

# Designing Automatic Motion Sensing Security Light Using PIR Sensor

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**ABSTRACT:** - Pyroelectric infrared (PIR) sensors are extensively used as a presence trigger; however, the analog output of Pyroelectric infrared (PIR) sensors relies upon numerous other Aspects, which include the gap of the body from the PIR sensor, the body shape, the direction and speed of movement and gait. In this research, the author presents an empirical study of human movement detection and identification using a set of PIR sensors. The author developed a data collection module having two pairs of PIR sensors orthogonally aligned and modified Fresnel lenses. I have positioned 3 PIR-primarily based total modules in a hallway for tracking people; one module at the ceiling; and modules on contrary partitions dealing with every other. The author collected a data set from eight subjects when walking in three different situations: two directions (back and forth), three distance intervals (near one wall sensor, within side the middle, near the opposite wall sensor), and 3 velocity levels (slow, moderate, fast). The author used two types of feature sets: a raw data set and a reduced feature Set composed of amplitude and time to peaks; and passage length extracted from every PIR sensor.

**Keywords:** pyroelectric infrared sensor, Piezo Buzzer, Arduino Uno, PIR

## I. INTRODUCTION

Security is the degree of protection against danger, loss, and criminals [1]. Motion detection is the way of detecting a change in the position of an object concerning its Environment, or a change in the surroundings concerning the object [3]. PIR sensors are detecting sensors that use the light emitted to detect the place of an object or a living creature. People and warm-blooded animals emit light and also infrared rays. These rays cannot be

seen with human eyes due to low frequency. Infrared rays are sensed with Fresnel lenses.

These lenses have a sort of crystalline matter that turns into an electrically charged surface when it meets infrared rays. This charged surface changes with the number of rays it meets.

PIR sensors are frequently used within side the creation of PIR-based motion detectors. Apparent motion is detected when an infrared source with one temperature, such as a wall [6]. All objects above absolute zero radiate energy in the form of radiation. Usually, infrared radiation is invisible to the Human eye but can be detected by electronic gadgets designed for such a purpose. A motion detector i.e. passive infrared sensor (PIR sensor) is an electronic device that is used to measure the infrared (IR) light radiating from objects in its field of view [4]. The time period passive in this example approach is that the PIR tool no longer emits an infrared beam however simply passively accepts incoming infrared radiation. Generally, it is a simple alarm system that includes notifying suspicious activities at a very low cost [2].

## II. METHODOLOGY

### 2.1 Introduction

The system is developed by using experimental method. Proteus 8.7 software was used to develop simulation system. In developing a project, methodologies are one of the most important elements to be considered to make sure that the development of the research is smooth and get the expected result. A good methodologist can be described the structure or the flow of the research whereby it can be the guideline in managing. The simple block diagram of the system is shown in Figure 1

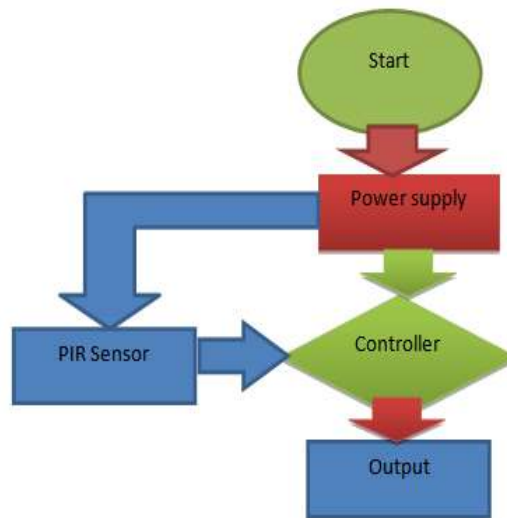


Figure 1. Blok diagram

2.2.Sequence of the project

The following figure 2 sequence is used to develop the system.

