

# Design of Remote Intelligent Smart Home System Based on Zigbee and GSM Technology

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## ABSTRACT:

Based on ZIGBEE and GPRS technology a wireless remote and smart home security system has developed. Wireless remote systems for smart home application is developed to analysis and detect the status of home equipments based on GPRS and ZIGBEE technology. It consists of host control system and several sub function module and software. The host control system has GPRS module, a controller, ZIGBEE module and PIR sensor. The several sub function modules consists of the data acquisition module, centralized switch and ZIGBEE module.

## INTRODUCTION:

As the science and technology has advanced, many applications developed in each and every field. In the communication field the technologies used such as GSM, Bluetooth, WI-FI so on. The wireless communication technology is existing in wide range. The smart home application is also one of the important applications which led to luxury home environment and more to the pursuit of security which made the people living life style more comfort and improved the people living standard. Many applications has been developed and many smart home applications have come into existence which led to luxurious home environment. Wireless remote systems for smart home application is developed to analysis and detect the status of home equipments based on ZIGBEE and GPRS technology.

The aim of the smart home application is to discover a valuable wireless system that will provide controlling of the home equipments remotely whenever the home host is absence of home, the host remotely manipulates the home equipments by the smart home application which is the main aim of this system. As the advance of technology, the user has to

take the advantage of technology in such a way that a person can send a message to home control center

when he forgot to turn off air conditioner instead of returning home. In addition it also provide the home security. This application proposes a system that allows user to control home equipments any where any time.

## RELATED WORK:

### A. SYSTEM ARCHITECTURE:

The host sends the text message via GPRS mobile phone to the master slave or host control center the work of the home appliance and appropriate control of them. The control center detect an external interrupt, when an external interrupt occurs, the buzzer will automatically alarm, the control center to send text message to mobile phone. ZigBee module is responsible for receiving and sending data between the host control and sub function system. Data transmission is due to communication between the ZigBee and ZigBee modules. GPRS module is responsible for receiving the control system issued the warning signals and sent over the control command to the host center.

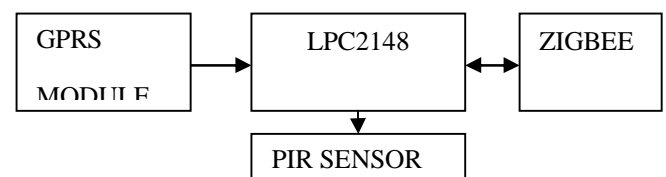
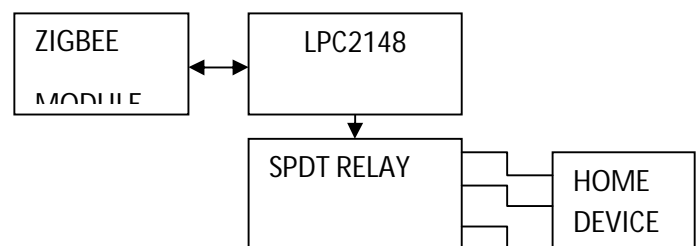


Figure1 Host control center



*Figure2 Sub function system*

### **A. GPRS MODULE:**

The system uses the GSM / GPRS module which is produced by Siemens Company, GPRS module is designed for GSM communication module business, which provides GPRS service. It is compatible with GSMphase2/2, support for dual band (GSM900, 1800), ETSI compliant GSM0707 and GSM0705, which includes the GSM baseband processor, power supply ASIC, RF, and Flash memory and other parts. With this module we can implement SMS and GPRS services, to complete long-distance communication system needs. Interface module ZIF40 connected with the main control center, in which GPRS module is connected with a user's system through serial port, and does not need Level conversion.

### **B. ZIGBEE MODULE:**

ZigBee application used to implement embedded system on a chip which is makes by Chipcon Company. It supports 2.4GHz IEEE802.15.4 ZigBee agreement. According to the different chip flash memory capacity, It provides users with three versions, namely CC2430-F32/64/128, corresponding to the built-in flash memory 32KB/64KB, 128KB. CC2430 chip with a powerful integrated development environment as a support, the internal circuit interactive debugging of the IAR IDE to comply with industry standards support, embedded institutions received a high recognition.[2] CC2430 is the extension of the previous chip architecture of CC2420 chip, integrated on a single chip with ZigBee radio frequency (RF) front end, memory and microcontroller.

