

A Review on Surveillance and Protection System for Malls

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Abstract

Safety is one of the most important issues in professional trade. With the development of society many social evils are also increasing day by day. The anti-social activities like theft, robbery and burglary are causing headache to civilized society and hence should be eradicated at any cost. In Indian malls, presently most of the shops are locked with shutters. These are not the safest ways since most of the times these can be simply broken by gas cutters. So, more secure way is needed to get rid of such issues. Global System for Mobiles (GSM) is rapidly advancing mobile communication technology and the decrease in costs make it possible to incorporate mobile technology into various systems. Smartphones have also rapidly incorporated in day to day life, making it possible to use in security systems. In proposed technique, unauthenticated openings of shutters of shops in mall are alerted locally and wirelessly by sending smartphone notifications. Proposed system will be very useful to shop owners and can be extended with password enabled digital shutter lock and remote control system, if required. Proposed system describes battery operated module connected by IR sensors and buzzers for alerting purpose.

Keywords: Smartphone; IR sensors; GSM; Battery operated; Zigbee

Introduction

Ours is the world of technology and safety is one of the most important issues in nature. Negligence in the safety part may cause damaging of high quality equipment hampering of production or may cause loss of human life also in extreme cases. Communication is the most vital key factor today, to monitor different parameters continuously and to take necessary actions accordingly to avoid any types of hazards related to production, security, managing of human resources. With the development of technology and the continuous improvement of people's living standard, people are in pursuit of automated, intelligent and convenient security systems. With the popularity of smart phones, particularly, the phone based on Android System will become a mainstream way to remote control. With increasing usage of GSM, network services are expanded beyond speech communication to incorporate many other custom applications. ZigBee, an IEEE 802.15.4 standard and very closely resembles Bluetooth and Wi-Fi standards, is attractive largely because of its low power consumption and open specifications which makes the devices ideal for battery operated uses. It is designed for low-power consumption allowing batteries to essentially last longer. A system should be developed with the help of low power consuming sensors, ZigBee and GSM to eradicate cons of these traditional systems through a technical approach. The system should prevent the theft in shops and other establishment. Developed system must be able to warn about stir up to shutters of shops in malls. The system should have the features of easy installation and low cost, and the hardware and software can be customized and extended.

Review of Literature

As per the survey taken on Indian malls, presently most of the shops are simply locked by conventional locks or in-build shutter

locks. But unfortunately, these are not the safest ways since most of the times it can be simply broken by gas cutters. These do not provide a sense of security and privacy to the opening and doorways in any room. These types of locks are helpless when middle part of shutter is used to break to enter in shop by thieves as shown in Figure 1.



