AN INTEGRATED WIRELESS SENSORS NETWORK BASED HOME SECURITY ALERT SYSTEM

B.Naveenkumar ,S.Dhivagar , R.Perumal, S.Pradeepraj , S.E.Murthy, M.Bharathi selvaraj

ABSTRACT

In recent years, the home environment has seen a rapid introduction of network enabled digital technology to establish safety and protection in Homes. The Wireless and Remote control technology provides control and monitoring with enabled devices. This paper identifies the reasons for this slow adoption and evaluates the potential of ZigBee for addressing these problems through the design and implementation of flexible home automation architecture. A ZigBee based home automation system and Sensor Network is integrated through a common home gateway. The home gateway provides network interoperability, a simple and flexible user interface, and remote access to the system. A dedicated virtual home is implemented to cater for the system's security and safety needs. To demonstrate the feasibility and effectiveness of the proposed system, four devices, a light switch, vibration sensor, safety sensor and ZigBee remote control have been developed and evaluated with the home automation system.

Keywords: GSM Modem, ZIGBEE, Micro controller, Wireless sensor network.

INTRODUCTION

There is a growing interest in intelligent home network as away to offer a comfortable, convenient and safe environment for occupants. In order to enhance the occupants'convenience and safety, home security system is indispensable in the field of intelligent home network. The requirements of a home security system include low cost, low power consumption, easy installation and rapid response to alarm incidents.

According to connecting mode, home network can be divided into two kinds: wireless network and non-wireless network. The wireless technology has some remarkable benefits comparing with non-wireless technology. For example, it makes the installation and maintenance easier and reduces the system cost. Bluetooth, ZigBee, Radio Frequency, GSM and wireless USB

are the most popular technologies in the field of home wireless network introduces a method to form ahome network which provides flexible and dynamic servicesvia Bluetooth. However, the system mentioned in is high power consumption and high cost so that it is not convenient to use in security system and present how to

apply ZigBee to establish a home network that is cost effective and low power consumption.

LITERATURE SURVEY

Syam Krishna, J.Ravindra et al[1], design and implementation of remote home security system based on wsns and gsm technology.Security has been an important issue in the smart home applications. Conventional security systems keep home owners, and their property, safe from the intruders. A smart home security system, however, offers many more benefits. The system is composed of the microcontroller based wireless sensor network center node with GSM module, data collecting node, device control node and mobile phone. The wireless sensor network data collecting node module is connected with Pyroelectric Infrared Detector, Temperature Sensor ,Smoke Detector and Gas Sensor separately. When the PIR finds that some people intrudes into the house or when the temperature sensor detects too high indoor temperature or when the gas sensor detects leakage of gas, the data collecting node will send encoded alarm signal to the wireless sensor network

center node through the wireless sensor network established in home. Once the Wireless sensor network center node receives alarm signal, it will send alarm short message to the users through the GSM module and GSM network immediately.

Khusvinder Gill, Shuang-Hua Yang, Fang Yao, and Xin Lu et al[2], A zigbee-based home automation system. In recent years, the home environment has seen a rapid introduction of network enabled digital technology. This technology offers new and exciting opportunities to increase the connectivity of devices within the home for the purpose of home automation. This paper identifies the reasons for this slow adoption and evaluates the potential of ZigBee for addressing these problems through the design and implementation of a flexible home automation architecture.To demonstrate the feasibility and effectiveness of the proposed system, four devices, a light switch, radiator valve, safety sensor and ZigBee remote control have been develop and evaluted with the home automation system.

EXISTING SYSTEM

Low-cost security system using small PIR (Pyroelectric Infrared) sensor built around a microcontroller. The low-power PIR detectors take advantage of pyro electricity to detect a human body that is a constant source of Passive Infrared (radiation in the infrared region).The system senses the signal generated by PIR sensor detecting the presence of individuals not at thermal equilibrium with the surrounding environment. Detecting the presence of any unauthorized person in any specific time interval, it triggers an alarm & sets up a call to a predefined number through a GSM modem. This highly reactive approach has low computational requirement, therefore it is well-suited to surveillance, industrial applications and smart environments. Tests performed gave promising results.

PROPOSED SYSTEM

The setup of home security automation consists of atmega328 micro controller, which acts as a main console to communicate with the input devices viz., sensors and the other output devices viz., gsm module, zigbee, alarm, relay driving circuit.

The PIR sensor senses the human activity at place where it is installed. The Vibration sensor used is the piezo electric sensor, which generates signals due to vibrations caused due to any abnormal activities occurring in the silent region. The gas sensor consists of MQ6, which can be able to sense propane, butane, LPG types of gases and sends signal to the controller. The smoke sensor is used to sense the smokes released due to fire.

