WIRELESS SECURITY SYSTEM USING PIR SENSOR

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ABSTRACT: In this paper wireless security system is explained in which pyro electric infrared (PIR) motion sensors are used. The main objective of this paper is to implement and improve the wireless security system in economic rates so that, this can be used every where very easily. PIR sensor detects motion of intruder when comes in its range and alerts the person inside the building. The detection of motion of the intruder is based on the change in temperature due to the body temperature of intruder. The property of pyro-electric material is to generate energy when temperature is changed. The side of the intruder is detected by the particular sensor which is placed there. The circuit saves the power consumption and memory storage.

Key Words: PIR (pyro-electric infrared) sensors, Video recording devices (Video camera), Transmitter, Receiver.

I INTRODUCTION
In wireless security system the used circuit is based on pyro electric infrared (PIR) motion sensors [1]. To capture the disturbance into the security region, many PIR sensors are used in each side of building. The circuit detects motion of intruder from any side with the help of placed sensors and alerts the person inside the building by turns ON the alarm [2]. The detection of motion of the intruder is based on the change in temperature which changes due to the body temperature of intruder. The detected signal is then amplified and sent to the receiver circuit (Central Controller Unit) wirelessly. This circuit will work only when intruder enters otherwise it remains OFF, therefore save the energy and records information when it is ON, therefore more memory space is available [4].

In this system no wires are used and the placement of sensors is depends on the most desired location from where every intruder can be easily detected. The range of covered area by the sensor is up to 10 meters.

It alerts the inside persons by blinking light and sound alarm immediately. This is generally most applicable at remote buildings for security of wild animals etc.

The working principle of this system is based on temperature change with-in the capture area due to intruder. This is low cost device and easy to installation.

The main aim of this device is to give security protection to buildings, houses and especially in remote areas where wild animals or human beings cross the boundaries and try to enter houses and buildings, the device alerts the owner by giving audio/visual hints or alarms.

II BACKGROUND STUDY
Transmitter and receiver are present in normal security system. A transmitter is used to send IR laser and a receiver is used to receive the signal. The IR radiation is cut when any intruder enters and indication received but this system has some major disadvantage of poor line of sight and limitation in range which is eliminated by PIR sensors [6]. In this circuit the radiation of IR is not required because here the energy is emitted, above absolute zero temp, from the intruder. The temperature of wall is different from the temperature of human pass across PIR sensor. Therefore it is called passive as it accepts the signal passively. An idea was invented to secure houses or buildings with the help of electronics devices. Because this is very cheap in cost and also secure, because anyone can alert inside the house without going outside and can alert another neighbors giving loud voice. Two systems are used for security purpose i.e. video cameras in which human face can be identified or video recordings are possible and the PIR motion sensors which are used as it alerts immediately. The cameras are connected with cable/wires whereas PIR sensors are wirelessly works. It senses the change in temperature by cause of intruder. The passive word is used for sensors because of generation of electrical signals when temperature changes on pyro-electrical material.
III METHODOLOGY
This topic was selected due to keeping in view its utility and application in house security by means of wirelessly connection with the help of motion of PIR sensor. The circuit diagram for this has been designed. The circuit will be assembled as per block diagram and will be checked properly at every test point as per circuit diagram. Finally check will be within the range of sensor as it is working properly or not by disturbing the capture area in front of mirror.

IV WORKING PRINCIPLE
When the temperature changes due to the body temperature of human beings or any animals the pyroelectric material generate electrical energy. They induced voltage and amplify by the amplifier so that it can activate the alarm or lighting the lamp.
When the intruder enters in to PIR sensor's range it take 10 to 60 seconds to activate and familiar with surrounding environment. When the intruder left the area the alarm/ lamp/ any recording video camera etc. gets turned off.
Due to the turned off all devices energy saves as well as the recording device stops the recording when there is not any intruder present in the PIR sensor's range, because of this the storage memory of the device also has enough empty space.
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V CIRCUIT DIAGRAM:
In the following diagram, shown below there are four transmitters (TR1, TR2, TR3 and TR4 for each directions, i.e. front, back, left and right) which are attached with individual PIR sensors and connected wirelessly to the central receiver unit. The sensors sense the presence of intruder and generate electrical signal to process the transmitter unit.

![Diagram](image_url)

Figure: basic block diagram of PIR security system.

VI CIRCUIT DETAILS
6.1 Transmitter- section
The transmitter is used to send signals to the central receiver unit by means of air. This air/ wirelessly connection make the circuit long life because there is no wear and tear loss of wires and cable as well as easily hided the sensor. In this section the detected signal is amplified and transmitted at a particular frequency range. Each sensor requires a separate transmitter unit. In this section the main components are as under:

6.2 PIR sensor
The PIR sensor detects motion by change in temperature and generate low power electrical signal due to property of pyroelectric crystalline material and send it to the RF amplifier for amplification.

6.3RFAmplifier
The Radio frequency amplifier amplifies the received weak signal up to a level and sends it to the RF encoder.
6.4 RF Encoder
This section encodes the signal in to serial bit stream and send it to RF transmitter.

6.5 RF transmitter
In this section amplitude shift keying (ASK) technique is used for modulation, the signal is modulated with 434MHz carrier frequency and transmits it with the help of antenna.

6.6 Receiver - section
This is the main central control unit in which all signals from various transmitters are received. In this section there are following main components:

6.7 RF receiver
The RF receiver receives the signal through its antenna demodulates signal at 434MHz frequency and send the signal to RF Decoder chip.

6.8 RF-decoder:
In this section HT12D RF decoder chip is used to decode the bit stream and generate original digital signal and give it to main control unit (MCU).

6.9 MCU
This section operates with AT89S52 MCU and gives the audio/video indications along with side of intruder.

6.10 LCD panel
The display panel is used to display messages.

6.11 Multi-vibrators
The multi-vibrators are used to blink LED at low frequency and operates at 1KHz audio frequency for lamp.

VII SECURITY APPLICATIONS
In the security system the PIR is used as a switch or relay by turn on and off the circuit. The working of switch/relay is being done by the sensor. When the circuit is complete it turns on the alarm and lamp. The indication of intruder is then received by this way.

In this circuit if there is no motion then temperature does not change and PIR remains the circuit as off, but when the intruder come across PIR range ,the temperature changes due to the body temperature of intruder and sensor generates electrical signal to complete the circuit[3].

VIII PLACEMENT OF PRODUCT
The placement of sensors must be done very carefully designed so that the false alarm can be avoided. The face of the sensor must be in front of boundary wall or inner wall as per application. The entrance sensor should not focus at the floor area and also designed to ignore domestic pets. The range of PIR sensors is up to 10 meters. The consumption of power is low therefore solar power can be used in this project[6].

IX CONCLUSION
In this paper a security system by using PIR sensor is proposed. The proposed circuit save the energy as lamp is turned on only when there is any intruder in the range of PIR sensor. It is also observed in the proposed circuit that it also save the memory space as the video camera starts recording when PIR sensor gets activated.

REFERENCES:
1. Electronics for you magazine
2. circuitsproject.blogspot.com