

Intelligent Security System for Industries by using GPS and GSM

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Abstract

Security has becoming an important issue everywhere. Home, industries and vehicle security is becoming necessary nowadays as the possibilities of intrusion are increasing day by day. Safety from leaking of raw gas and fire are the most important requirements of home and industrie security system for people. A traditional security system gives the signals in terms of alarm. However, the GSM (Global System for Mobile communications) based security systems provides enhanced security as whenever a signal from sensor occurs, a text message is sent to a desired number to take necessary actions.. in this system use GPS and GSM. GPS finds location and sends location information where the fire occurs to nearest fire station and police station and also open emergency windows.in this system sends SMS which uses GSM- GPS Module (sim548c) and ATMEL89S51 microcontroller, sensors, relays and buzzers.

Keywords

GSM ,GPS, fire sensor, security system Microcontroller, SMS (Short Message Service).

I. Introduction

Home and industries security has changed a lot from the last century and will be changing in coming years [1]. Security is an important aspect or feature in the smart home applications [2]. The new and emerging concept of smart homes offers a comfortable, convenient, and safe environment for occupants. Conventional security systems keep homeowners, and their property, safe from intruders by giving the indication in terms of alarm.

However, a smart home security system offers many more benefits. This paper mainly focuses on the security of a home and industries when the user is away from the place and industrial areas away from cities if fire occurs during night this system sends the location details by means of sending longitude and latitude angles by using GPS and sends messages to fire station, police station ,and predefined numbers.

At the fire and police station received information has a destination address to find route in google map from fire and police station. This system uses fire sensors and gas sensors that finds fire occurred or not if occurred it sends control signal to microcontroller. The microcontroller receives the GPS information by GPS modem connected to the microcontroller and it sends the message using GSM modem containing information of longitude and latitude angle calculated by GPS. The microcontroller also sends signal to the alarm and signal to the emergency window that opens by means of actuators.

II.

According to the market research, the common parameters or characteristics of home and industries security system are 24 hours monitoring of the intruder, ease of use, reliability, efficient, fast and precise notification system. Today number of home security systems are available in market. In this paper [4], a design which contains a home network including a GPRS/GSM gateway and three kinds of wireless security sensor nodes are presented. This system has a user interface and it can respond quickly to alarm incidents.

In paper [5], a new method of moving object detection by combination of pixel illumination with its chroma in YUV color space is implemented. The algorithm of maintenance with 3 key values is discussed in this paper. In case of swaying objects, it is

very robust and effective way of false alarms. Paper [6] discusses the detection and description based on an object oriented, statistical multi feature analysis of video sequences.

The system described in [7] monitors everything by moving cameras. The system can increase the efficiency of monitoring and can eliminate the blind spots of fixed cameras. In this system, a mobile manipulator is developed which is equipped with cameras at the arm end for purpose of monitoring. The system is based on SMS technology using any GSM modem/mobile is presented in [8]. The proposed remote control system works from anywhere in the world. A low cost Short Message System (SMS) 18F4520 through the SMS having password.

III. Proposed System

Proposed system consists of various sensors like fire sensor, gas sensors, light sensor etc. Home appliances like LED lights and fans are also connected to make the home energy efficient. The proposed system is controlled by an ATMEL89s51 microcontroller. If fire sensor detects fire then send control signal to the microcontroller interfaced to it the microcontroller take necessary action like emergency alarm, emergency window opener and sending location information to the fire station using GSM and GPS. At the fire and police station use location information by means of longitude and latitude angle and find the shortest route to the location by using google map. The figure1 shows the transmitter at the station side,figure2 shows the receiver at the fire station and figure 3 shows the GPS module.

