

# Security and Power Saving System Using Embedded Technology

M. Arun Prasad<sup>1</sup> | O.M. Saravana Kumar<sup>2</sup>

<sup>1</sup>(Department of B.Sc. ECS, KG College of Arts and Science, Coimbatore, India ,arunprasad1012@gmail.com)

<sup>2</sup>( Department of ECS, Sri Krishna Arts and Science College, Coimbatore, India, omssaravana@gmail.com)

**Abstract**— The research entitled security and power saving system using embedded technology is a type of sensing device. This research describes a design of effective security system that can monitor an office, home or industry with PIR sensors. Unauthorized access, temperature increment, IR detection can be monitored by the status of each individual PIR sensor. Crime happens when no one is around to notice. Now this technology can protect user's home or office with the AUTO SMS SECURITY. The system sends SMS to a particular mobile number when it detects any human motion in that room. This system is also used as a power saving system. While the system is in the power save mode, the sensor automatically monitors any temperature variation (human motion) in office or home. When any human motion is detected in that particular room, the lights and fans which are connected to the system will become ON. When no one is presented at that room, the lights and fans will become OFF state. Embedded systems have the control of the common devices in use today. Embedded system is dedicated to do specific tasks, design engineers can optimize it, reducing the size and cost of the product, or increasing the reliability and performance. The PIR sensor is connected with the PIC microcontroller and it keeps on sensing any human motion and if found any, it sends SMS to a particular mobile number and in power saving mode, it turns on the necessary relay to turn on the respective lights and fans.

**Keywords**— PIR Sensor, SMS, PIC Microcontroller, IR detection

## 1. INTRODUCTION

An embedded system could be a ADPS with an ardent perform at intervals a bigger mechanical or electrical system, usually with period of time computing constraints. It's embedded as a part of a whole device usually together with hardware and mechanical components. Embedded systems management several devices in common use nowadays. Associate in nursing embedded system could be a special-purpose ADPS designed to perform one or some dedicated functions, usually with period of time computing constraints. It's sometimes embedded as a part of a whole device together with software package and hardware components. In distinction, a general pc, like a private pc, will do many alternative tasks betting on programming. Embedded systems have management several of the common devices in use nowadays. The aim of the research is to avoid wasting the energy and conjointly used for security functions. Passive infrared sensors are used in this research work.

## 2. ARCHITECTURE OF DESIGN

In this novel approach the essential signal process is that the parameter temperature. For activity parameters values, PIR sensors are used and therefore the output of those sensors are born-again to manage the parameters. The feedback circuit is meant mistreatment micro-controller. The outputs of all the 3 parameters are fed to the small controller. The output of the small controller is employed to drive the liquid crystal display, in order that the worth of every parameter is displayed. Additionally to the liquid crystal display small controller outputs are accustomed drive a relay severally. This relay energizes with the

condition of the parameter. Associate in nursing hooked up GSM electronic equipment sends SMS to the planned variety once the PIR sensing element senses any temperature variation within the space. A Passive infrared sensing element (PIR sensing element) is associate degree electronic sensor that measures infrared (IR) lightweight diverging from objects in its field of read. They are the most frequently employed in PIR-based motion detectors. All objects with a temperature on top of temperature emit energy within the kind of radiation. Sometimes this radiation is invisible to the human eye as a result of it radiates at infrared wavelengths, however it are often detected by electronic devices designed for such a purpose.

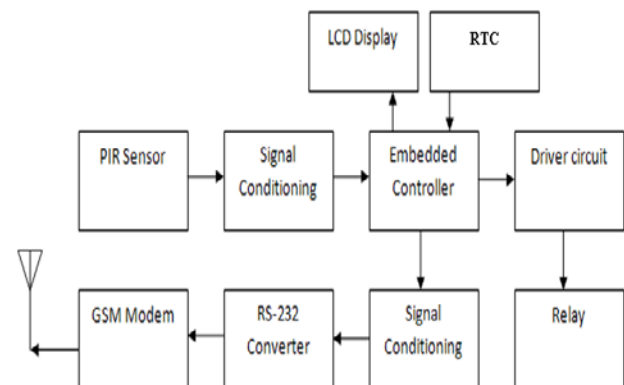


Fig. 1: General Block Diagram

The term passive during this instance refers to the very fact that PIR devices don't generate or radiate any energy for

detection functions. They work entirely by detection the energy given off by different objects. PIR sensors do not sight or live "heat"; instead they sight the actinic radiation emitted or mirrored from associate degree object.