The signal from the sensors is been received by sensor control unit and transmits to ATMEGA328 micro controller which can interface using keypad and display. ATMEGA328 micro controller sends instruction to gsm module which is been interfaced with user mobile phone, alarm driving circuit to alert the people about the abnormal activity, zigbee.

There are many Safety and Protection techniques. The Proposed system is based on Sensor Networks interfaced with wireless communication devices. The wireless devices provide advancements in long distance and accuracy better than wired components. Gas Sensor, PIR sensor, Accidents and Power Saving concepts.

The Automatic and closed loop control sensor and wireless network establish home security and monitoring with low Cost system. The Microcontroller controls and monitors all sensors and activates the external devices like exhaust fan and buzzer. Zigbee device is used as a wireless medium to provide Trip facility of EB main Switch Board Supply in order to protect from fire accident during Gas Leakage.
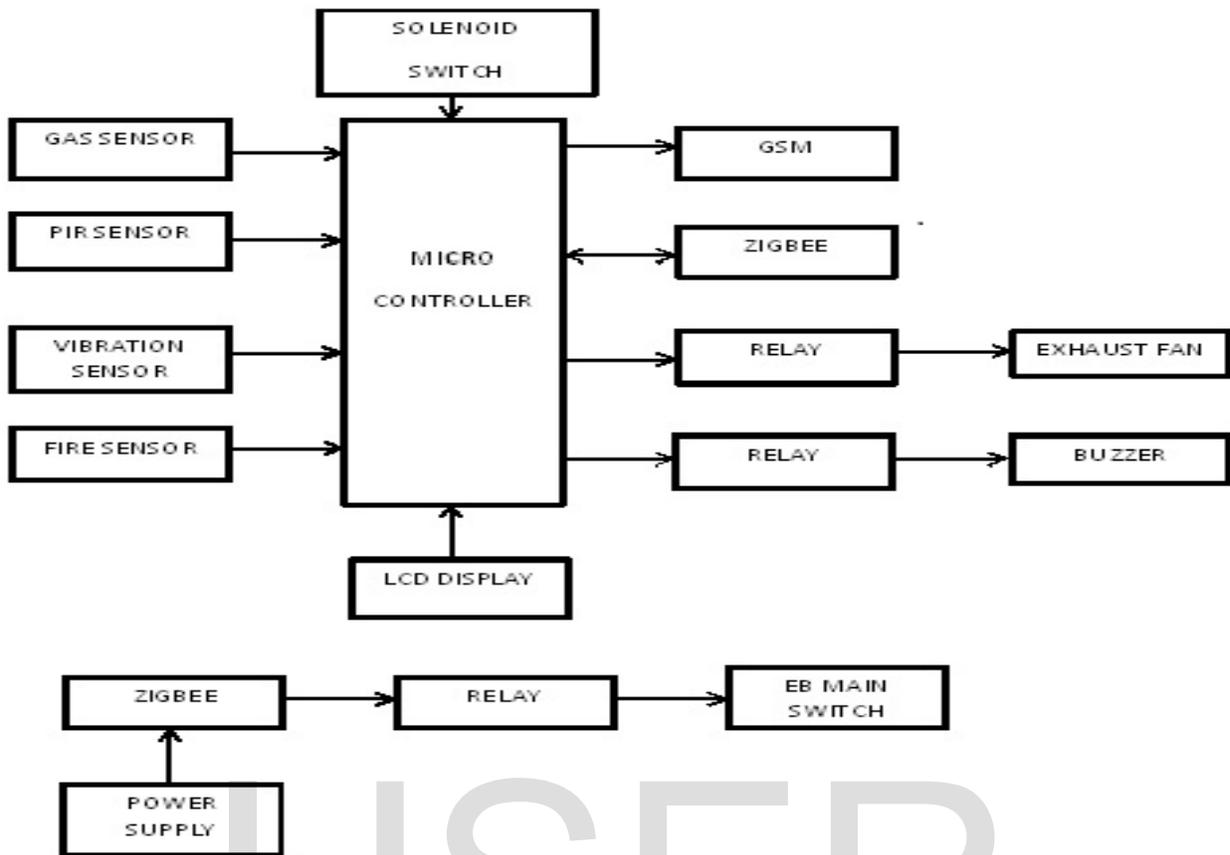
Figure 1: Block diagram of the proposed system.

