

Industrial and home safety Management using GSM

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Abstract: Security and safety is one of the most verbalized of topics in virtually every facet like surveillance, industrial applications, offices, and in general, in perspicacious environments. In this paper we design an home and industrial embedded surveillance system which estimates the development of a Low-cost security system utilizing Global System for Mobile communication (GSM) and microcontroller. The design of simple hardware circuit enables every utilizer to utilize this wireless home security system with PIR sensor, Smoke sensor, current sensor and temperature sensor at Home & Industries.

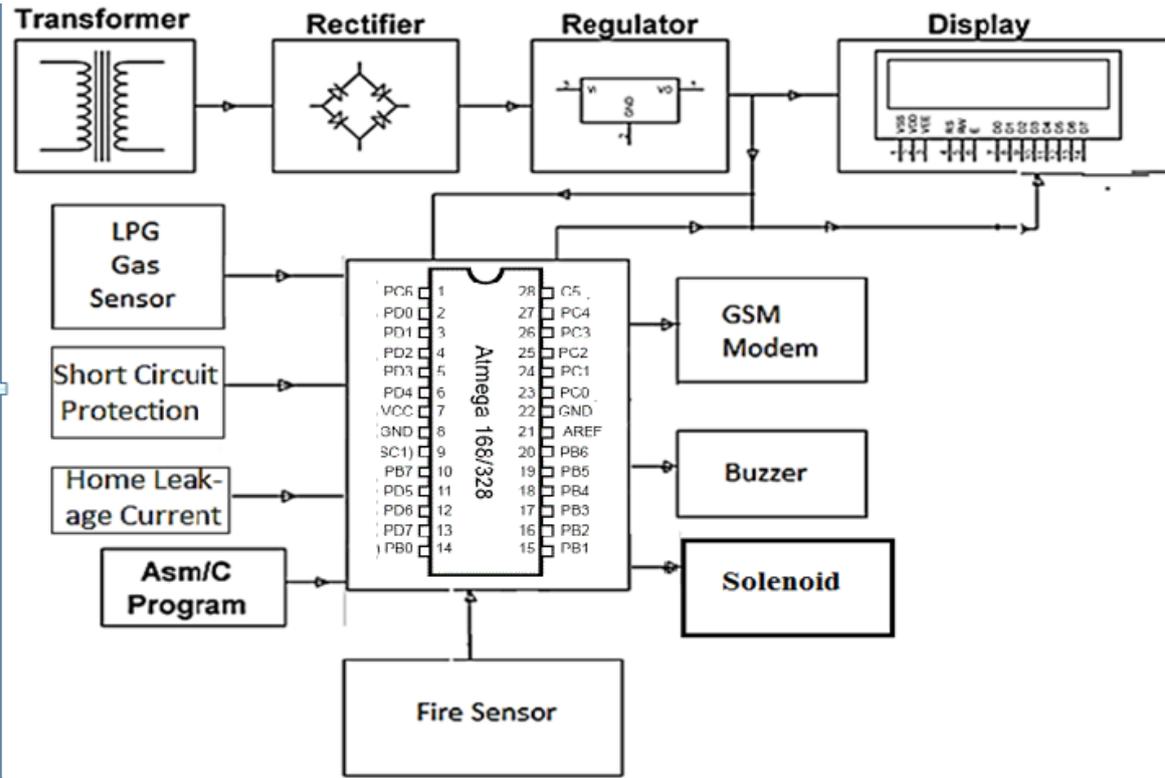
Keyword: GSM module, Atmega8 microcontroller, LM35, MQ-6 sensor, current sensor, motion sensor.

