

## Research on Smart Home Control System Based on Cloud Platform

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**Abstract:** There are some problems in smart home system, such as the inability of remote control, people can only control through the gateway indoors, people cannot use mobile phones anytime and anywhere through the network to inquire about the use status and work information of household appliances, people need to install specific mobile phone software of electrical appliances manufacturers, etc. Based on the above problems, this paper studies a set of smart home control system based on cloud platform. The remote control of household appliances and inquiry functions has been realized through integrating cloud platform and home gateway with WeChat platform, so as to provide people with a more convenient and comfortable home living environment.

### 1. Development status of the Intelligent Home at home and abroad

In recent years, a large number of well-known enterprises in Europe and America have devoted themselves to the research and development of smart home, and put forward many plans. For example, the “dream home <sup>[1]</sup>” developed by the Microsoft Corp, the “home gate <sup>[2]</sup>” developed by Motorola company, the “family director <sup>[3]</sup>” developed by IBM company, and the Control4 company of the United States applied the wireless transmission of ZigBee (the purple bee protocol) and the function of the ad hoc network in the smart home <sup>[4]</sup>.

Compared with foreign countries, smart home starts a little later. After continuous research and development, some domestic mobile Brand Company also try to control the smart home system with mobile phone APP, such as HUAWEI, millet and so on.

At home, some enterprises have launched their own products, U-Home smart home (Haier) through multi network integration technology, formed an organic integrated intelligent home system <sup>[5]</sup>. E-home<sup>[6]</sup> digital home (Tsinghua Tongfang), the smart home control system follows the international technical standards, the use of embedded software and hardware technology, provide network, network nodes and terminal equipment, product based on functional module development, to provide users with more quality digital service.

The development of cloud computing technology is increasing rapidly, making enterprises save a lot of time and money to build private servers. It only takes a small amount of money to enjoy the huge storage and various services provided by the cloud computing platform. The cloud platforms developed by major enterprises provide new ideas and methods for the development of smart home control.

### 2. Design of smart home control system based on cloud platform

#### 2.1 System overall design

This system will send control commands to the cloud platform the 4G network through the mobile terminal (WeChat on mobile phone). The cloud platform responds to commands, modifies the stored control information in the database, and the home gateway accesses the cloud platform to obtain control information. The network communication module of the home gateway transfers the obtained information to the wireless communication module (ZigBee), and then transfers the control commands to the home appliances by the ZigBee communication network, thus realizing the remote remote control of the home appliances by WeChat. At the same time, you can also get

control records, use and real-time information of home appliances through WeChat, so that even if people are in a thousand miles away, home appliances are in their own control.

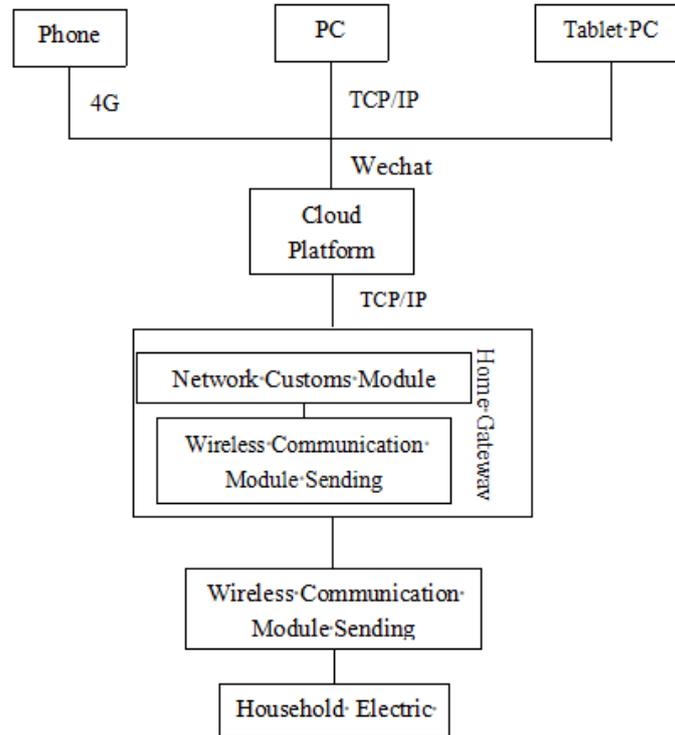


Fig.1 System Overall Architecture

## 2.2 WeChat Platform Design

In order to send control instructions to cloud platform, the system needs to develop the public platform of Wechat and design its operation interface. Users can send instructions not only by sending voice and text messages, but also by operating interface.