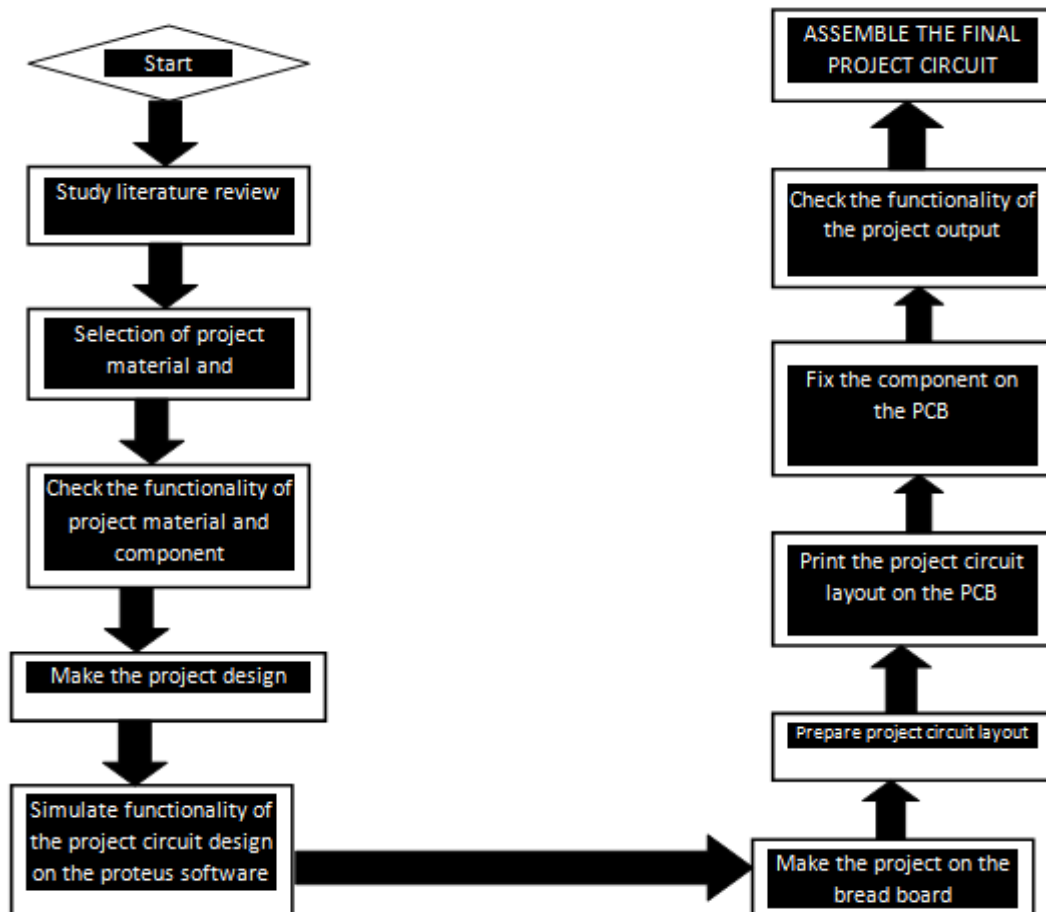


Figure 2. Sequence of project

### III. PIR (PASSIVE INFRARED) SENSOR AND SOFTWARE ANALYSIS

PIR (passive infrared) sensor is likewise typically referred to as the movement sensor which measures the infrared IR mild radiating from the item in its discipline of view [5].so when the object comes into its field of view the readings of the sensor gets disturbed and thus detects the object in front of it. The PIR sensor in the Proteus looks like in the following image.

PIR sensor is used to hit upon movement within side the surroundings and is normally referred to as movement sensor. It's pretty useful in protection tasks wherein you want to discover motion. For instance, in a few financial institution vaults in which there is no opportunity for motion, you may vicinity this sensor and may take a look at if there is any movement. It is likewise utilized in domestic automation like if there is no motion in a few rooms then flip off its appliances. So, in brief, the PIR sensor has several uses and is used pretty much in engineering projects as shown in Figure 3.