IV. Hardware Design

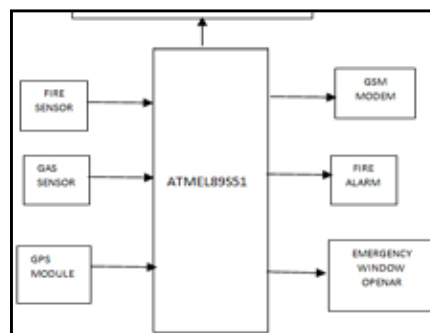


Fig.1: Proposed system



Fig.2: Receiver at fire station

A. Sensors

Fire and gas sensors used in this system. These sensors read the fire and send electrical signals to ADC which converts analog signal to digital. This is taken as an input to the microcontroller.

B. Microcontroller Unit

This is the heart of this system. The central controller is ATME89S51 which is an 8-bit microcontroller with 16/32/64K Bytes and in-System Programmable Flash. It has 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.

C. GSM Module Unit

A SIM548C based quad-band GSM module which supports GPS technology for satellite navigation is used. It provides GPRS multi-slot class 10 / class 8 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. There is an attached FT232RL USB interface for serial communication with PC or other serial devices. This USB port is also interfaced with the microcontroller. When connected to a PC, the port presents itself as a virtual serial (RS232) port. 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 serve as the interface to external input sources (sensors) or output devices (LEDs). AT Command is a set of commands or instructions which can be used to communicate (talk) with a GSM modem/mobile phone. AT commands are used to automatically receive the call on system from the preconfigured number and system also sends the message to preconfigured number about the intrusion indication through AT commands [9]. The AT commands of GSM-GPRS modules are given below.

D. GPS (Global Positioning System)

A GPS navigation device is a device that receives Global Positioning System (GPS) signals to determine the device's location on Earth. GPS devices provide latitude and longitude information, and some may also calculate altitude, although this is not considered sufficiently accurate or continuously available enough (due to the possibility of signal blockage and other factors) to rely on exclusively to pilot aircraft. GPS devices are used by the military,

by aircraft pilots, by sailors, and for recreational purposes by the public.

GPS devices may have capabilities such as:

Maps, including street maps, displayed in human-readable format via text or in a graphical format, turn-by-turn navigation directions to a human in charge of a vehicle or vessel via text or speech, directions fed directly to an autonomous vehicle such as a robotic probe,

- Traffic congestion maps (depicting either historical or real-time data) and suggested alternative directions,
- Information on nearby amenities such as restaurants, fueling stations, and tourist attractions.

GPS may be able to answer:

- Roads or paths available,
- Roads or paths that might be taken to get to the destination,
- If some roads are busy (now or historically) the best route to take,
- The location of food, fuel or other needs,
- The shortest route between the two locations.



Fig.3: GPS module

E. Actuators

An actuator is a transducer which converts electrical signal into mechanical energy. Here it is used to open an emergency window in case of accidents.

F. Receiver at the fire station

The receiver at the fire or police station is a smartphone having an application of Google Maps that shows the shortest route to the destination.

V. Software Design

The proposed system uses a microcontroller. Programming is done in embedded 'C' language using Keil software and the program is downloaded into the microcontroller using IC burners.

A. Algorithm of the proposed system

- Step 1: Initialize LCD, relays and ADC etc.
- Step 2: Take output of all sensors in ADC
- Step 3: If fire sensor is ON
- Step 4: Make alarm ON
- Step 5: Make emergency window opening
- Step 6: Take GPS values
- Step 7: Send message to fire, police and owner

VI. Results and Discussion

The proposed systems are tested on the model of smart security system (which is shown in Figure 1). The sensor based security system detects the motion and sends message to fire, police station and owner. The system is very simple and easy to use. There are various parameters which can be adjusted in this software. 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 seconds.

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.

VII. Conclusions

The GSM GPS based home and industry 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. This system user friendly and software has many features. It will be more easy to use and easy to replace. Similar softwares are available on internet which will perform the same task. This type of system is useful when the owner is out of station and the home is locked. then intrusion mail can be received by police and fire also and necessary action can be taken. The system has tested on the model of smart home and further it will be tested in actual industries. 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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