A LOW COST GPRS BASED WIRELESS HOME SECURITY SYSTEM

Abstract

Home security system is needed for occupants’ convenience and safety. In this paper, we present the design and implementation of a low cost, low power consumption, and GSM/GPRS (global system for mobile communication / general packet radio service) based wireless home security system. In existing system, the home network is engaged with non-wireless technology, where the installation and maintenance is difficult. So the system cost is very high. In our proposed system, these difficulties are overcome by introducing a wireless home network which contains a GPRS Gateway and three kinds of security nodes namely door security node, fire alarm node and PIR node. The nodes are easy installing. All the three nodes are connected to the microcontroller. In turn, the microcontroller is connected to the PC.

Home Security System

The general structure of the home security system is shown in Figure below. The system includes two parts: wireless security sensor nodes and a GSM/GPRS gateway. There are three kinds of sensor nodes in this system: door security nodes, infrared security nodes and fire alarm nodes. The GSM/GPRS module is the interface between the gateway and the GSM/GPRS network.

The General Structure of the Sensor Nodes

IMPLEMENTATION

The Home security system is a wireless home network and it is implemented using embedded C. The system contains a GPRS gateway and three kinds of wireless security sensor nodes that are

1. Door security node
2. Fire alarm node
3. PIR sensor node

The nodes are easy installing. All the three nodes are connected to the microcontroller. In turn, the microcontroller is connected to the PC or MOBILE. When alarm incidents occur, the nodes will send alarm information to the GSM/GPRS gateway immediately.
1. IMPLEMENTATION OF DOOR SECURITY NODE:

1. Door security node adopts magnetic sensor.
2. The sensor doesn’t need external power supply and has an ON/OFF signal output according to the distance from magnet to dry spring.
3. The distance threshold is 16 mm.
4. If it doesn’t exceed the threshold it is in OFF state.
5. If it exceeds the threshold i.e., if the door is opened, the sensor is in ON mode, and sends the signal to the PC via GPRS Modem as “door is broken”.

2. IMPLEMENTATION OF PIR SECURITY NODE

(1) The infrared security node adopts a pyroelectric infrared sensor (PIR).
PIR sensor responds to the infrared radiation of human body whose radiation is strongest at wavelength between 9.4 μm and 10.4 μm.
When an intruder enters these areas, the sensor will detect the infrared radiation generated by the intruder and output a signal whose range is about 1mV and frequency is about 1Hz.
4. After sensing the intruder it sends an alarm signal to user’s PC via GPRS Modem as “Intrusion Detected”.
5. It remains in OFF state if there is no intrusion.
If the human intrusion is detected, alarm incidents occur. The nodes will send alarm information to the GPRS gateway immediately. The message is sent via GPRS modem to the users PC.

3. IMPLEMENTATION OF FIRE SECURITY NODE
   1. fire alarm node adopts a temperature sensor and an infrared receiver.
   2. If temperature or infrared of environment exceed defined thresholds, the node sends out alarm signal.

3. After sensing the increase in temperature it sends an alarm signal to the PC through GPRS modem as “temperature exceeded”
4. It remains in OFF state if temperature is below the defined threshold

4. THE WIRELESS COMMUNICATION
   When alarm incidents occur, the nodes will send alarm information to the GSM/GPRS gateway immediately. If there is no alarm incident, the gateway and sensor nodes use a query-reply communication mode.

CONCLUSION
This paper presents the design and the implementation of a wireless home security system.
PSoC devices and wireless transceiver modules are adopted. The system has a friendly user interface and employs some methods to reduce the power consumption. Communication of the system is complete wireless, which makes the system easy to install and use. The system is low cost, low power consumption and easily operable. In addition, the wireless transceiver modules enable the system to transfer other information such as voice and picture rather than just alarm signals.

**FUTURE WORKS**

As a result, the system can lightly be expanded to other applications. The system is secured with a login password. As a future work, we are currently working to establish a more secure system by researching a proper wireless security protocol.

**REFERENCES**

