
Design of Intelligent Home System based on ARM and ZIGBEE

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Abstract

Based on the embedded technology and Zigbee wireless communication technology, the intelligent home system based on ARM and WINCE.NET is developed. This project gives the overall framework of the intelligent home system based on ARM and Zigbee, and studies the specific structure of Zigbee technology, Zigbee network model, ARM microprocessor, embedded operating system WINCE. NET and home gateway. And implements a home gateway based on ARM and Zigbee wireless modules. And the embedded software development of WINCE. NET platform is expounded, respectively, the software modules of the system: main program module, security alarm module, environmental control module, remote control module, information appliance control module and three table copy module Function on a detailed analysis, on the basis of the use of C language and C + + design to achieve the software sub-module. And discusses several key issues to achieve the system: users can remotely monitor the smart home through the gateway, in the interior can use embedded Zigbee module handheld devices (such as PDA) on the network of home appliances equipment for centralized management and monitoring.

Keywords

ARM; ZIGBEE; Internet of things; Embedded systems.

1. Introduction

As early as 1999 to start the sensor network research, compared with other countries have the same advantage. The hospital has formed a team of more than 2,000 people, has invested hundreds of millions of dollars in the wireless intelligent sensor network communication technology, micro-sensors, sensor terminals, mobile base stations and other significant progress, now has from materials, technology, devices, systems To the complete network industry chain. In the field of sensor networks in the world, China, together with Germany, the United States and South Korea, has become one of the leading countries in the development of international standards.

August 2009 Premier Wen Jiabao in the inspection of the Institute of Wuxi Institute of Internet of Things industry, for the application of things also put forward some views and requirements. Since the Premier Wen proposed \"perception of China\", the Internet of Things has been officially listed as one of the five emerging strategic industries, written in the \"government work report\", the Internet of Things in China by the whole society a great concern, its attention Is unmatched in the United States, the European Union, and other countries. As of 2010, the NDRC, Ministry of Industry and other ministries and commissions are in conjunction with the relevant departments in a new generation of information technology research to form a new generation of information technology to support the new policy measures to promote China's economic development.

In 1999, the International Conference on Mobile Computing and Networks, held in the United States, first proposed the concept of Internet of Things. In 1999, Professor Ashton of MIT Auto-ID Center

first proposed to combine RFID, And Internet technology solutions. At that time, based on the Internet, RFID technology, EPC standard, based on the computer Internet, the use of radio frequency identification technology, wireless data communication technology, etc., to create a global real estate information real-time sharing of the Internet \"Internet of things\", Which is set off in 2003, the first round of China's Internet of things based on the upsurge.

On 17 November 2005, at the World Summit on the Information Society (WSIS) held in Tunisia, the International Telecommunication Union (ITU) issued the ITU Internet Report 2005: Internet of Things, which refers to the concept of \"Internet of Things\". The definition and scope of the Internet of Things has changed, the coverage has been greatly expanded, not just refers to the Internet based on RFID technology. Internet of things research boom in Europe and the United States, and even the world set off.

2. Organization of the Text

In this paper, based on embedded technology and Zigbee wireless communication technology developed based on ARM and WINCE.NET platform under the intelligent home system. This project gives the overall framework of the intelligent home system based on ARM and Zigbee, and studies the specific structure of Zigbee technology, Zigbee network model, ARM microprocessor, embedded operating system WINCE.NET and home gateway. And implements a home gateway based on ARM and Zigbee wireless modules. And the embedded software development of WINCE.NET platform is expounded, respectively, the software modules of the system: main program module, security alarm module, environmental control module, remote control module, information appliance control module and three table copy module Function on a detailed analysis, on the basis of the use of C language and C + + design to achieve the software sub-module. And discusses several key issues to achieve the system: users can remotely monitor the smart home through the gateway, in the interior can use embedded Zigbee module handheld devices (such as PDA) on the network of home appliances equipment for centralized management and monitoring.

The overall structure of intelligent home network can be divided into three parts: external network, home gateway and intranet. External network can be residential LAN, cable television network, telephone network and internet. The internal network is used for interconnection of home appliances within the home appliances, including: information appliances, environmental control (including room temperature, lighting, curtains and other parts) security alarm and three copies of the copy part. Each node contains a number of nodes, each node is a communication of the terminal, the nodes are independent of each other, a node failure does not affect the operation of other nodes. The home gateway is a network connection device that connects the home intranet and the external network, connects the internal network to the external network, provides the control function for the internal network equipment of the home network, and the home gateway can use different networking technology in the home, Since we define a home network that uses only Zigbee technology for wireless connectivity, we do not need to consider the conversion of different protocols within the home network.

Among them, the home gateway using 32-bit ARM embedded microprocessor, through the home gateway and a variety of home appliances embedded in the Zigbee chip-based wireless network transceiver module to achieve the gateway and the network node data transmission, in order to achieve a variety of family Equipment wireless connection and home automation.

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For the system software function we designed the corresponding sub-module to complete the required functions. Mainly include main program module, security alarm module, environmental control

module, remote control module, information appliance control module and three table copy module. The main program module is the creator of the other tasks, from which to manage the creation and operation of various tasks.

(1) ARM9 microprocessor, embedded operating system WINCE.NET and low power consumption, close proximity Zigbee wireless networking communication technology used in intelligent home system, effectively reducing the cost of the sensor network.

(2) the use of SQLite embedded real-time database storage intelligent home system in real-time data.

(3) through the Internet or wireless handheld terminal (mobile phone, PDA) through the home gateway to smart home appliances to control and monitoring.

(4) using WINCE.NET platform embedded configuration software for software development, greatly shorten the development cycle.

3. Conclusion

Home gateway is the core of intelligent home system components, is a full-featured embedded system. Hardware design using a powerful ARM9 microprocessor with other functional modules, and an external Zigbee wireless transceiver module to achieve a variety of home appliances within the home appliance control. Using embedded operating system WINCE.NET, and in this platform to develop drivers and applications.

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