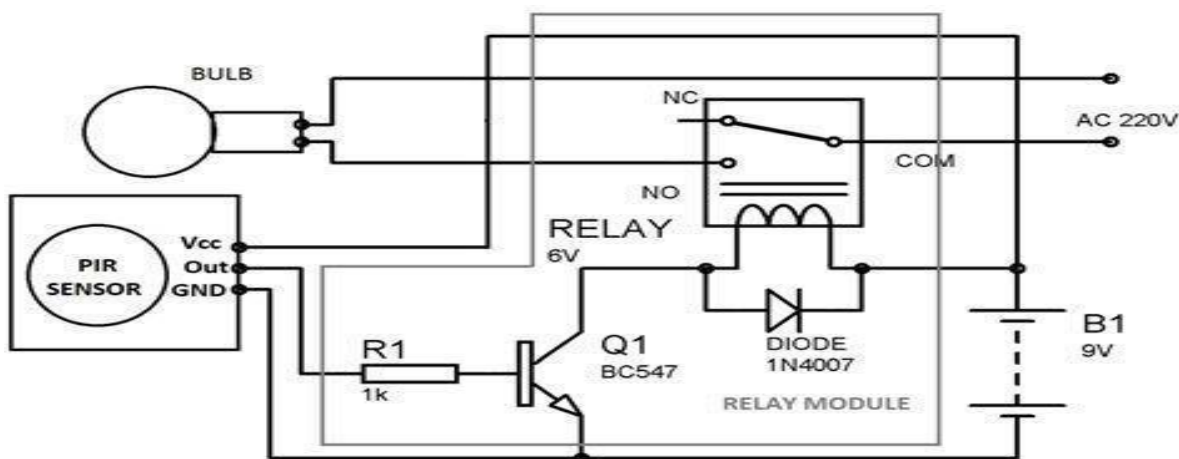


Fig 3. Circuit layout of the sensor based human detector for lighting purposes on the staircase.

In this construction sites used PIR sensors to detect people movement within a range of 2 meters. +DC voltage connector connected to the positive (+V) supply voltage. The output pin is connected to the base of the transistor through a 1k resistor. The ground connection is connected to circuit ground. The principle of operation is always there is body movement around the sensor and it detects the signal converted to an electrical signal. This signal voltage is then applied to the base of the transistor lead. The Pir sensor has a variable resistor and you can change its value, sensitivity, and range.

The PIR sensor is supported and Fresnel lenses, infrared detectors, and detection circuit. The sensor’s lens focuses the infrared light. Ambient radiation/wavelengths towards infrared detectors. Provide a preliminary detection range of about 2m highly sensitive and generates infrared heat that is detected by a motion sensor. Sensor output, a 5V signal for a period. Using sensor output (5V) it drives transistor BC547, then the transistor turns on a 7v SPDT relay. The relay will switch stairs accordingly to case light ON.

Amplifying stage: Based on sensor structure human detector for stairwell lighting purposes, the amplifier stage uses the NPN transistor BC547. In addition to amplifying the signal voltage, current and power performance, BJT-transistors can generally be used like this: A switch or a combination of a switch and an amplifier. In this structure use NPN transistor BC547 signal amplification and switching. Its operation isto convert the electrical energy from the PIR sensor and its bias to a transistor that conducts or saturates. If there is no signal from the PIR sensor, the transistor will switch and stay in shutdown mode.

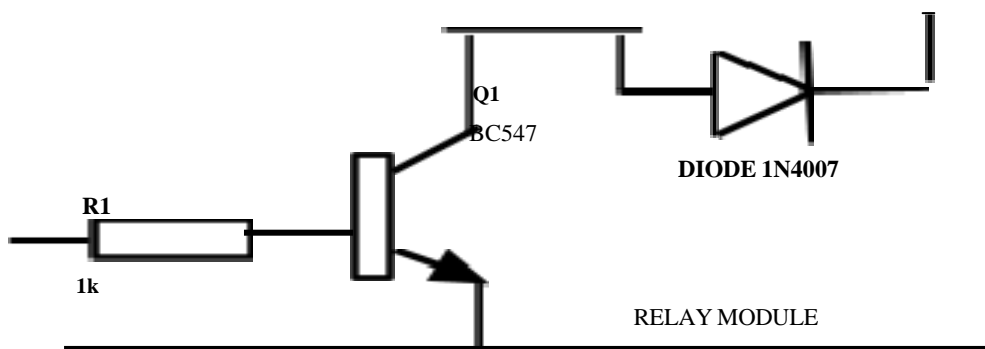


Fig 4. Amplifying stage

The components listed below are included in PIR:

1. PIR motion detection.
2. Dual element sensor.
3. Adjustable delay time.

Standard TTL output

CONCLUSION

The Stair control lighting system designed for lighting purposes is one of the simplest and most effective methods. Automatic energy saving in building organization. Based on the PIR sensor object detector for lighting purposes in stairs System, Easy -to -connect, low-power , low-cost PIR sensor and other components were used. Using this creates power Consumption that has decreased and finally it can be used in the car parking lot and street lighting .

ACKNOWLEDGEMENT

We would like to thank to our faculties ,group members and our project guide who have contributed towards development of This project or work .Finally ,we would also like to thank the electronics and communication engineering department and Buddha Institute of Technology for all facilities to perform the Research .

REFERANCE

- [1] .Suresh, S., et al. "Automatic lighting and control system for the classroom." 2016 International Conference on ICT in Business Industry & Government (ICTBIG). IEEE, 2016.
- [2]. Rubinstein, Francis , Michael Siminovitch , and Rudolph Verderber . "Fifty percent energy saving with automatic lighting controls." IEEE Transaction on Industry Applications 29.4(1999):768-773[1].
- [3]. Ayush (2015): "Simple motion sensor light PIR,Autodesk Inc (US) , Article <http://www.instructables.com/id/make-a-simple-motion-sensor-light-PIR>.
- [4] .Benezeath Yannick , Laurent Helene ,Emile Brono and Rosenberger Christophe (2011) Towards a sensor for detecting human presence and Activity , Energy and Building, Pages 305
- [5] .Perma chodan ,Devi Maya Adhikari ,Gopal Chandra Nepal, Rajen Biswa , Songay Gyeltshen Cherico (2013):Passive Infrared(PIR)Sensor Based lighting and security system , International Journal of Electrical, Electronics and computer system (IJECS),Vol:14 Issues :2Pages 772-776.
- [6]. Safewise (2013) . Security providers and safety Resources , Beginners Guide to Motion sensors , Article . 5202 W . Douglas Corrigan Way Suite #300 Salt Lake City ,UT 84116.
- [7]. Sapkota (2010) : Dark / Light sensor using Transistor ,Article , buldcircuit . <http://www.buldcircuit.com/darklightsensor-using-transistor>.
- [8]. Tao Hu hao Zhang ,Xinyam Zhu , Julaine Clonus and Gelang Yang (2018): Depth sensor Based Human Detection for Indoor Surveillance ,Science Direct ,Vol.88,Pages 540-551.
- [9]. Theraja , B.L. and Theraja A.K.M (2002):"Electronics Technology" S, Chand and company Ltd.India . ISBN 978-8121924412 23rd Edition, Pages 105- 110.
- [10]. Vijayarpya Anvit, Avadesh Sharma ,Pawan Kumar , Manhandra Yadav , Omprakash Yadav , Phoolchand Chaudharv (2016) : PIR Motion Sensor in home Application , International Journal of Engineering and Management Research , Vol. 6 issues 2, Pages 48-51