I. Introduction

Nowadays, Industrial and home security is the prime concern for an individual. The owner's look for ways to protect their personal space and enhance their habitation values. An advanced GSM based industrial and home security system is designed using smoke sensor, current sensor, temperature sensor and PIR sensor and ATmega8 microcontroller using embedded C language. These sensors are cheaper and have less maintenance compared to any other security device. When the owner is away from home or industry, all the sensors connected to the circuit are activated by switching on the Security system. When there is an abnormal condition in the system like any fire/smoke, any type of electrical fault and robbery or theft occurs in the home/industry and any intrusion into the domicile/industry. The Security system alerts the security personnel as well as the owner by sending SMS alerts to the users of the home/industry. The system operates with the avail of sensors installed in this system. The existing systems used for home/industrial security system are wired system, radio frequency based security system, and web enabled security system. The wired system and radio frequency based system are not economical for longer distance. The web enabled security system needs continuous internet access. These systems are difficult to maintain. Hence the proposed system uses GSM module which gives the real time security status of home/industry when the user is away from home/industry. GSM technology is used to communicate input signal from appliances to output message on device. The system is fully controlled by ATmega8 microcontroller. All the sensors and detectors are interconnected to microcontroller using various interfacing circuits. The microcontroller continuously monitors all the sensors and is it senses any abnormal condition then the microcontroller will send the SMS to the user through GSM module. All the sensors will be activated and the buzzer connected with the microcontroller will give an alarm and the reason for insecurity will be displayed on the LCD interfaced to the microcontroller.

II. Architecture Of The System

It can be implemented to any calibers of the security system. The architecture of the system mainly consists of three components the GSM Modem and the interface circuit that include the different sensors utilized. The function of the GSM MODEM is the remote communication between the owner and the controller through the RS232 serial communication standard. The microcontroller is connected to different sensors like smoke detector, motion detector through relays. Then the programmed microcontroller has been connected to the interface circuit and the GSM MODEM through the serial port of the GSM MODEM.



A. Atmega 328

Parameter	Value
CPU type	8-bit AVR
Performance	20 MIPS at 20 MHz ^[2]
Flash memory	32 kB
SRAM	2 kB
EEPROM	1 kB
Pin count	28-pin PDIP, MLF, 32-pin TQFP, MLF ^[2]
Maximum operating frequency	20 MHz
Number of touch channels	16
Hardware QTouch Acquisition	No
Maximum I/O pins	26
External interrupts	24
USB Interface	No
USB Speed	No

B. MQ-6 Gas/Smoke sensor

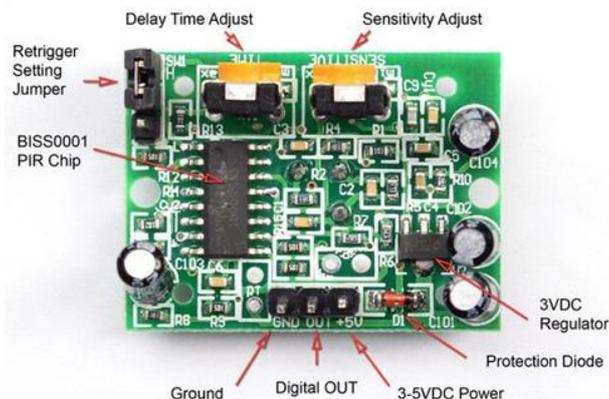


These sensors are used in gas leakage detecting equipments in home and industry, are suitable for detecting of LPG, iso-butane, propane, LNG, avoid the noise of alcohol and cooking fumes and cigarette smoke. into a crust made by plastic and stainless steel net. The heater provides indispensable work conditions for work of sensitive components. The enveloped MQ-6 have 6 pin, 4 of them are used to fetch signals, and other 2 are used for providing heating current. MQ-6 sensor sound an audible alarm to alert the operators in an area when the dangerous gas has been detected in industrial operations such as painting, fumigation, fuel filling, construction, land fill operation. This type of devices is paramount because there are many harmful gases which can affect to organic life such as human or animals. Resistance value of MQ-6 is difference to various kinds and various concentration gases. So, when using these components, sensitivity adjustment is very necessary. The detector should be calibrated for 1000ppm of LPG concentration in air and use value of Load resistance (RL) about 20K Ω (10K Ω to 47K Ω). For accurate measurement, the specific alarm point for the gas detector should be determined after considering the temperature and humidity influence. MQ-6 sensor has high sensitivity to LPG, iso-butane, propane. This sensor can detect leakage of gas/smoke up to a range of 100 - 10,000 ppm iso-butane propane. Its response is extremely fast, approximately less than 10 seconds. Its operating voltage is about 5.0V. The circuit required to drive the MQ-6 sensor is very simple. Potentiometer is used to change the sensitivity of the gas detection.