### **C. LPC2148:**

The LPC2141/2/4/6/8 microcontrollers are based on a 32/16 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty.

Due to their tiny size and low power consumption, LPC2141/2/4/6/8 are ideal for applications where miniaturization is a key requirement, such as access

control and point-of-sale. A blend of serial communications interfaces ranging from a USB 2.0 Full Speed device, multiple UARTS, SPI, SSP to I2Cs and on-chip SRAM of 8 kB upto 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers particularly suitable for industrial control and medical systems.

### **D. PIR SENSOR:**

The PIR (Passive Infra-Red) Sensor is a pyroelectric device that detects motion by measuring changes in the infrared levels emitted by surrounding objects. This motion can be detected by checking for a high signal on a single I/O pin.

### **E. SPDT RELAY:**

A **relay** is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism, but other operating principles are also used. Relays find applications where it is necessary to control a circuit by a low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits, repeating the signal coming in from one circuit and re-transmitting it to another. Relays found extensive use in telephone exchanges and early computers to perform logical operations. A type of relay that can handle the high power required to directly drive an electric motor is called a contractor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device triggered by light to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protection relays".

### **F. BUZZER:**

FDK piezoceramic buzzers generate sound through the bending vibrations of a thin metalplate adhered to a piezoceramic disc. These buzzers feature a low power consumption, a safe, spark-free and non-contact structure, and a small size and light weight

for an easy mounting to printed circuit boards. As a result, an increasing number of piezoceramic buzzers are now used to generate an artificial voice in combination with voice synthesizing ICs. To produce high-quality piezoceramic buzzers, FDK has capitalized on many years of piezoceramics production and outstanding ceramic processing technologies and thin film forming techniques. By adding a sophisticated audio know-how to this manufacturing expertise, FDK offers a large array of electronic tone generating products, such as piezoceramic diaphragms, sounders and buzzers, to meet loud sound outputs, wide frequency ranges, and many other requirements.

**SYSTEM IMPLIMENTATION & RESULT:**

The host send text messages to GPRS module, the module begin to interpret the command when it receives the command, and then send the command to the control center of the ZIGBEE co coordinator module. Finally the command was sent to the appropriate sub-control terminal equipment by the ZIGBEE module sub-control terminal take the corresponding actions when it receives a command.

**A. The architecture of the host control centre design :**

The host control centre consists of five modules: The remote communication module GPRS, ZigBee wireless communication module, control module , power module and PIR sensor. The system ZigBee module which features Chipcon's CC2430 radio transceiver chip, the remote communication function is performed by Siemens GPRS module to achieve, control module from the macro crystal technology STC series single-chip control, power module GPRS. The control unit MCU controls all the operations of the host system units which provides the communication to the host and the home equipments. The PIR sensor is used to identify the home equipment disturbance when the host sets the absence of home of any one. The PIR sensor gives the abnormal or error message to the host through the GPRS module. The below figure gives the block diagram of the host control system.

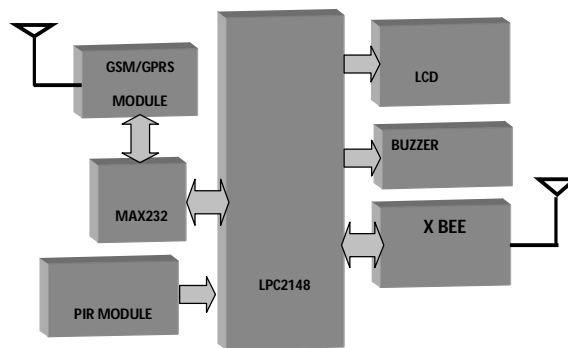


Figure3 gives the block diagram of the host control system

**B. The architecture of Sub-control terminal hardware design:**

The sub control system consists of three modules ZigBee wireless communication module, centralized switch or SPDT Relay and the MCU module. The ZigBee module gets the appropriate condition from the host control system which the host wants to get that device to be controlled or turn off that device. The MCU module controls all the operations performed by the sub control unit. The centralized switch gets the condition from the MCU module to turn off the device. The switch or relay turns the device into appropriate condition which the user wants. Thus the sub control terminal is designed to operate according to the host. The block diagram of the sub control unit is shown

