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Research Paper

ENACTMENT OF SCADA SYSTEM FOR JUDICIOUS DWELLING

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This project is concerned with the design and implementation of an embedded surveillance system with ultra-low alert power which find application in security related areas such as house applications. In this surveillance system, the microcontroller unit consumes less memory space and normally stays in sleep state, and it get activated, when the sensors are enabled. Pyroelectric Infrared sensors (PIR), senses the presence of human in the abandoned area. The presence of obstacle/intruder at a distance sensed by the Ultrasonic sensor. The vibrations that may be created by the intruders detected by the Vibration sensor. When any one or two sensor gets activated, the buzzer automatically alerts the presence of intruder. The embedded surveillance system determines the sensor's result from the controller, and sends the information to the owner through Short Message Service (SMS).

Keywords: GSM (Global System for Mobile communications), Microcontroller, SMS (Short Message Service)

INTRODUCTION

Design and implementation of an embedded surveillance system with ultra-low alert power finds application in security related areas such as military applications, government related organizations. Traditional surveillance systems suffer from an unnecessary waste of power and the shortcomings of memory conditions in the absence of invasion. The MCU normally stays in a sleep state, unlike the traditional surveillance system which stays in the detection state. We reduce the power consumption in the alert or sleep state by 10.9 times by maintaining 90% in the alert state and 10% in the detection state.

Sensors with low-power consumption are placed near those windows and doors where an intruder must pass through. The embedded surveillance system reduces unnecessary memory consumption for the capture of images without an intruder, compared to previous surveillance systems. This method saves a large number of sensors required for the purpose of surveillance.

Pyroelectric Infrared sensors (PIR) and ultrasonic sensors are placed in windows and doors where an intruder must pass through. When an intruder enters the sensing area, the sensors wake up the sleeping Micro Controller

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Unit (MCU) which starts the power supply for the indoor sensors and for the sensor signal transmission to the embedded system. The PIR sensor will sense the presence of human in the abandoned area; and ultrasonic sensor senses the distance at which the obstacle/intruder is present. The vibration sensor detects the presence of vibrations that may be created by the intruder. The load cell present at the entrance determines the weight of the intruder, which helps us to identify whether the intruder is human or an animal. The embedded surveillance system determines the sensor results and then decides whether to send information to the owner through SMS.

MARKET SURVEY

According to the market research, the common parameters or characteristics of home security system are 24 h monitoring of the intruder, ease of use, reliability, efficient, fast and precise notification system. Today numbers of home security systems are available in market. In paper (Zhao and Ye, 2007) a design which contains a home network including a GPRS/GSM gateway and six kinds of security sensor nodes is presented. The system is based on SMS technology using any GSM modem/mobile is presented in . The proposed remote control system works from anywhere in the world. A low cost Short Message System (SMS) based home security system equipped with sensors.

PROPOSED SYSTEM

In this paper the alerting sensors with low-power consumption are placed near those home windows and doors where an intruder must pass through. When an intruder enters the sensing area, the sensors wake up the sleeping MCU

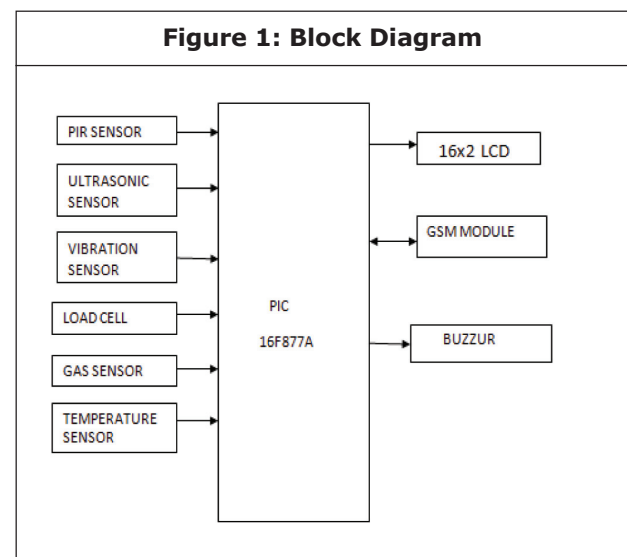
which starts the power supply for the indoor sensors and for the sensor signal transmission to the embedded system. The embedded surveillance system determines the sensor results and then decides whether to start the GSM to send the SMS to the owner.

ADVANTAGES

- Can use multiple sensors.
- Low power consumption
- Improve reliability.

HARDWARE DESIGN

Hardware of the system contains sensors, PIC16f microcontroller, sim548c (GSM module), Buzzer, in system programmer and relays to control the appliances. The system design is shown in Figure 1.



The outputs of all the sensors are connected to PIC. When the unauthorized entry occur in a room buzzer will be turned ON. Temperature is continuously monitored, if it is high (greater than 45°) in case of fire, a SMS is sent ("Fire at home") to the home owner. If gas sensor is ON indicating the gas leakage then SMS will be send to the owner ('Gas Leakage').

