ADVANCED SECURITY SYSTEM USING PIR

B. Anil Kumar*1, B. Rambabu2

1M.Tech(S.S.P.), Assistant Professor, B.V.S.R.Engineering College, India
2B.Tech (pursuing), E.C.E. Branch, B.V.S.R.Engineering College, India.

ABSTRACT

Now a days we seen different security systems using of IR Sensors. A normal IR Sensor circuit will have a transmitter and a receiver. The transmitter sends out an IR laser and this will be received by the receiver. When an intruder or object moves past the device, the IR beam is cut and thus the alarm is activated. But, this system has some major disadvantages like limited range and poor line of sight. These disadvantages are eliminated through the PIR sensor. This paper designed by PIR(Passive Infrared Radial) sensor implace of IR Sensor. The sensor is basically a pyroelectric device. When the device is exposed to infrared radiation, it generates an electric charge. The device is element, there will be a change in the voltages generated, which is measured by an on-board amplifier. This technology is used in banking or ATM or anywhere for saving the power and human being need. In this Paper we explained the technology with the application of ATM’s.

Key words: PIR Sensors, Camera, IR Sensors.

I. INTRODUCTION

IR Sensor is a one type of wireless data transmission device for short distance communication. Based on IR Sensor lot of circuits are implemented. In that one is Security system. We research on it and find the disadvantages of this system. And implement the new security system which is replaced PIR Sensor instead of IR Sensor in the system. The paper contain what are the disadvantages of the system, how it overcome with an example. In this paper we are not implemented a new technology, with the existed one we designed a new application. That gives a good result in Security levels. PIR Sensor also a one type of Infrared sensor. Instead of infrared or laser transmitters and receivers, PIR (Passive Infrared Radial) sensors are used in this circuit. The sensor is basically a pyroelectric device. When the device is exposed to infrared radiation, it generates an electric charge. The device is made of crystalline material. According to the change in the amount of infrared striking the element, there will be a change in the voltages generated, which is measured by an on-board amplifier.

The infrared light explained here refers to the light radiating from all objects in its field of view. The reason for not having a transmitter and receiver is that the device does not emit one, but only accepts the energy emitted from objects above absolute zero in the form of radiations. Thus the temperature will be different for a human working past a sensor, and that of a wall right in front of it. Thus the word “passive” is used in PIR to explain that it does not emit a radiation and receive it, but instead accepts the incoming infrared radiation passively. The device contains a special filter called a Fresnel lens, which focuses the infrared
signals onto the element. As the ambient infrared signals change rapidly, the on-board amplifier trips the output to indicate motion. We can say that the PIR sensor is a human body sensor because it is only activated when a human or animal walks past the sensor. The PIR sensor is the heart of the project. We can design the project in such a manner that as soon as the burglar or intruder walks past the sensor, the camera would turn on and the whole lighting and camera system could turn on. Fig 2.1 represents the overall circuit diagram of the project.

II. DESIGNING APPROACH

![Fig 2.1: Pir Sensor Circuit Diagram](image)

PIR modules have a 3-pin connection at the side or bottom. The pinout may vary between modules so triple-check the pinout. It’s often silkscreened on right next to the connection. One pin will be ground, another will be signal and the final one will be power. Power is usually 3-5VDC input but may be as high as 12V. Sometimes larger modules don’t have direct output and instead just operate a relay in which case there is ground, power and the two switch connections. The output of some relays may be 'open collector' - that means it requires a pullup resistor. If you’re not getting a variable output be sure to try attaching a 10K pullup between the signal and power pins. By soldering in 0.1" right angle header, a PIR is easily installed into a breadboard. The time factor means the cut down of sensor beam and reflected signal receiving time is depend on the values of resistors(R9 and R10) and capacitors use in the circuit. Change of capacitance value(C6 and C7) the transmission and receiving time is either increased or decreased.

III. PIR SENSOR

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range.
Fig 3.1: **STRUCTURE OF PIR SENSOR**

They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.