### 3. SYSTEM OVERVIEW

When the PIR motion detection module detects any motion within the space, it sends associate degree output to the small controller that controls the entire system. Once small controller receives associate degree input, it sends associate degree output to the relay driver section. The relay driver section drives the relay ON. Once the relay was ON the LED glows. If there's no motion the LED remains silent.

Compact and complete, straightforward to use electrical phenomenon infrared (PIR) sensing element module for physique detection incorporating Fresnel lens and motion detection circuit with high sensitivity and low noise. Output could be a 5V active low signaling. Module provides associate degree optimized circuit which will sight motion up to six meters away and might be employed in thief alarms and access management systems. Cheap and straightforward to use, it's ideal for alarm systems, motion-activated lighting, vacation props, and AI applications. The project in the main includes five sections. They are PIC microcontroller, PIR sensing element section, Real clock, GSM electronic equipment and relay. The microcontroller section includes IC PIC16F877A. The microcontroller is that the heart of the circuit. The sensing element section includes two PIR sensors that square measure connected with the PIC microcontroller. Apparent movement is detected once associate degree infrared supply with one temperature, like a personality's, passes before of associate degree infrared supply with another temperature. It's sometimes actinic radiation that's invisible to the human eye. The term passive during this instance means the PIR device doesn't emit associate degree infrared beam however simply passively accepts incoming actinic radiation. "Infra" suggests that, below our ability to sight it visually, and "Red" color represents rock bottom energy that our eyes will sense before it becomes invisible.

This system contains of two modes of operation, traditional and security mode. Beneath traditional mode the system acts as an influence saver system. The keyboard is employed to line ON and OFF time. In between on and off time, the sensing element starts to figure. If any sensing element senses the human motion then the corresponding fan and light weight that square measure connected to the microcontroller can become ON. If the sensors don't seem to be detected any human motion then it'll become off. When it's switched into security mode, the liquid crystal display says 'SECURITY MODE'. During this mode of operation the system sends SMS to a predetermined mobile variety. A GSM electronic equipment is hooked up with the PIC microcontroller is employed to send SMS. Once the primary PIR sensing element senses any human

motion, it sends 'STRANGER ENTERED AT ZONE 1' to the mobile number. Once the second PIR sensing element senses any human motion in a very place, it sends 'STRANGER ENTERED AT ZONE 2' to the mobile number.

The output of the microcontroller is connected to the motive force section that consists of two relays. The two relays square measure connected to the diode and an acquaintance. The output are going to be in step with the input detected by the PIR sensors. Another output from the microcontroller is connected to a GSM electronic equipment that is employed to send SMS. Pyroelectric devices, like the PIR sensing element, have parts manufactured from a crystalline material that generates an electrical charge once exposed to actinic radiation. The modifications within the quantity of infrared putting the component change the voltages generated, that square measure measured by associate degree on board electronic equipment. The device contains a special filter referred to as a fresnel lens, that focuses the infrared signals onto the component, because the close infrared signals modification apace, the on-board electronic equipment journeys the output to point motion. The PIR (Passive Infra-Red) sensing element could be a electrical phenomenon device that detects motion by changes within the infrared (heat) levels emitted by encompassing objects. This motion are often detected by checking for a sharp modification within the encompassing IR patterns. Once motion is detected the PIR sensing element outputs a high signal on its output pin. This logic signal are often browse by a microcontroller or accustomed drive a semiconductor device to modify a better current load.

### 4. HARDWARE AND SOFTWARE DESIGN

#### A. PIR Sensor

A PIR detector may be a motion detector that senses the warmth emitted by a living body. These area unit typically fitted to security lights in order that they'll turn on mechanically if approached. They are terribly effective in enhancing in home security systems. The sensing element is passive as a result of, rather than emitting a beam of sunshine or microwave energy that has got to be interrupted by a passing person so as to "sense" that person, the PIR is just sensitive to the infrared energy emitted by each animate thing. Once associate degree entrant walks into the detector's field of vision, the detector "sees" a pointy increase in infrared energy.



