Application of Mobile Monitoring System of Smart Home Based on Wifi

Xie Zhixin, Qi Hao, Wu Jie*

Fujian Normal University, Fuzhou, 350117, China

*Corresponding Author

Keywords: Wifi Transmission Technology, Smart Home, Mobile Monitoring System, Single-Chip Microcomputer

Abstract: With the continuous progress of the times, intelligent products have constantly entered people's lives. The intelligent development of information technology has brought convenience to people's lives. In people's daily furniture life, the use of intelligent technology to achieve the centralized control of a variety of resources is becoming more and more popular, which is also the direction of people's future development. With the continuous popularization of high-tech products, home mobile monitoring system comes into people's vision, through the way of WiFi transmission, to achieve home mobile monitoring operation. Based on the classic STM32 series 32F103 single chip microcomputer in electrical engineering as the control center of the monitoring system, and WiFi as the signal transmission way, a complete intelligent home mobile monitoring system is established. Through such a system, flexible home monitoring operation can be realized, and the establishment cost of the system is not high, but also has strong expansibility and high application value. This paper analyzes the establishment of the intelligent home mobile monitoring system based on WiFi, discusses the establishment of the hardware and software components of the intelligent home mobile monitoring system, so as to realize the basic home monitoring operation and contribute to the development of the intelligent home control system.

1. Introduction

With the development of high-tech era, people’s life has undergone tremendous changes. The emergence of smart home system has improved our life quality and changed the way of life. People’s life is developing towards the intelligent direction. Nowadays, home appliances are a good example. Comprehensive intelligent control based on WiFi transmission has brought a lot of good experience to people. By making use of advanced intelligent technology and WiFi, mobile monitoring system realizes the control of intelligent system. It also can realize real-time video monitoring, circuit, fire alarm and other functions. With WiFi intelligent control system, good home monitoring provides a strong guarantee. The traditional home monitoring and control system requires to install complex lines in the room, and the monitoring function is greatly limited. By taking the classic 32F103 single-chip microcomputer technology as the core and WiFi as the transmission signal, a monitoring system of smart home can be built to avoid complex lines, simplify the installation of system, realize great flexibility, view and manage the monitoring system anytime and anywhere with good expansibility, thus achieving the home control operation in the new era. It is of great significance to improve people’s living standards.

2. Research Status of Smart Home

With the continuous development of smart home, people’s life has entered the intelligent stage. With the wireless control system and WiFi as the transmission way, common electrical equipment is controlled in a centralized way, which simplifies the complex line laying of home management and provides many conveniences for people. In terms of the current situation of smart home in China, although the change of smart home has been hyped for a long time, new products and technologies have been constantly invented and promoted. This phenomenon indicates that smart home control is the development trend of future science and technology, and is of a cross-age significance for

  DOI: 10.25236/iiicec.2019.052

human production and life. However, there are still many problems that need to be improved and perfected continuously due to relatively complex technology. It is essential to apply advanced technical means, establish a perfect home control system and realize intelligent home management, so as to improve people's quality of life.

3. Components of Mobile Monitoring System of Smart Home Based on Wifi

In the construction of mobile monitoring system of smart home, the core technology is 32F103 single-chip microcomputer in STM32. The system structure mainly includes software and hardware. The intelligent design is adopted for software and hardware to realize the basic work of monitoring system and meet the basic needs of monitoring system.

3.1 Hardware Design of Mobile Monitoring System of Smart Home

For the mobile monitoring system of smart home, the hardware part is the basis of the system, which provides the basic equipment support for operations, and plays an important role in the mobile monitoring system. In the hardware design, it mainly includes the following parts: (1) mobile module design; (2) video monitoring equipment; (3) system control processing equipment; (4) WiFi signal transmission equipment; (5) terminal sensor equipment. The distribution of hardware modules is shown in the figure below.