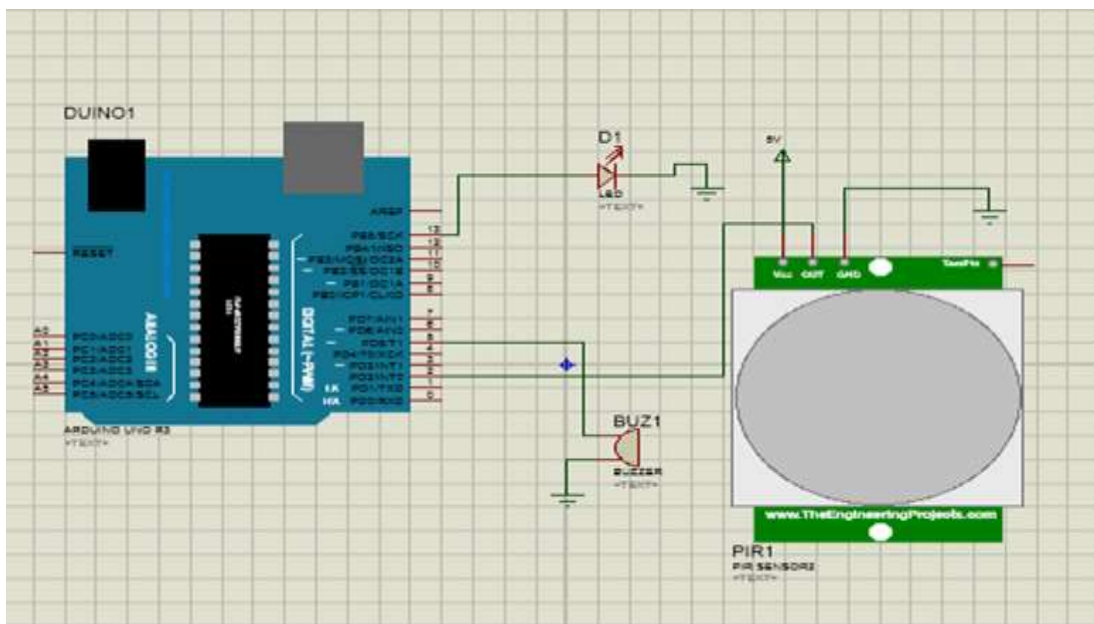


Figure 3. PIR Sensor with Arduino Uno

The software used for to project is professional Proteus 8.7 software and PIR motion sensing security light software Proteus 8.7 is a single application with many service modules offering different functionalities (schematic capture, PCB layout, etc.) and source code. The project program is written using assembling language.

### IV. HARDWARE IMPLEMENTATION

The motion sensor project is successfully designed and tested as the prototype of the home security project. Home Security systems using PIR

sensors can be been implemented for security concerns. Firstly, the overall wiring diagram and soldering system connections are made as per the circuit diagram. The system is working properly as shown below in Figure 4. Show the hardware for the Advanced Motion sensing Using PIR Sensors. The printed circuit board (PCB) is in a 55.88×152.44-mmRectangular form. All the integrated circuits, the battery holder of the AAA alkaline cell, and the Booster Pack pin out are located on the bottom side of the PCB. On the top of the PCB are all the sensors (PIR, Light, and Humidity as shown in figure 4.

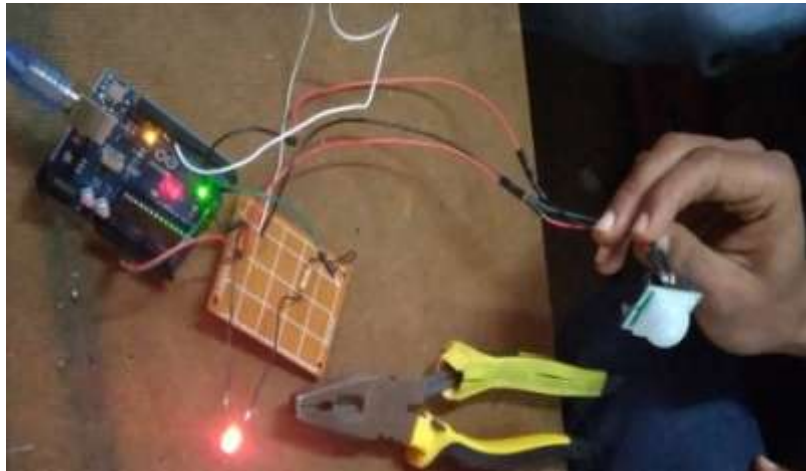


Figure4. System design Arduino hardware

#### 4.1 System Testing and Evaluation

As shown in Figure 5, after the security system is completely developed, functionality and usability testing will be carried out. Feedback gathered information from the tests will be used to

further improve the final system. Documenting process will also be carried out in line with the testing and evaluation.