In order to send the control commands to the cloud platform, the system should develop the WeChat public platform and design its operating interface, so that users can not only send the instructions by sending voice and text messages, but also send the instructions through the operation interface. In order to enable users to use the resources and functions of the WeChat public platform, WeChat provides users with a WeChat interface, and the communication between the WeChat platform and the cloud platform can be realized by properly configuring the WeChat interface.

In order to enable users to use the resources and functions of the Wechat public platform, Wechat provides users with the Wechat interface[5]. The communication between the Wechat platform and the cloud platform can be realized by reasonably configuring the Wechat interface. The communication flow of micro-credit users is shown in Figure 2.



Fig.2 Communication flow of micro-credit users

## 2.3 Cloud Platform Design

The communication of Wechat background, cloud server and home gateway constitutes the communication of the whole system. HTTP protocol, PHP language and XML (Extensible Markup Language) language will be used in the communication. Hypertext transfer protocol is applied to the communication between the background and server of Wechat, PHP language is used to edit cloud language, and XML language is used to write the data transmitted between the background and public number of Wechat.

## 2.4 Home Gateway Design

Home gateway mainly consists of two modules: communication network connecting the Internet and ZigBee protocol for indoor communication. The communication network obtains real-time information of household appliances and transmits it to ZigBee communication. Then the sender sends the signal to the receiver of the appliances and controls the appliances. This system will use Arduino platform to access the Internet, and ZigBee with simple and close characteristics to achieve indoor wireless communication.

### 2.4.1 Hardware Design of Communication Module

Arduino Ethernet uses AVR series single chip Atmega328 core processor, through the 4G network access to the cloud server, access control instructions and other information. Atmega328 has the advantages of high performance, high throughput, power-on reset, power-off detection and low energy consumption. It is suitable for this design system.

In addition to remote control, indoor control of household appliances through touch screen is also considered. Therefore, hardware includes touch screen, ZigBee sending and receiving port, MCU and ISP programming interface. In the aspect of wireless communication, RL78/I 1A series single chip computers with single chip functions of AC/DC conversion, PFC, LED control and communication are used as main processing chips.

### 2.4.2 Communication Module Software Design

The design program is written by IDE (Arduino integrated development environment). Cloud data is acquired by network, and data is output by serial port. The wireless communication module uses Cubesuit + to write programs, and then through the programming of display program, touch screen program and key program to achieve the control of household appliances.

## 3. Conclusion

The intelligent home control system based on cloud platform is tested, and the system is stable and can work normally. The system realizes the data fusion between ZigBee network, 4G network and Internet, which enables data to be transmitted freely, quickly and efficiently among various networks. The system uses cloud computing technology to manage and dispatch the resources in the network reasonably, so that the channel resources can be balanced and the node resources can be allocated on demand. The system adopts modular design and can easily build the required application system.

The application of 4G technology, ZigBee technology, cloud platform and micro-message terminal in smart home control and the establishment of smart home control system based on cloud platform can solve the problem that household appliances can only be controlled indoors, but can not be remotely controlled through mobile terminal. At the same time, users do not need to install different mobile apps from different businesses to control household appliances. They only need to send voice through mobile micro-message. The control of household appliances and the inquiry of their usage and usage records can be realized by text information or through the operation interface. The system provides people with a better and faster living environment, but also in line with people's yearning for a better life. The system can be used to build a variety of remote monitoring systems, and can be applied in all aspects of life, with excellent application prospects.

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