Fig.2 : PIR Sensor

A PIR sensing element light-weight is meant to show on once an individual approaches, however won't react to an individual standing still. The lights area unit designed this manner. A moving person exhibits a fulminant modification in infrared energy, however a slower modification is emitted by a nonmoving body. All objects emit what's referred to as black body radiation. This energy is invisible to the human eye however will be detected by electronic devices designed for such a purpose. The term 'Passive' during this instance suggests that the PIR doesn't emit energy of any kind however simply accepts incoming actinic radiation.

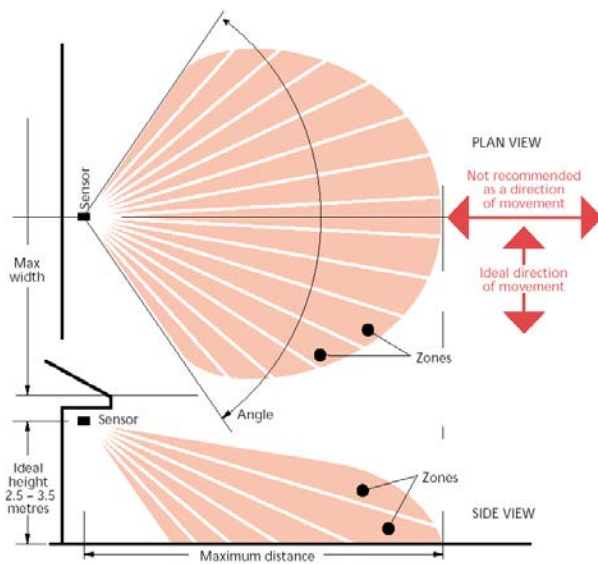


Fig.3: Width and height of the sensor

The PIR detector contains a vary of roughly twenty feet (6 metres). This may vary with environmental conditions. The detector is intended to regulate to slowly ever-changing conditions that might happen ordinarily because the day progresses and also the environmental conditions modification, however responds by creating its output high once sharp changes occur, like once there's motion.

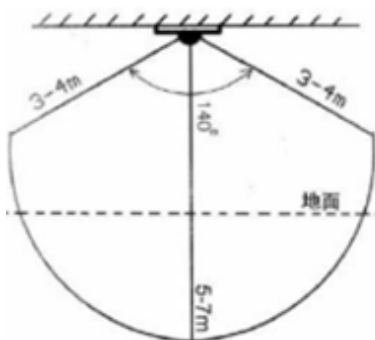


Fig.4: Sensor's Range

B. Real Time Clock

The DS1307 may be a low-power clock/calendar with fifty six bytes of battery-backed SRAM. The clock/calendar provides seconds, minutes, hours, day, date, month, and year info. The date at the top of the month is mechanically adjusted for months with fewer than thirty one days, as well as corrections for intercalary year.

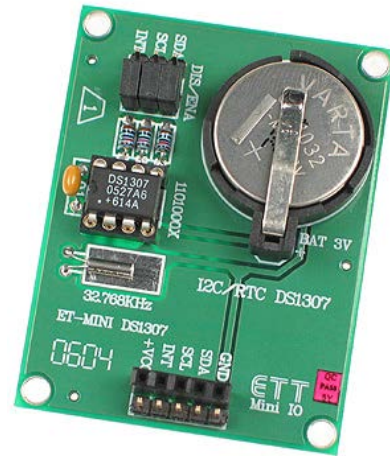


Fig.5: RTC

The DS1307 operates as a slave device on the I2C bus. Access is obtained by implementing a begin condition and providing a tool identification code followed by a register address. Future registers will be accessed consecutive till a STOP condition is dead. Once VCC falls below  $1.25 \times V_{BAT}$ , the device terminates associate access current and resets the device address counter. Inputs to the device won't be recognized at this point to stop inaccurate knowledge from being written to the device from associate out-of-tolerance system. Once VCC falls below  $V_{BAT}$ , the device switches into a low-current battery-backup mode. Upon power-up, the device switches from battery to VCC once VCC is bigger than  $V_{BAT} + 0.2V$  and acknowledges inputs once VCC is bigger than  $1.25 \times V_{BAT}$ .

C. GSM

GSM (Global System for Mobile communication) could be a digital mobile phone system that's wide utilized in several components of the globe. The mobile communications has become one in all the driving forces of the digital revolution. The complexness of the cellular phone is increasing as folks begin causation text messages and digital footage to their friends and family. The cellular phone is slowly turning into a hand-held pc. All the options and advancements in cellular phone technology need a backbone to support it. The system must give security and therefore the capability for growth to accommodate future enhancements. General System for Mobile Communications, GSM, is one in all the numerous solutions out there. GSM has been dubbed the "Wireless Revolution" and it does not take abundant to understand why GSM provides a secure and confidential methodology of



communication. GSM could be a digital mobile phone system that's wide utilized in several components of the globe. GSM operates within the 900MHz, 1800MHz, or 1900 Mc frequency bands.