C. PIR motion sensor



PIR sensors sense the motion and detects whether a human has moved in or out of the sensor range. They are small, inexpensive, have low power, don't wear out and are easy to use. They are often found in appliances and gadgets used in home or businesses. They are commonly used as PIR, "Passive infrared", "Pyroelectric" or "IR motion" sensors. These sensors can detect the level of infrared radiations. Anything that emits some low level radiations, the hotter it gets, the more radiation is emitted. These sensors have two slots in it and each slot is made up of a material that is sensitive to IR. When there is no motion i.e. when the sensor is idle, both slots sense the same amount of IR, the ambient amount radiated from the room or walls. When a warm body passes through the room, it first cuts in one half of PIR sensor, which causes a positive change between the two halves. The reverse happens when the body leaves the sensing area and sensor generates negative change. These changes are detected by the sensor.



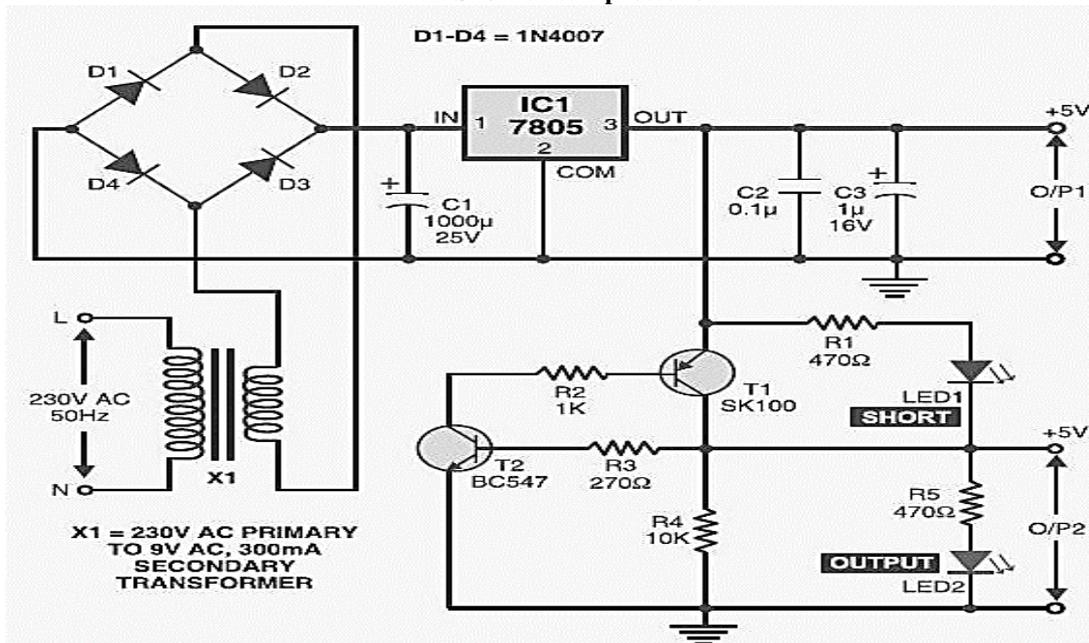
IR sensors are best for the basic projects that need to sense when a person passes by or leaves the area. They have low cost and low power, have wide range and easy to interface. The detection range of PIR sensor is up to 20 feet (6 meters). The power supply range is about 5V to 12 V. The IR sensor is equipped in a completely sealed metal can to improve noise, temperature, humidity immunity.