VARIOUS SENSOR USED:

I.PIR SENSOR:

PIR is basically made of Pyro electric sensors to develop an electric signal in response to a change in the incident thermal radiation. Every living body emits some low level radiations and the hotter the body, the more is emitted radiation. Commercial PIR sensors typically include two IR-sensitive elements with opposite polarization housed in a hermetically sealed metal with a window made of IR-transmissive material (typically coated silicon to protect the sensing element).When a warm body like a human or an animal passes by, it first intercepts one half of the PIR sensor which causes a positive differential change between the two halves. When the warm body

leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected
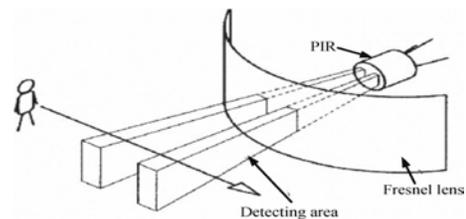

Fig .2 PIR sensor

II. VIBRATION SENSOR:

In this integrated home security system piezoelectric sensor used as vibration sensor. A piezoelectric sensor is a device that uses the piezoelectric effect to measure pressure, acceleration, strain or force by converting them to an electrical signal in fig 3.
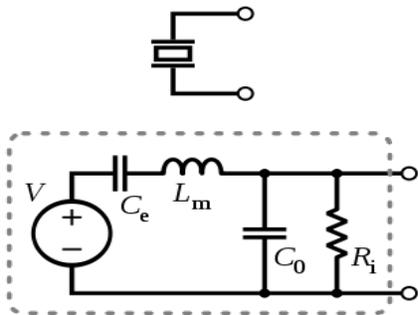

Fig .3 vibration sensor

III. SMOKE SENSOR:

A fire sensor also called a smoke alarm is a device that detects smoke, typically as an indicator of fire. Commercial, industrial, and mass residential devices issue a signal to a fire alarm system, while household detectors, known as smoke alarms, generally issue a local audible or visual alarm from the detector itself.

IV.GAS SENSOR:

The main function of the detection module is to detect changes in concentration of combustible gas and activate an audio-visual alarm switch off the gas flowing value and also the main supply of the whole circuit. A solid state gas sensor MQ6 is used. Tin di oxide SnO_2 is the sensitive material of MQ-6 gas sensor, this has lower conductivity in clean air but when the target combustible gas exists in the environment, the sensor's conductivity increases, and resistance of sensor changes with the concentration of combustible gases. A simple electronic circuit can be used to convert the change in resistance to change in terms of concentration of combustible gases.MQ-6 gas sensor has highsensitivitytoMethane LPG and coal gas. Low cost and long life are the advantages of

using this sensor. For the sensor to function properly the sensor needs to be heated for specific amount of time called the preheat time.

WIRELESS NETWORK

I. GSM MODEM:

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone.GSM modems can be a quick and efficient way to get started with SMS, because a special subscription to an SMS service provider is not required. In most parts of the world, GSM modems are a cost effective solution for receiving SMS messages, because the sender is paying for the message delivery. The integrated home security system, based on ZigBee and GSM technology, can detect the theft, leaking of raw gas and fire, braking of windows, doors and send alarm message remotely. The hardware of this system includes the single chip, wireless receiving and sending chip as the TC35 GSM module. The system software developed in Embedded C Language has the ability of collecting, wireless receiving and transmitting data, and can send a piece of alarm short message to the user's mobile phone when some dangerous condition has been detected and users automatically stop the devices with messages.

II.ZIGBEE

The mission of the ZigBee Working Group is to bring about the existence of a broad range of interoperable consumer devices by establishing open industry specifications for unlicensed, untethered peripheral, control and entertainment devices requiring the lowest cost and lowest power consumption communications between compliant devices anywhere in and around the home.

The ZigBee specification is a combination of Home RF Lite and the 802.15.4 specification. The specific

 operates in the 2.4GHz (ISM) radio band - the same band as 802.11b standard, Bluetooth, microwaves and some other devices. It is capable of connecting 255 devices per

network. The specification supports data transmission rates of up to 250 Kbps at a range of up to 30 meters. ZigBee's technology is slower than 802.11b (11 Mbps) and Bluetooth (1 Mbps) but it consumes significantly less power.

FEATURES OF ATMEGA 162 MC

- High-performance
- Two 16-bit Timer/Counters with Separate Prescalers, Compare Modes
- Five Sleep Modes:
     Idle, Power-save, Power-down,   Standby, and Extended Standby.

SILENT FEATURES OF INTEGRATED HOME SECURITY SYSTEM:

 It has the following features:

(1) Low cost. All the microprocessors used in the sensor nodes and the gateway are cheap 8-bit microprocessors, and all other devices are inexpensive.

(2) Low power consumption. All security sensor nodes are powered by batteries.

