

Opterna-Smarthome

I. Introduction

IOT Smart Home is a combination of embedded system monitoring, SCM, RFID communication, GSM communication and other latest technology, making smart home security monitoring system as a prototype, introduced a comprehensive training system. This system connected with temperature and humidity sensor, illumination sensor, dB sensor, combustible gas, smog sensor, infrared sensor and other information collection, strong power switch control of home appliance, embedded system for wireless transmission, GSM communication all in one, initially achieve smart home security as a rudiment prototype, establish a training system concept for the practice and training staff.



Smart Home of IOT training platform includes hardware, software resources, experimental resources. Experimental resources includes basic experiment (TinyOS), basic experiments (IAR part), integrated basic experimental code (IAR part), integrated smart home controlling experiment (IAR part), integrated intelligent home control experiment (TinyOS part) and so on; can fully satisfy IOT, and related embedded teaching research.

II. Product List

Name and NO.	picture	Name and NO.	picture
BaseboardX1		Smart home system boardX1	
CC2430 node		2.4G antennaX8	

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moduleX8			
Battery nodeX7		Illumination snesorX1	
Flame snesorX1		Temp. and humidity sensorX1	
Relay sensorX1		RFID moduleX1	
USB interfaceX1		emulatorX1	
9V power supplyX1		Serial interfaceX1	
Resource CDX1		Mini-USB interfaceX1	

III. The hardware resources

Network nodes:

using TI Zigbee recommended current mainstream processor solution CC2430, built-in hardware location engine and enhance 8-bit microcontroller 51; * rich I / O ports, built-in temperature sensor, A / D and a variety of common peripherals interface (timers, UART, DMA, interrupt);

meet IEEE802.15.4/ZigBee standards, frequency range 2045M-2483.5M, be free to switch between the 16 bands.

wireless data transfer rate of about 20 ~ 250 kb / s;

has a programmable chip 128K Flash, and 8K of RAM;

Operating Voltage 2.0V-3.6V, low power consumption, supports sleep and wake-up function;

support specifically designed for wireless sensor networks, TinyOS operating system

ZigBee-compliant XMesh network protocols and standard protocols to support the Z-MAC (integrated CSMA, TDMA system), X-MAC, can facilitate the rapid secondary development;

integrated development environment based on IAR 51 engineering simulation debugging environment;

support routing relay function, auto repair network nodes;

sensor nodes can be connected with a variety of modules, to temperature and humidity, pressure, acceleration, light sensors, sound detection data acquisition;

Baseboard:

The system adopts the baseboard, power supply node and the gateway board. It mainly achieves the power supply to the power node and the gateway node board, and programs of the node board. The main hardware interface resources:

baseboard can take 7 battery nodes, all battery nodes plug in and take down the baseboard directly;

achieve the programming of the 7 CC2430 on the battery node without taking down

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through the baseboard;

- have 3 battery nodes at the node ports on the baseboard, easy to expand;

- RS232 to USB serial interface on the baseboard; convenient for the PC without the RS232

- provide 5V, 3.3V, 9V, 12V power connector;

- smart home system board directly using the patch on the base plate;

- baseboard leads to the smart home system 4-channel sensor interface board;

Battery node:

Main hardware interface resources of the battery node:

- battery node use a 2.54 pin interface, improve the firmness of the system;

- can plug on the baseboard of the IOT smart home system, and also be used alone;

- have 2 full symmetry revision CC2340 interface on the battery node;

- 3-LED indicator;

- can supply the battery, and also use the external power supply;

- CC2430 pin ports are all convenient, easy to expand to use;

Smart Home system board:

Main hardware resources of smart home system board:

- provides two symmetrical CC2430 interface;

- 2 * 5 standard emulator interface;

- 2 electric relay interface, to control household appliances, compatible with the old smart home version (with 2 large LED analog display);

- motor control circuit, can control two DC motors or a two-phase stepper motor, for controlling the opening curtain;

- 1 RFID-reader interface, can read the standard RFID cards (such as transportation card, etc.); external reader circuit

- 4 way of the sensor interface (available for the key analog), the main access: smoke, infrared, gas and other sensors (compatible with older versions of smart home);

- a buzzer interface for system alarms;

- 12V, 9V, 5V, 3.3V power supply interface, used for peripheral power supply; also be connected with the system baseboard;

- standard RS232 interface, compatible with the old version of Smart Home

- intelligent home control board can be used for WSN gateway board

Sensor nodes:

Sensor nodes adopt the same interface design of CC2430 module; main 8 standard sensor interface module:

- illuminate sensor module

- flame sensor module

- temperature sensor module

- electric relay sensor module

- RFID Module

Emulator

CC Debugger as Zigbee multifunctional simulation/debugging tools, mainly for

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debugging and emulation the RF system on chip (CC1010 excluded) has introduced by TI, it can use TI's SmartRF Flash Programmer software on TI's RF PSoC programming, meanwhile with the IAR Embedded Workbench for 8051 development environment, seamlessly build and realize TI's RF PSoC chip debugging.

IV Software Resources

IOT Smart Home Software

Basic experiment (IAR part):

1. automatic flash
2. button control switch
3. button control flash
4. T1
5. T2
6. T3
7. T4
8. Relay driver
9. external interrupt
10. temperature inside sensor test
11. GPIO light test
12. Serial data sending and receiving
13. System sleep and wake-up
14. System sleep and work state
15. System sleep and timer using
16. system wake-up
17. Flash read and write for CC2430 inside
18. sleep timer
19. Random number generate
20. DC motor control

Experimental code on a consolidated basis (IAR part):

1. point to point communication
2. two-to-multipoint communication

Integrated smart home control experiment (IAR part)