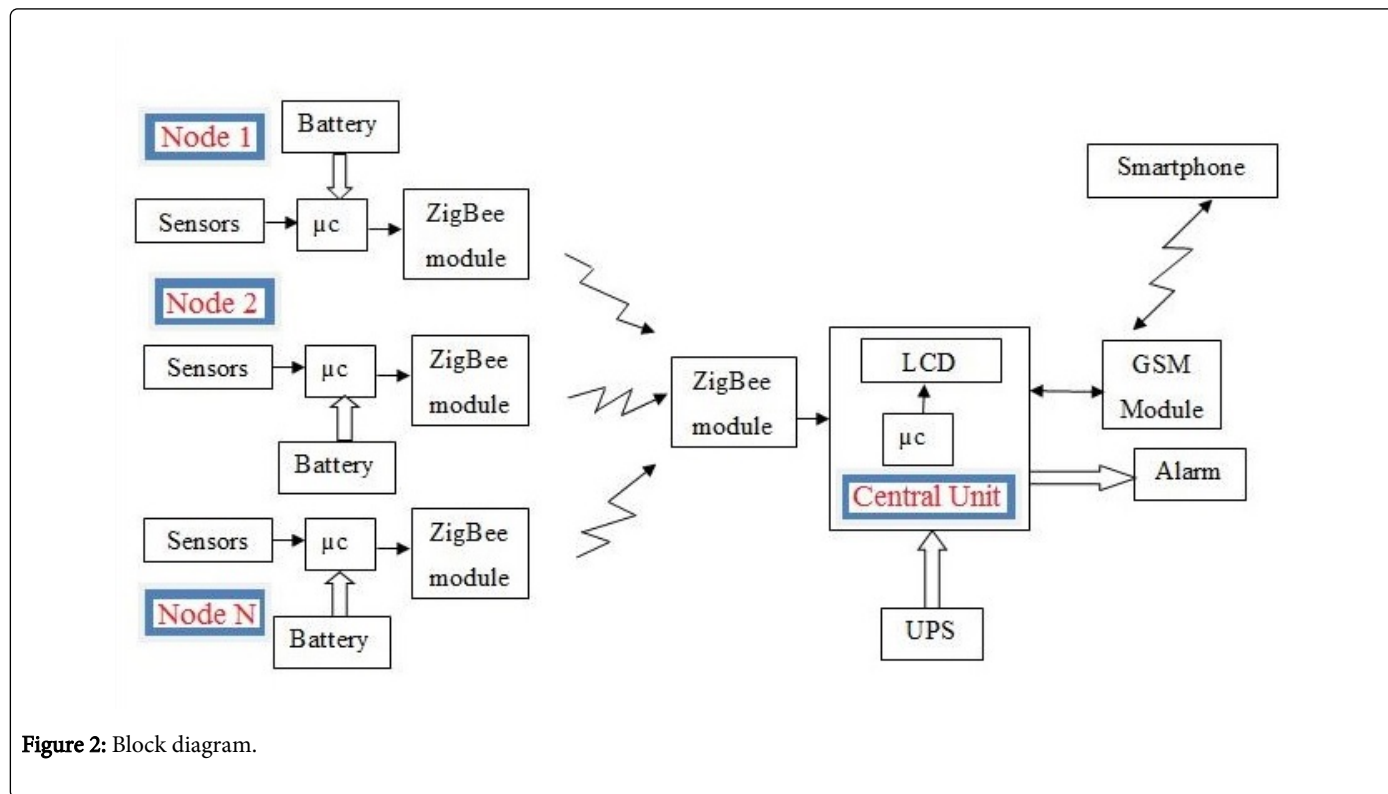
Figure 1: Shutter broken by gas cutter.

Existing systems are present for detection of leaking of raw gas and fire, theft and sends alarm short message to the user's cell phone when any dangerous condition has been detected [1]. Its hardware part consists of single chip C5081F310, SIMENS TC35 GSM module as well as the wireless receiving and sending chip CC1100. Android smart phone based remote appliances control system is designed [2-10]. In this system a user logs into the smart phone interface, and taps buttons on home map's GUI to send message commands which will be transmitted to the home information center through GSM network.

Proposed system differs from these by providing smartphone notification alerts and graphical user interface with preloaded maps for exact event location findings.

Method

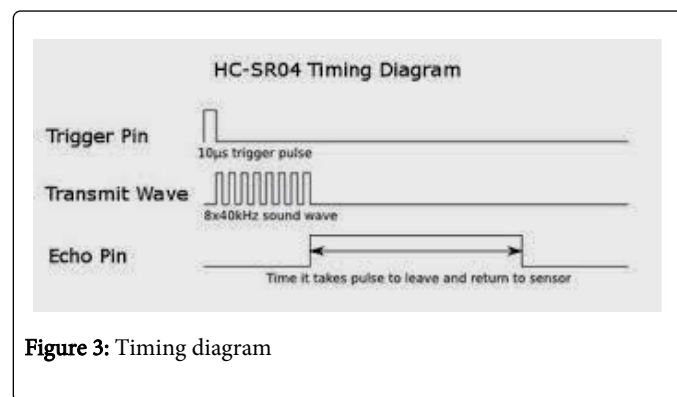
Block diagram consist mainly 3 sections as shown in Figure 2 below:



Sensing part

As general requirements of being a slave module, sensing part should be tiny in design, battery operated and easy to install. So, low power consuming sensors should be interfaced in sensing part to last battery longer. Three types of sensors are used to detect motion at entrance viz. IR sensor, Ultrasonic sensor and LDR. The IR Sensor is a general purpose proximity sensor. Usually it is used for obstacle detection or collision detection. The module consists of a IR emitter and IR receiver pair and 555 timer IC. Timer IC is used to generate particular frequency signals (e.g. 38 KHz) to transmit through emitter. Transmission of a specific frequency signals is required so that same can be received through IR receiver and no other IR signals from environment like signals emitted from human body. IR sensor (TSOP) and ultrasonic sensor (hc-sr04) are interfaced with transmitting ZigBee module with the help of avr 16. HC SR-04 ultrasonic sensor is one of the most popular distance sensors among robotic hobbyists. The ultrasonic sensor module consists of ultrasonic transmitter, receiver and control circuit. Ultrasonic Sensor (HC SR-04) module is high performance, sensor, provides stable and high accuracy and easy to interface with a micro-controller. It's ranging distance is 2 cm to 350 cm with accuracy of 3 mm. These qualities make it ideal for designing object detection and avoidance schemes. +9 V battery operated slave nodes are mounted at windows (with IR sensors) and at door openings (ultrasonic sensors) of shops in mall to detect intruders. Ultrasonic sensor works on trigger (TTL-10 µsec) pulse provided by any device. To achieve a perfect 10 µsec trigger pulse, 5 µsec of low is send before the pulse. When trigger pulse sends to trigger pin of HC SR-04, then sensor module sends 8 cycles of 40 KHz frequency pulses and receives echo signal after striking on object and reflecting back. Figure 3 shows

a timing diagram of ultrasonic sensor. The distance between object and sensor is calculated by measuring high level time of the echo pulse which can be retrieved from ECHO pin of sensor module and processing the high level time. If object is detected in range of ultrasonic sensor and on interruption in other sensors line of sight, wireless signals are transmitted to master and alarm is activated.



LDR (Light Dependent Resistance) is used to interruption detection occurred in LASER rays placed across door side [4]. ZigBee has been a preferred technology by many to create personal area networks mainly because of the fact that it is an open standard. In addition, zigbee offers high data security and reliability, and strong data encryption capabilities. zigbee is ideal for research related activities. Though transmission distance of zigbee is limited to 10–100 meters line-of-sight, depending on environmental characteristics and power output,

it is best suited protocol at slave nodes due to its low power consumption requirement and unlicensed open access.

Controlling part

The central part of the system is controller. Controller can be placed at a safe place like attaching to ceiling, in security cabin etc in mall. Controller is interfaced with different devices like Zigbee and GSM. GSM module and Zigbee module require serial port for interfacing with controller. The SIM900 module is used to realize the GSM communication, and it is integrated with the RF circuit and GSM baseband processor. GSM module and AVR communicate with each other by AT commands. Firstly, the AVR serial port and GSM module are initialized, and the AVR processor sends the command "AT" to the GSM module to ensure their connection.

Remote alerting system

GSM module is used to send signals received from controlling part to smartphone. The terminal based on android phone is designed, which contains GUI design. A notification will pop up for each event occurred and android app shows exact location of event on pre-loaded maps. User can also send query about current status by sending query sms at any time.

Conclusion

Varies security systems are available for homes, companies and shops for protection like sensor based, video recorder, network video recorder, attendance and face recognition (biometric) etc. Though all of them claim the best, but in reality none. This paper provides a survey over all of them and describes their inefficiency. Main advantage of proposed system is that it is real time operating and sends alerts on remote devices, low power requirements and cost effective. The proposed system has features of low cost and easy installation, and the software and hardware can be customized and extended.

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