(3) Easy installing. Because the nodes communicate with the gateway by wireless, they can be installed anywhere inside the home.

4) Rapid response. The GSM/GPRS gateway will send SMS (Short Message Service) messages to inform remote PMP (Property Management Person) and users when alarm incidents occur.

(5) Friendly user interface. The system has a friendly user interface including sixteen capacitive sensor keys and a LCD. Users can view the states of security sensor nodes, modify password of the gateway and change the mobile phone number for receiving the alarm messages.

(6) Emergency alarm function. There is an emergency alarm key (SOS key) in the GSM/GPRS gateway which makes users at home to alarm in emergency situations.

CONCLUSION

This paper presents the design and the implementation of awireless 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. 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

1. Yuanxin Lin, Rui Kong, Rongbin She and Shugao Deng " *Design and Implementation of Remote/Short-range Smart Home Monitoring System Based on ZigBee and STM32*" © Maxwell Scientific Organization, Published: March 20, 2013

2. Syam Krishna1, J.Ravindra **"***design and implementation of remote home security system based on wsns and gsm technology*" *published in* [**IJESAT**] International Journal Of Engineering Science & Advanced Technology Volume-2,

3. Somak R. Das, Silvia Chita, Nina Peterson, Behrooz A. Shirazi, Medha Bhadkamkar "home automation and security for mobile devices"

4. Khusvinder Gill, Shuang-Hua Yang, Fang Yao, and Xin Lu "*A ZigBee-Based Home Automation System*"   IEEE Transactions on Consumer Electronics, Vol. 55, No. 2, MAY 2009

5. Guang-xue Yang, Feng-jiao Li "investigation of security and defense system for home based on internet of things" 2010 International Conference on Web Information Systems andMining.

6. Faizan Farid, Muhammad Rehan,Faiza Faizan, M Tahir Qadri"*Home Automation And Security System via PSTN*" 2010 2nd International Conference on Education Technology and Computer (ICETC).

BIBLIOGRAPHY

B.NAVEEKUMAR is pursuing eighth semester, Bachelor of Engineering in the discipline of Electrical and Electronics Engineering at Knowledge Institute of Technology, Salem, affiliated under Anna University, Chennai, India. He has presented number of technical papers in symposium,National Conferences and International conference. He is doing Minor research works on various fields like Microcontroller, Power Electronics, Renewable Energy systems and Embedded System. He got State second prize for his projectand achieved many price in different conducted by AMBER'Z association. He is member of Green Club and higher education cell. He is highly appreciated by the Head of the Department.

S.DHIVAGAR is pursuing eighth semester, Bachelor of Engineering in the discipline of Electrical and Electronics Engineering at Knowledge Institute of Technology, Salem, affiliated under Anna University, Chennai, India. He has presented number of technical papers in National Conferences. He is doing minor research works on various fields like Microcontroller, and Power Electronics. He is highly appreciated by the Head of the Department.

R.PERUMAL is pursuing eighth semester, Bachelor of Engineering in the discipline of Electrical and Electronics Engineering at Knowledge Institute of Technology, Salem, affiliated under Anna University, Chennai, India. He has presented number of technical papers in symposium, National Conferences and International conference. . He is doing minor research works on various fields like Power Electronics and Embedded System. He is highly appreciated by the Head of the Department.

S.PRADEEP RAJ is pursuing eighth semester, Bachelor of Engineering in the discipline of Electrical and Electronics Engineering at Knowledge Institute of Technology, Salem, affiliated under Anna University, Chennai, India. He has presented number of technical papers

Symposium .He is doing minor research works on various fields like Power Electronics and Embedded System. He is highly appreciated by the Head of the Department.

S.E.MURTHY is currently working as an Assistant professor in the Department of Electrical and Electronics Engineering at Knowledge institute of technology, Salem. He presented papers in National and International level conferences. He is the staff coordinator of EPE club at Knowledge institute of technology, Salem. His research interests lie in the field of Power Electronics Control System and Renewable Energy.

Mr.M.BHARATHI SELVARAJ is currently working as an Associate Professor in the Department of Electrical and Electronics Engineering at Knowledge Institute of Technology, Salem. He received his UG degree in the discipline of Electrical and Electronics Engineering from Government College of Engineering, Salem 636011 under Anna University, Chennai and got PG degree in Power Electronics and Drives discipline from Annai Mathammal Sheela Engineering College under Anna University, Coimbatore. He has guided number of project for students. He is the staff Co-ordinator of AMBER'Z Electrical Engineer's Association at Knowledge Institute of Technology, Salem. His research interests lie in the field of Power Electronics, Renewable Energy and Power System.

IJSER