D .GSM

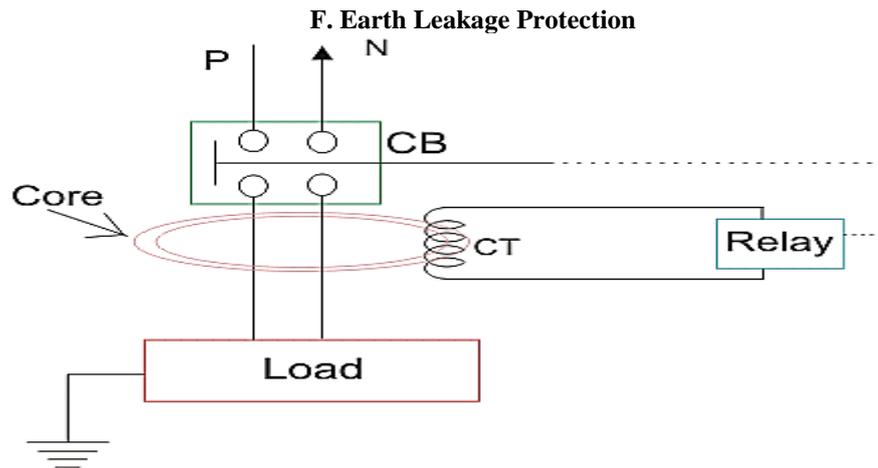


GSM modem is a plug and play simple serial interface. It is used to send SMS, make and receive calls. It is controlled by simple AT commands by microcontroller and computers. For all of its operation GSM uses the popular SIM300 module. GSM modem can be easily interfaced to microcontrollers and computers through standard RS232 interface. The modem is equipped with all the external circuitry like power regulation, external antenna, SIM holder, etc. required while experimenting with SIM300 module. It provides serial TTL interface for easy and direct interface to microcontrollers. To provide backup for the module's internal RTC a 3V Lithium battery holder is used. For better reception, it has onboard wire antenna.

E. Short circuit protection



Short circuit protection is often a desirable feature to add to power amplifiers or power supplies, for both safety concerns and protection of circuitry. The circuit in the schematic below can be used to protect the output power transistor T1. Under normal circumstances, where there is a typical load, the voltage across R1 is negligible, and T2 is turned off and the circuit acts normally. When Vout is shorted a voltage develops across R1, resulting in T2 turning on. Since the base of T1 is pulled towards ground by T2, it is turned off, and current through it is limited or completely shut off, thus protecting it from overheating and short circuit.



- If any current leaks from any electrical installation, there must-be any insulation failure in the electrical circuit, it must be properly detected and prevented otherwise there may be a high chance of electrical shock if-anyone touches the installation. An earth leakage circuit breaker does it efficiently. Means it detects the earth leakage current and makes the power supply off by opening the associated circuit breaker. The working principle of current earth leakage circuit breaker is also very simple as voltage operated ELCB but the theory is entirely different and residual current circuit breaker is more sensitive than ELCB. Here one CT core is energized from both phase wise and neutral wire. Single Phase Residual Current ELCB. The polarity of the phase winding and neutral winding on the core is so chosen that, in normal condition mmf of one winding opposes that of another. As it is assumed that, in normal operating conditions the current goes through the phase wire will be returned via neutral wire if there's no leakage in between.
- As both currents are same, the resultant mmf produced by these two currents is also zero-ideally. The relay coil is connected with another third winding wound on the CT core as secondary. The terminals of this winding are connected to a relay system. In normal operating condition there would not be any current circulating in the third winding as here is no flux in the core due to equal phase and neutral current.
- When any earth leakage occurs in the equipment, there may be part of phase current passes to the earth, through the leakage path instead of returning via mental wire. Hence the magnitude of the neutral current passing through the RCCB is not equal to phase current passing through it.

III. Conclusion

From this project we can easily sense the abnormal condition and the safety measure can be conducted automatically and Real time information send to operator or house owner by using GSM.

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