Microcontroller Unit

The control module is built with the microcontroller IC. The central controller is PIC16f which is 16-bit Microcontroller with 16/32/64K Bytes and in-System Programmable Flash. It is having advanced RISC architecture. It consists of Two 8-bit Timer/Counters with separate prescalers and Compare Modes, one 16-bit Timer/Counter with separate prescaler, compare Mode, and capture Mode, Real time counter with separate oscillator, six PWM channels, 8-channel 10-bit ADC and 32 Programmable I/O Lines.

GSM Module Unit

A SIM548C based quad band GSM module which supports GPS technology for satellite navigation is used. It provides GPRS multi-slot class10 / class8 capabilities and supports GPRS coding schemes CS-1, CS-2, CS-3, and CS-4. This module takes care of all your GSM-GPRS based communication requirements as well as provides live GPS data. An HD44780U based LCD is embedded onboard (operates in 4-bit mode) interfaced with the microcontroller. A 10-pin programming interface is used to transfer (flash) the programs (in form of .HEX files) to the microcontroller. Another 10 pin header is attached to serves as the interface to external input sources (sensors)

Sensors Used in the System

PIR, senses the presence of human in the abandoned area. The presences of obstacle/ intruder at a distance sensed by the Ultrasonic sensor. The vibrations that may be created by the intruders detected by the Vibration sensor. The load cell present at the entrance determines the weight of the intruder, which helps us to identify whether the intruder is human or an animal The LM35 is used as temperature sensor whose

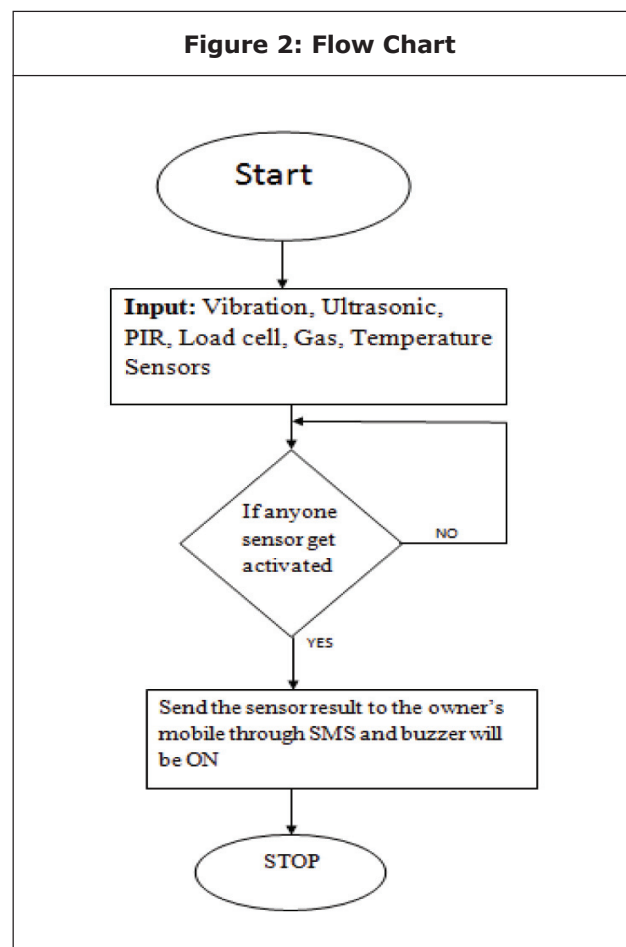
output voltage is linearly proportional to the Celsius (Centigrade) temperature. It gives linear output 10.0 mV/0 C as scale factor. Gas sensor to detect any gas leakage

SOFTWARE DESIGN

The proposed system uses PIC microcontroller, programming is done in ‘C’ language and to download the program into PIC chip, extreme burner is used.

MikroC PRO and eXtreme Burner for PIC

In this system MikroC PRO is used to develop the program for PIC microcontroller. To get the HEX file from developed C program, eXtreme Burner software is used. The flow chart of whole system is shown in Figure 2.



RESULTS AND DISCUSSION

The developed GSM based security system gives good response to the sensor and sends SMS when it detects the fire or temperature is increased above desired level or detection of intrusion at the windows. The time taken by the system to deliver the SMS is dependent on the coverage area or range of the specified mobile network. If the mobile is in the range of the system then the SMS is delivered in 25-30 s.

Advantages of the proposed system:

1. As the system is SMS based, there is no need to have extra circuitry to transmit SMS. Mobile networks are used for transmission.
2. It is very cost effective, as day by day the cost of SMS is reducing.

Drawbacks of the proposed system:

1. All over the world, there could be a area where the mobile network is not established, so no connectivity of mobile phones in that area. Therefore, SMS cannot be delivered.
2. Older people still are not familiar with the use of mobile and find it difficult to see the SMS on mobile.

CONCLUSION

The GSM based home security system has been designed and tested with the mobile network. The user can get alerts anywhere through the GSM technology thus making the system location independent. A flexible way to control and explore the services of the mobile, AT commands is used in the system. The communication of home is

only through the SMS which has been tested with the mobile networks and is working on any mobile network.

The system has tested on the model of smart home and further it will be tested in actual home. The complexity of the algorithm of the system can be increased by introducing number of sensors to make the energy efficient home.

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