# SIMPLE SURVEILLANCE STRUCTURE USING PIR SENSOR NETWORK AND GSM

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**ABSTRACT**

*Surveillance is most main security systems in house, industrial, office and public places. In this security system is based on the embedded system along with GSM and sensor networks. The human movement is detect using the PIR sensors. In this time, the system triggers an alarm detecting the presence of person in a specific interval of time and simultaneously sends the how many persons are intruder via message to the SMS through GSM Modem. When the security scheme is activated, the CCTV camera is activated. This highly reactive approach has low computational condition. Therefore it is well suited for home surveillance system. This surveillance security system implemented using PIC micro controller, camera, GSM and Sensors.*

***Key words***: ***PIR Sensor; GSM; PIC microcontroller; Camera.***

## I INTRODUCTION

Surveillance is most essential field in security system. Surveillance is the monitoring of the behavior, actions, or other changing information, usually of people for the purpose of influencing, running, directing, or protecting them. surveillance systems are normally used in home, office, factory or vehicle monitoring and image recognition, but this system requires a high performance center, which works against some advantages of embedded systems, such as low power consumption and low cost. Surveillance is very useful to governments and law execution to keep social control, recognize and monitor threats, and prevent/investigate wrong activities.

Home/office secyurity systems have grown in popularity in recent years, a home/office owner's look for ways to defend their personal space and improve their home values. It is necessary for every home owner to allowing for adding up a home security system, as burglaries, thefts and murders have become everyday in big cities.

PIR sensor are low cost security system for house applications in which Passive Infrared (PIR) sensor has been implemented to sense the movement of human through the detection of infrared radiation from that human body. PIR device does not emit an infrared radition but passively accepts incoming infrared radiation. PIR sensor notice the presence of human in the home and generates signal which is read by the microcontroller. According to the signal received by microcontroller, a call is acknowledged to mobile station through a GSM modem and thus alert the presence of human in the home to owner-occupier.

Designed an advanced GSM based electronic security system for home applications using infra red progress detectors and RISC based Micro controller using embedded C language. Infra red motion detectors will sense any

intruder with 10 feet and alert the Owner of house or police control room by sending SMS through GSM modem about the intruder.

## II EXISTING SYSTEM

### 2.1 Video Cameras

Security and crime control concerns are the motivating factors for the process of video supervision cameras. Closed-circuit television (CCTV) is the utilize of video cameras to transmit a signal to a specific place, on a limited set of monitors. This performance just uses the cameras to do surveillance. It needs a command and control center to monitor all the tricks using cameras. All the cameras are connected to the command center and send their data directly to the central location. All the behavior which is happening in the association or inside the building can be viewed live from the command center.

### 2.2 RFID

Radio Frequency Identification (RFID) use radio waves to robotically identify human being or objects. There are many methods of recognition, but the most general is to store a unique serial number that identifies a human or object on a microchip that is attached to an antenna. The combined antenna and microchip are called an "RFID transponder" or "RFID tag" and work in mixture with an "RFID reader". An RFID system consists of a reader and one or more tags. The reader's receiver is used to broadcast radio frequency (RF) energy. Depending on the tag type, the force is "harvested" by the tag's antenna and used to power up the interior circuitry of the tag. The tag will then adapt the electromagnetic waves generated by the reader in classify to transmit its data back to the reader. The reader receives the modulated waves and converts them into digital data. In the case of the Parallax RFID Reader Module, correctly received digital data is sent serially through the SOUT pin.

## III PROPOSED METHOD

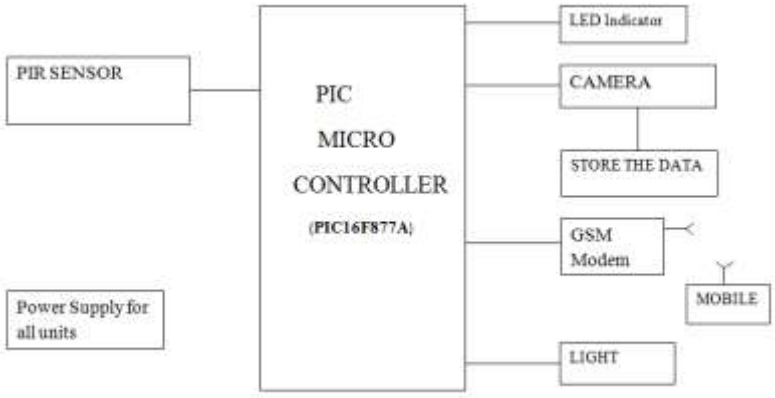


**Fig 3.1System Architecture**

In this proposed system, the home based simple surveillance structure which evaluates the improvement of a very Low-cost security system using PIR (Pyroelectric Infrared) sensors and video cameras built in the region of the PIC(Peripheral Interface Controller) microcontroller. The person progress is detected using the PIR sensors. In this time, the system triggers an alarm detecting the attendance of unauthorized person in a detailed interval of time and concurrently send a message to the SMS through GSM Modem. When the security system is activated, the CCTV camera is activated. This highly reactive approach has low computational requirement. Therefore it is well suited for home surveillance system.