D. PIC Microcontroller

A Microcontroller consists of a robust hardware tightly including memory RAM, fixed storage or read-only memory, numerous I/O options like serial ports, Parallel Ports, Timer/Counters, Interrupt controller, knowledge Acquisition interfaces-Analog to Digital convertor, Digital to Analog convertor, everything integrated onto one semiconductor. Any digital computer system needs memory to store a sequence of directions creating up a program , parallel interface or port for human activity with an external system, timer / counter for management functions like generating time delays, information measure for the port, except the dominant unit referred to as the central process unit. If a system is developed with the microcontroller, the designer must select the external memory like RAM, fixed storage or read-only memory and peripherals and therefore the scale of the PCB are massive enough to carry all the desired peripherals. But, the digital computer has of these peripheral facilities on one chip therefore development of an identical system with a microcontroller reduces PCB size and price of the look.

E. Software Section

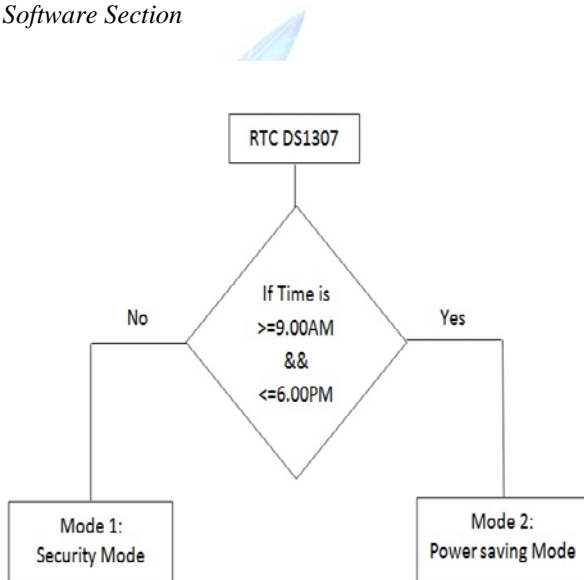


Fig.6: Operation Modes

The system development is quiet a fancy activity if massive integrated system square measure concerned. In many stages of system development, it had been necessary to research data flow and procedures. The principle activity within the development stage is that the development of procedures utilized in this research. In the embedded world, there are several reasons for developers to try to their actual programming work on a system aside from the one on that the software system can eventually run. The system could or might not have a keyboard, a screen, a drive and also the different peripherals necessary for programming it's going to not have enough memory to run a programming editor so most programming tools run. It

solely when program has been written, compiled, assembled and connected that it's touched on a target system, that stripped to customers. Most desktop system used as hosts accompany compilers, linkers and building program that may run on the host. Tee tools area unit known as native tools.

The Windows National Trust system supported an Intel Premium, as an example, builds program meant to run on an Intel Premium. These processors won't perceive binary. Pentium directions area unit made by native compiler. so it want a compiler that runs on a number system however produces binary directions that may be understood by the target chip. Such a program is termed cross-compiler.

5. CONCLUSION

This research explains regarding however the PIR detector is employed in safety and power saving system. The PIR detector unendingly monitors the human motion in wherever it's placed. As an influence system, if any detector senses the human motion then the corresponding fan and light that are connected to the microcontroller can become on. If the sensors aren't detect any human motion then it'll become off. It controls the required fans and lights in keeping with the persons in an exceedingly space and it saves the current or power employed in homes, offices, schools and industries etc. As a security system, it's used as human unwelcome person system by detective work unauthorized access, temperature increment; IR detection will be monitored by the standing of every individual detector. It will defend homes or offices with the protection alarm. The PIR detector will be ready to cowl a distance of regarding twenty feet. So, among this vary, it will be ready to discover any human motions. The distinctiveness of this research isn't solely alerting the neighbors' by alarm, it conjointly sends SMS to a specific mobile number that is already programmed into the system. This research will be increased to use it for a lot of applications in future with none major modifications. The thriving completion of this research is said in quicker processing, best user friendly, knowledge validation and straight forward installation.

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