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PIR Sensor Based Security System

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July - 12 - 2011

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The circuit of an inexpensive and highly secure electronic security system is explained below. This electronic security system can be used in banks and other high security areas.

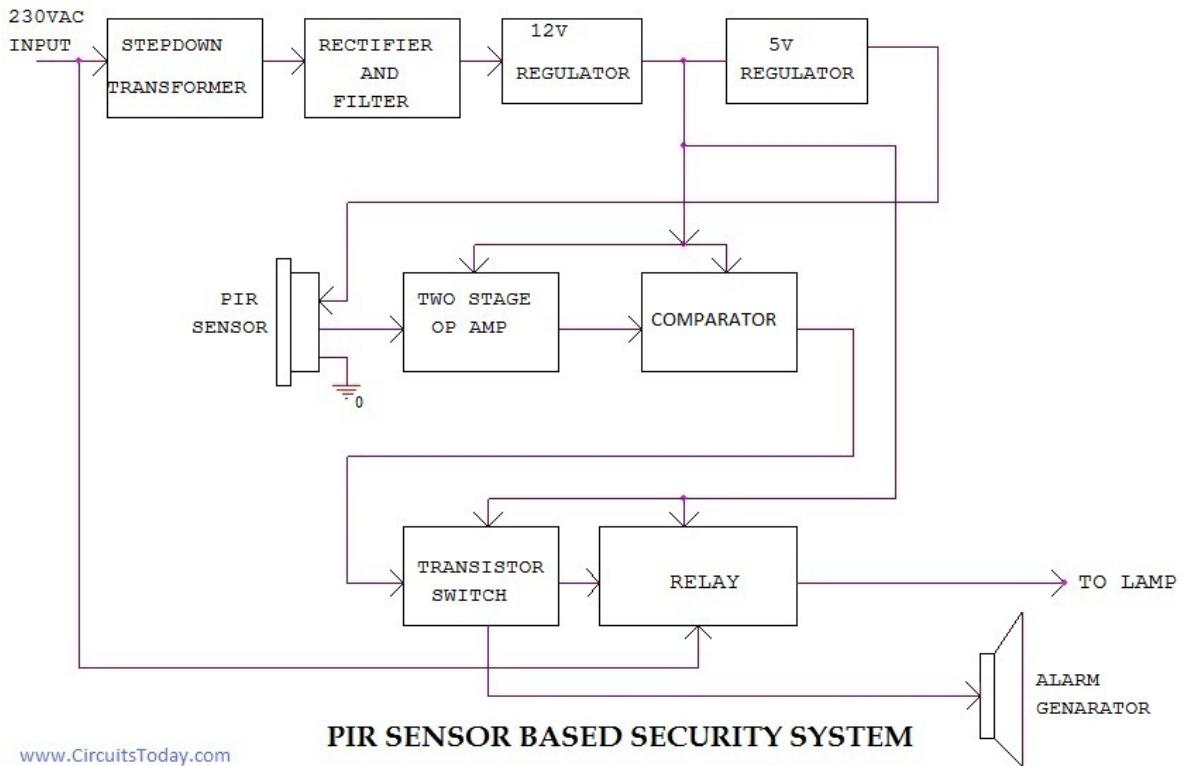
A normal electronic security system will have a transmitter and a receiver. The transmitter sends out an IR laser and this will be received by the receiver. When an intruder walks past the device, the IR beam is cut and thus the alarm is activated. But, this system has some major disadvantages like limited range and poor line of sight. These disadvantages are eliminated through the PIR sensor circuit explained below.

Working

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 block diagram of the PIR based security system is given below.

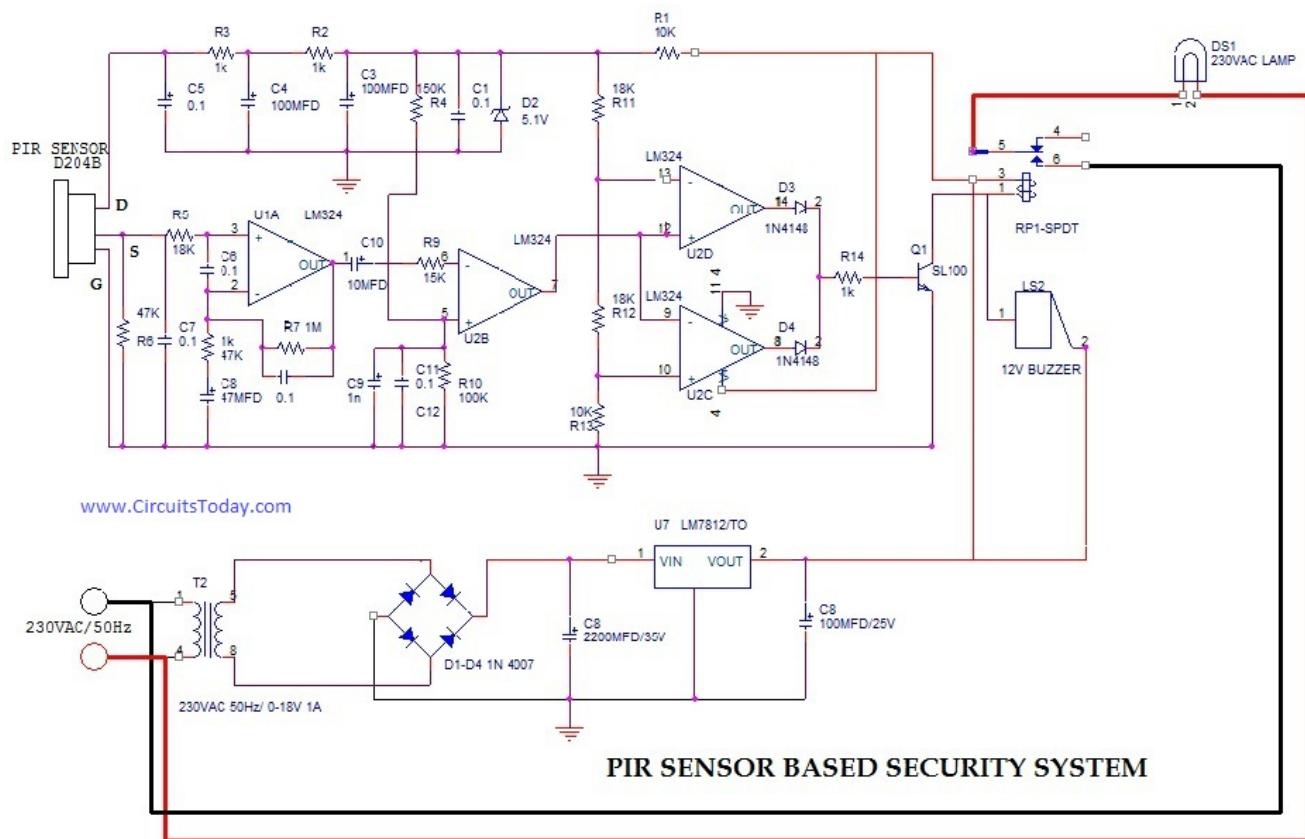


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PIR Block Diagram

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 alarms would turn on and the whole lighting system could turn on.

Circuit Diagram



PIR Sensor Based Security System

- **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 act 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.

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