## IV HARDWARE SPECIFICATIONS

### 4.1 PIR Sensor

A Pyroelectric Infrared Sensor (PIR sensor) is an electronic sensor, in that type of sensor actions the infrared (IR) light glowing from objects or human in its field of view. the normal sensor release the radiation but in this sensor detect the radiation .

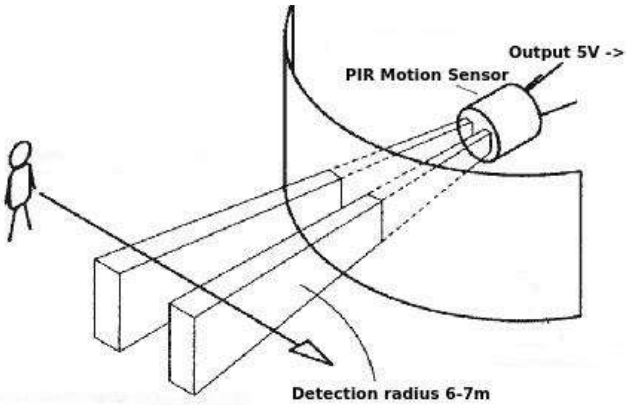


**Fig 4.1 PIRSensor**

All the objects with a temperature above absolute zero release warmth energy in the form of radiation. Usually this radiation is not observable by person eye because it radiates at infrared wavelengths, but in this infrared can be detected by electronic devices considered for detecting the human movement.

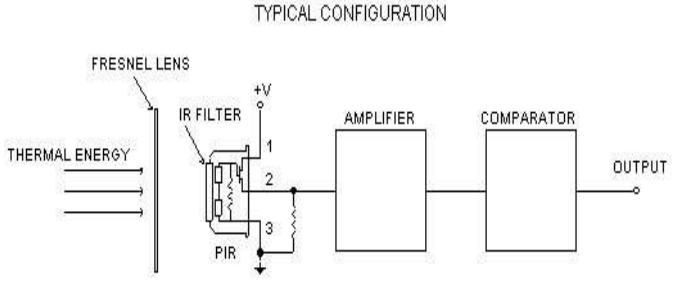


**Fig 4.2 Internal structure of PIR**

The PIR Sensor has a range of approximately 20 feet (6 meters). The sensor is considered to identify the gradually changing situation that would happen normally as the daily progresses and the environmental situation changes, but it responds by creation its output when sudden changes happen, such as when there is motion. This device is considered mostly for internal use. Operation outside or in very high temperatures may affect constancy negatively. Due to the high compassion of PIR sensor device, it is not suggested to use the some situation like rapid environmental changes and strong shock or vibration. and also in not functioning in direct sun light or direct wind from a heater or air condition.

| Pin | Name | Function |
|---|---|---|
| - | GND | Connects to Ground or Vss |
| + | V+ | Connects to Vdd (3.3V to 5V) @ ~100uA |
| OUT | Output | Connects to an I/O pin set to INPUT mode (or transistor/MOSFET) |

**TABLE1. Pin representaion of PIR sensor**

### 4.2 PIC Microcontroller

PIC is a family of adapted Harvard architecture microcontroller made by Microchip technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics Division. The name PIC is referred to as "Peripheral Interface Controller". PICs are popular with both industrial developers and hobbyists due to their low cost, wide availability, availability of low cost or free development tools, and serial programming (and re-programming with flash memory) capability.

Microchip introduced the new PIC32MX family of 32-bit microcontrollers operates at 2.3V to 3.6V supply voltage with 80 MHz frequency. The initial device line-up is based on the industry standard MIPS32 M4K Core. The device can be planned using the Microchip MPLAB C Compiler for PIC32 MCUs.

PIC microcontroller is the first RISC based microcontroller made-up in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory. The main advantage of CMOS and RISC combination is low power consumption resulting in a very small chip size with a small pin count.