PIRs are basically made of a pyroelectric sensor (which you can see above as the round metal can with a rectangular crystal in the center), which can detect levels of infrared radiation. Everything emits some low level radiation, and the hotter something is, the more radiation is emitted. The sensor in a motion detector is actually split in two halves. The reason for that is that we are looking to detect motion (change) not average IR levels. The two halves are wired up so that they cancel each other out. If one half sees more or less IR radiation than the other, the output will swing high or low.

**(a)Working:**

PIR sensors are more complicated than many of the other sensors explained in these tutorials (like photocells, FSRs and tilt switches) because there are multiple variables that affect the sensors input and output. The PIR sensor itself has two slots in it, each slot is made of a special material that is sensitive to IR. Fig:3.2 contains the lens used here is not really doing much and so we see that the two slots can 'see' out past some distance (basically the sensitivity of the sensor). When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a positive differential change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected. The IR sensor itself is housed in a hermetically sealed metal can to improve noise/temperature/humidity immunity.
Fig 3.2: Pir Sensor Signal Transmission

There is a window made of IR-transmissive material (typically coated silicon since that is very easy to come by) that protects the sensing element. PIR sensors are rather generic and for the most part vary only in price and sensitivity. Most of the real magic happens with the optics. The lens is just a piece of plastic, but that means that the detection area is just two rectangles. Usually we'd like to have a detection area that is much larger. To do that, we use a simple lens such as those found in a camera: they condense a large area (such as a landscape) into a small one (on film or a CCD sensor). For reasons that we would like to make the PIR lenses small and thin and moldable from cheap plastic, even though it may add distortion.

Fig 3.2: Structure of Fresnel Lenses
IV. WORKING PROCEDURE

- PIR Sensor: D204B PIR sensor is used in this project. The PIR sensor is the heart of the project.

- Two Stage Amplifiers: Two stage OP-amp: LM 324 is used as two stage amplifier. The signal from the PIR sensor is very low so this signal is amplified by using LM324. LM324 is a quad OP-amp. First two op-amps act as amplifiers.

- Comparator: The comparator compares the signal from the amplifier and a reference voltage. 3rd and 4th OP-amp of LM 324 acts as comparator.

- Transistor Switch: Whenever the output of comparator make HIGH Q1 transistor gets ON and relay will be energized causing the alarm and lamp to turn ON.

- Power Supply: Power supply converts 230 Volt AC into 12 Volt DC and 5 Volt DC. IC 7812 is used as the 12 Volt voltage regulator and a 5v zener diode act as the 5 Volt voltage regulator.

This technology is applied to banking systems as ATM (auto tellers machines). In ATM’s for watching the things who enter and leave purpose they use cameras continuously and a security guard is there. For usage of camera continuously power consumption is more. Because camera is continuously in ON position. That power is saved by this implemented paper. How it saves is discuss now. Two PIR Sensors are place at the entrance of ATM. PIR sensors are internally connect to camera and lamp. When the person enters in to ATM, one PIR sensor is enable and send signal to lamp, camera. After receiving of signal then only lamp, camera will ON and capture the image the enter person what is doing in the room. Until the lamp and camera in idle position. Another PIR sensor placed at another side.
of ATM door which is enable the pir send signal to lamp and camera to turn OFF the lamp and camera. The gap between the person enter and exit position camera and lamp in OFF position. In that case power will save. And one more advantage is the person enter in to ATM one by one, So there is no scope to hack or know the password of another user.

V. RESULT

Fig 5.1: Circuit Connections

From the Fig: 5.1 the circuit connections on bread board is shown. There is two pir sensors are used as left and right. Those are use at two sides of entrance in ATM. When the signal received from PIR camera start capturing, that is shown in Fig: 5.2.
VI. CONCLUSION

From this paper we conclude that PIR sensors are very sensible than IR sensors. It only detect the human beings. This technology is used at ATM’s, means the designed application gives security for user passwords and power saving. That is at a time single person only need to enter ATM so automatically hacking and knowing of password is imposible. And moreover the lamp and camera in idle position who ever enter in to the room through PIR sensor camera and lamp are ON. So no one enter the room gives system idle position. Hence power save automatically. This is one type of application using PIR sensor.

VII. REFERENCES