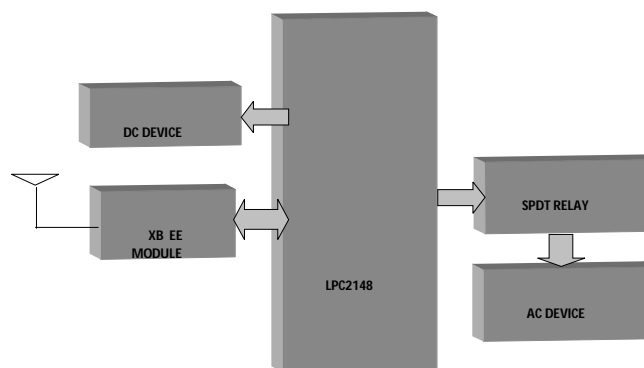


Figure4 gives the block diagram of the sub function

**FLOW OF OPERATION:**

The system software includes the host control system and sub function system. The function of the host control system includes data processing and transmission. The main function of the sub function system is data collection and then sending the data to the host control centre and controlling the household appliance according to commands sending from the host control centre. The below is the flow chart of the host control system and sub function system.

**ALGORITHM:**

**ALGORITHM OF HOST CONTROL SYSTEM:**

STEP1: Start

STEP2: Reset and initialization

STEP3: User gives the miscall to the host controller device for the identification of the user MSISDN number.

STEP4: The host control system accepts and stores the number of the user for future acceptance and gives an message to the user number accepted.

STEP5: User sends the command for knowing the status of the home devices.

STEP6: Host control system sends the status of all the device or home appliances.

STEP7: User sends the OFF/ON command to the host control system after knowing the status of the home appliance.

STEP8: Host control system accepts the command of user if yes the host control system sends the command to the sub function system of that particular device.

STEP9: If no the host control system sends the message to the user that particular device status.

**ALGORITHM OF SUB FUNCTION SYSTEM:**

STEP1: Start

Step2: Reset and initialization

STEP3: Command is accepted from the host control system

STEP4: The host control finds the particular device chosen by the user to be controlled.

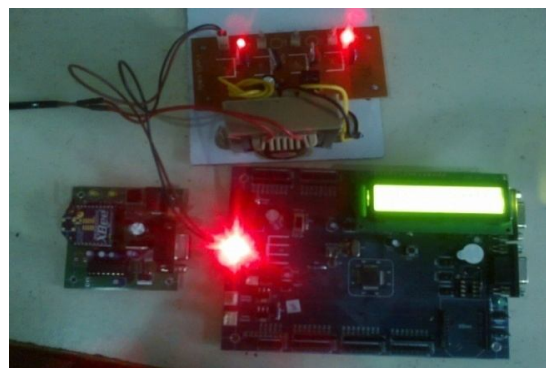
STEP5: If yes the command is accepted and that task is done. If not the status of the device is sent to the user mobile.

**CONCLUSION:**

This design is based on ZigBee and GPRS technology. The main purpose of this paper is to control the home appliance remotely from anywhere. The host controls the home from anywhere through his mobile. Hosts sends an SMS through is mobile phone to the host control system at the particular device. The host control according to the condition given by the host control that particular device. The important aim of this project is to detect the person (or) any damage of the home equipment when host is absence of the home. Thus the title is the design of remote intelligent smart home system based on ZigBee and GPRS technology.



*Figure5 gives the HOST CONTROL SYSTEM*



*Figure6 gives SUB FUNCTION SYSTEM*

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