All components are internally embedded for safety as shown in Figure 5

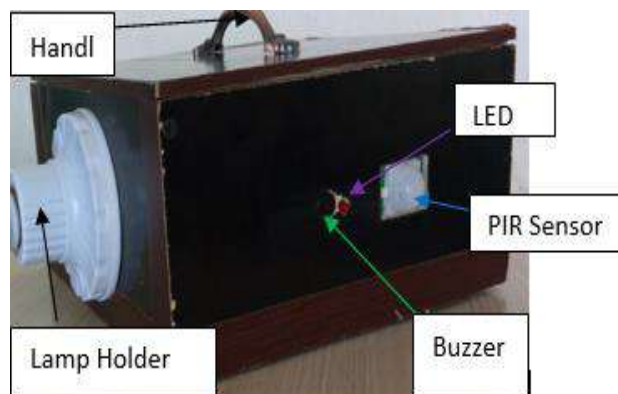


Figure 5. External parts of motion sensing security system

#### 5.2 Result Discussion

Our body creates heat energy in the form of infrared which is invisible to human eyes. But it can be sensed by an electronic sensor. PIR sensor is made up of crystalline material which is Pyroelectric. In Figure 6, the researcher is using PIR. Motion Sensor Module is an infrared sensor that generates electric charge when exposed in heat and sends a signal to Arduino Uno. According to the level of the infrared within side the front of the sensor, Arduino Uno begins humming the speaker and glows the LED. Relay is configured through the use of a small Driver circuit which consists of a Transistor, a Diode, and a resistor. The transistor is

used for amplifying the current in order that full current (from the DC source – 9v) can flow via coil to full energy it. The resistor is used to provide biasing to the transistor. Diode is used to avoid reverse current flow, while the transistor is switched OFF. The relay inductor coil produces the same and contrary EMF while switched OFF suddenly; this may cause permanent damage to components, so a Diode must be used to avoid the reverse current. This relay circuit is used to control the lamp based on the Arduino input signal. A program is running on Arduino which checks the sensor if anything is moved or a new object has been detected.

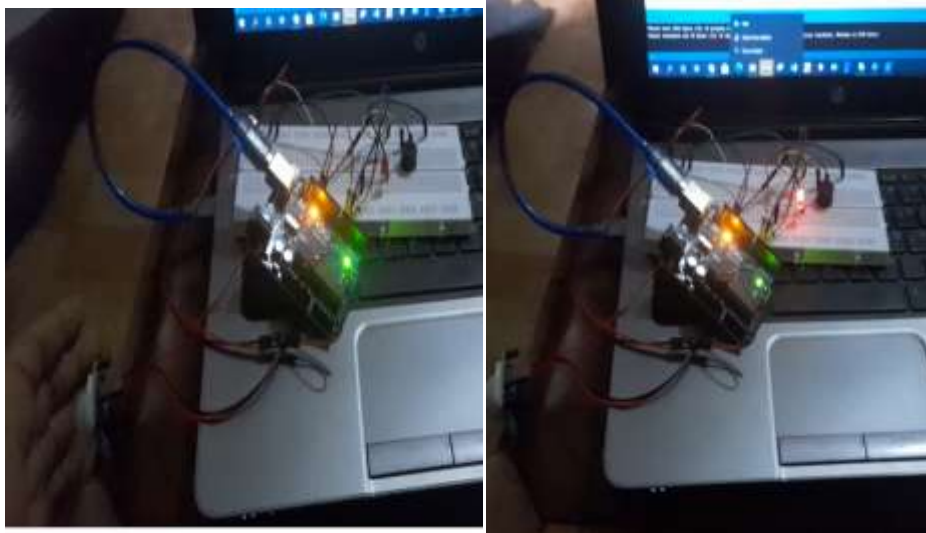


Figure 6. Hard ware of the project

## V. CONCLUSIONS

Thus, the Researcher has designed a domestic security alarm system using Arduino Uno and a PIR motion detector, which is portable, efficient, cost-effective, and highly effective as well. Such safety systems are hugely independent for safety purposes, and thus the given system can be proved useful and effective in view of the above discussion. Security is a rapidly growing field and there are new technology and improved burglar alarms coming up every day. With rapid improvement of technology, the field is turning out to be an area full of scope and new changes can be made to make it more efficient. The researcher has successfully designed and tested the prototype of a home security project.

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