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Study of Zigbee Based Smart home Security System and Fire alarm

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ABSTRACT
The paper will explain the designing and implementation of smart home security systems that will be cheap and easy to use by using the most widely deployed enhancement to the 802.15.4 standard, which is better known as Zigbee. Using Zigbee network enabled digital technology of wireless communication, we can make ourhome Smart and secure. This technology gives us the opportunity to increase the connectivity of various devices hence we can get an overall security solution. We are implementing use of both the Arduino and decreasing the cost of the system by later on using only the IC provided on the Arduino to reduce the hardware size. The use of thissystem would be user-friendly, flexible and cost effective.

I. INTRODUCTION

In day-to-day life, we come across different issues related to security. The issues can be like robbery, tempering the lock in a house etc. which means a lock cannot be a liable trusted source with the sense of security. Hence, we needed to develop an advanced technology to improve the security of such places. So our house will have some of the advanced security features that could simultaneously automatically detect the situation and work accordingly with a mini brain kind-of system. We can convert our houses into a Smart Home by using some of the commonly used cheap sensors that can be found in the market easily. These sensors will work as the eyes and ears of the house. Hence the brain of our house here is ATMEGA168 Micro-Controller on which the whole system will perform its operations. This system will use the Zigbee technology. Zigbee is an IEEE 802.15.4 based specification of high level Communication protocol for wireless communication for sending and receiving data through multiple routers and end-devices, which is suited for creating.

Personal Area Network. This network will connect all the sensor devices and the micro-controller and relay devices & fire alarm sensors. The advantageof using Zigbee is that it works on low power and have sufficient amount of network range.

II. ZIGBEE

Zigbee Technology is a type of Wireless Communication Network that defines a set of protocols for use in low data rate, short to medium range wireless networking devices like sensors and control networks. Zigbee Technology is a low cost, low power, battery operated wireless sensors that do not need to constantly update its status and it also allows sleep mode or low power mode. Zigbee Technology is based on IEEE 802.15.4 Standard and operates in 2.4 GHz ISM Band (ISM – Industrial, Scientific and Medical). Although 2.4 GHz band is commonly used worldwide for commercial Zigbee devices, it uses a different set of frequency bands like 784 MHz, 868 MHz and 915 MHz respectively.

III. ATMEGA168 MICROPROCESSOR

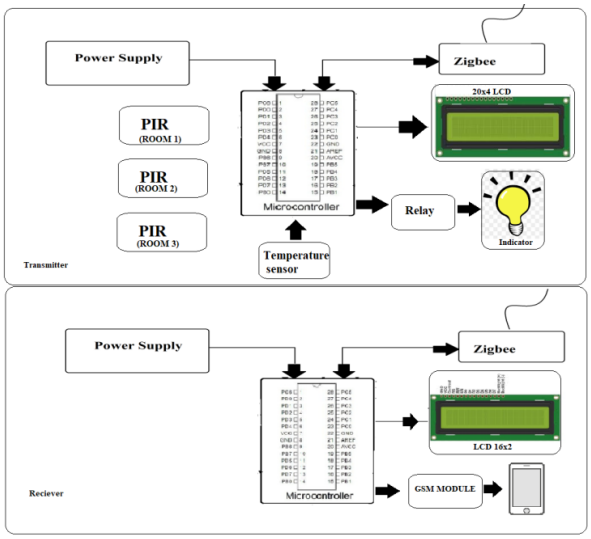
Tit is a high-performance, low-power Microchip AVR® RISC-based CMOS 8-bit microcontroller that combines a 16 KB ISP flash memory with read-while-write capabilities, 512B EEPROM, 1 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, byte-oriented two-wire serial interface, SPI serial port, 6-channel/10-bit A/D converter , programmable watchdog timer with internal oscillator, and five software selectable power saving modes. By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed. The high-performance, low-power Microchip AVR® RISC-based CMOS 8-bit microcontroller combines 16 KB ISP flash memory with read-while-write capabilities, 512B EEPROM, 1 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and

external interrupts, serial programmable USART, byte-oriented two-wire serial interface, SPI serial port, 6-channel/10-bit A/D converter (8-channel in TQFP and QFN packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

IV. GSM MODULE

These modules are one of the commonly used communication modules in embedded systems. This module is used to enable communication between a microcontroller and the GSM wirelessly.

GSM stands for Global System for Mobile Communication. A GSM MODEM comprises of a GSM Module along with some other components like communication interface, power supply and some indicators. With the help of this communication interface, we can connect the GSM Module on the GSM MODEM with an external computer (or a microcontroller).



V. HARDWARE

1- Smoke Detector
2- Temperature Sensor
3- Alarm
4- GSM Module
5- Zigbee Module
6- Proximity Sensor
7- Motion Sensor

VI. COMPARISON

Comparision of Zigbee with related technologies:-

Technology	Bluetooth	WiFi	Zigbee
Frequency	2.4GHz	2.4GHZ 5GHz	868MHz 915GHz 2.4GHz
Modulation	FHSS	QPSK COFDM QAM	BPSK O-QPSK
Error Control	CRC(16 bit)	CRC(32 bit)	CRC(16 bit)
Range	10m	100m	10m-100m
Network Size	8	2007	64000
Power Consumption	Medium	High	Very Low

VII. CONCLUSION

The system is purely targeted for the security of Homes, Banks, Industries etc. with the mindset of hardware minimum and security maximum. Since nowadays everyone is conscious about the security of their life and property we want to provide such a system that will take care of it. This proposed technology is reliable, cost saving and effective. The System implements wireless networkusing Zigbee Module as it has higher efficiency and low power consumption. The preliminary test results are promising and are being

slowly coming into trend and more research is going on to make Zigbee more reliable.

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During this project, I acquired many valuable skills, and I hope that in the years to come, those skills will be put to good use.

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