**TABLE 2. Various PIC Microcontrollers**

| PIC MCU device | PIC MCU No. of Pins | PIC MCU Flash memory |
|---|---|---|
| 12F675 | 8 | 1k |
| 16F88 | 18 | 4K |
| 16F877A | 40 | 8K |

The main benefit of CMOS is that it has resistance to noise than other fabrication techniques. Various microcontrollers offer different kinds of memories. EEPROM, EPROM, FLASH etc. are some of the memories of which FLASH is the most freshly urbanized. Technology that is used in pic16F877 is flash technology, so that data is retained even when the power is switched off. Easy Programming and Erasing are other features of PIC 16F877.

### 4.3 GSM

The GSM stands for Global System for Mobile Communications. In this technology is used to the communication purpose; it operates at a baud rate of 9600bps in standard UART model through AT Commands. This GSM Modem can recognize any of the 2G or 3G network operator SIM card and act like as cellular phone with its unique phone number. Advantage of using this GSM modem will be that it can use RS232 port to communicate and develop embedded safety applications or any other applications.

This modem used to SMS Control, data transfer, remote control and logging can be developed easily. The modem can either be associated to PC serial port directly or microcontroller. It can be mainly used to send and receive SMS or make/receive voice calls. This GSM modem is a highly flexible for plug and play quad band GSM modem for direct and easy integration to RS232 applications.

AT commands are also noted as Hayes AT commands. There are numerous views to know the meanings of "AT". Some call it "Attention telephone", whereas others recognize as "Attention Terminal" commands. AT commands giving instructions to both cell phone and normal landline telephones. The AT commands are sent to the phone's modem, which can be a GSM modem or PC modem. Different creator may have different sets of AT commands. Luckily, many AT commands are the similar commands. Mobile phone manufactures may also provide with attention to operators to allow or not to allow some commands on phones.List of AT commands are listed in TABLE 3.

**TABLE 3. AT commands**

| AT command | Meaning |
|---|---|
| AT+CMGS | Send message |
| AT +CMSS | Send message from storage |
| AT +CMGW | Write message to memory |
| AT +CMGD | Delete message |
| AT +CMGC | Send command |
| AT +CMMS | More messages to send |

### 4.4 CCTV camera

Closed-circuit television (CCTV) is the use of video cameras to broadcast a signal to a specific place, on a incomplete set of monitors. It differs from broadcast television in that the signal is not openly transmit, though it may employ point to point (P2P), point to multipoint, or mesh wireless links.

### 4.5 Keypad

Keypad is used for multiple purpose .It can be use for routine time setting, manual time setting ,opening and deactivation of sensors at particular interval of time.

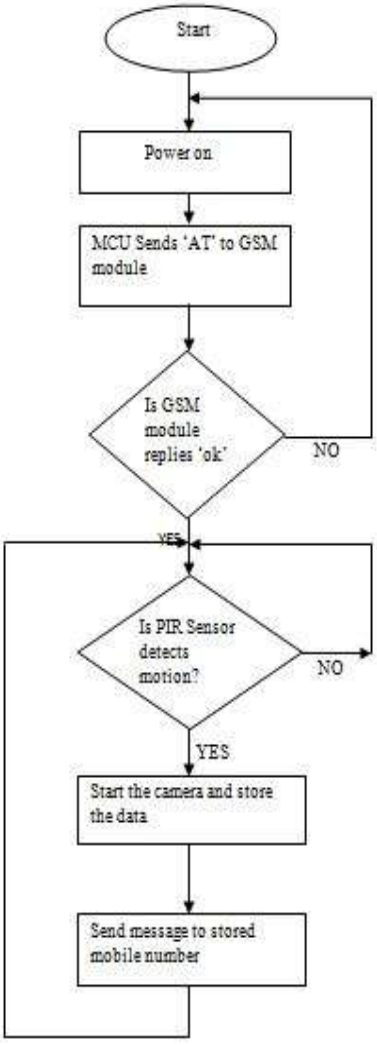


**Fig 4.1 Flowchart Representation**

## V CONCLUSION

In this surveillance security scheme PIR sensor has been used which is low power, and low cost. It have a wide lens range, and are simple to interface with microcontroller. This security scheme can be implemented in places like home, office, shop etc. The sensitivity range for detecting motion of this system is 3to 4 feet. It can be raised up to 20 feet through careful using the concentrating optical lenses as future development. In addition to this, this system can be prepared with glass fracture detectors to enhance the level of protection. Use of multi-sensor data fusion and difficult algorithm can be used to increase the effective FOV for larger spaces. In order to enhance the location accuracy and to improve the method of processing the PIR sensor signal, use of more advanced techniques such as probabilistic theories.

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