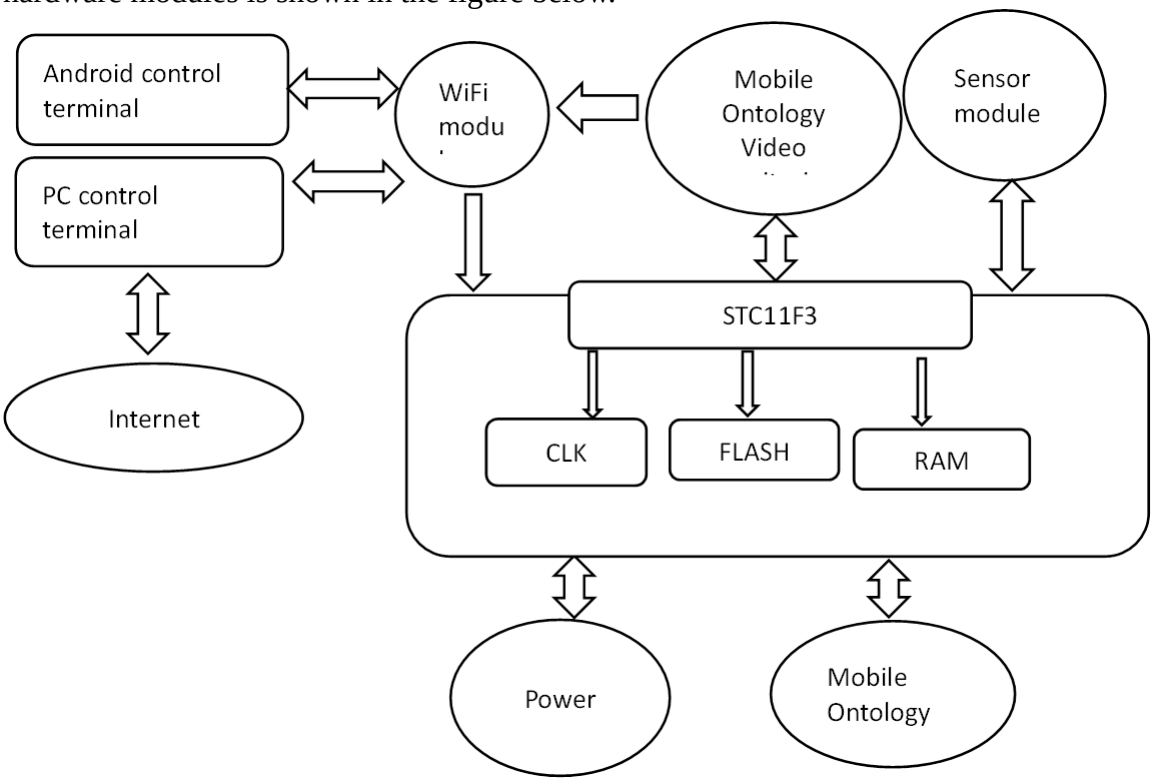

Fig.1 Hardware Design of Mobile Monitoring System of Smart Home

Through the design of these parts, a complete hardware is built to provide support for the system and realize the efficient operation. The following is a specific analysis of each part of the design: (1) Design of mobile module ontology. In this part, the four-wheel drive chassis is applied. Compared with the traditional two-wheel drive chassis, the four-wheel drive chassis can effectively improve the stability of the mobile module with a high cost performance. For the design of the motor drive in the mobile module body, the drive circuit of model L298N is adopted. The corresponding control is taken according to the level change of the output in the system. The basic operation of the equipment is completed by using the electric power to control the motor switch, so as to realize the all-round stable mobile operation; (2) Video monitoring equipment. For the hardware, the monitoring equipment is extremely important, which realizes the monitoring operation of the mobile monitoring system. Video monitoring equipment is mainly composed of two parts: camera

and PTZ. The camera connects WiFi signal transmission board and transmits the real-time information captured to the control end through the WiFi channel. The main function of PTZ is to realize camera's perspective conversion and mediation, and effectively control the camera's video signal acquisition. In the design, because WiFi signal transmission board belongs to the micro terminal system, selection of the camera is limited to a certain degree. Therefore, s605 camera with high cost performance should be selected, which not only has a high shooting clarity, but also has the most appropriate price; (3) WiFi signal transmission equipment. Because mobile module devices need to move in a wide range and transmit video content, standard WiFi technology is usually used and the module that supports USB signal transmission is selected. The signal content transmitted by the WiFi signal module is mainly sent out by the upper computer and fed back by the lower computer; (4) System control and processing equipment. The selection of control and processing equipment is the core of hardware. According to the application of core technology, the classic STM32F103 single-chip microcomputer is used as the control and processing equipment, which is effectively combined with the motor drive and signal transmission module to form a whole; (5) Terminal sensor equipment. The sensor module is mainly responsible for transmitting the signal of the fault terminal, detecting the fault signal, transmitting the signal back to the system, and realizing the real-time monitoring of home. Sensor module mainly includes the ultrasonic detection function, as well as the temperature and identification detection function. In the selection of sensors, there are also some skills. In the general sensor design, the ultrasonic sensors are always used to detect obstacles due to their affordable price and accurate measurement.

3.2 Software Design of Mobile Monitoring System of Smart Home

For the mobile monitoring system, the software part is the core, which provides technical support for the operation, and also plays an important role. In the software design, the main design architecture is as follows:

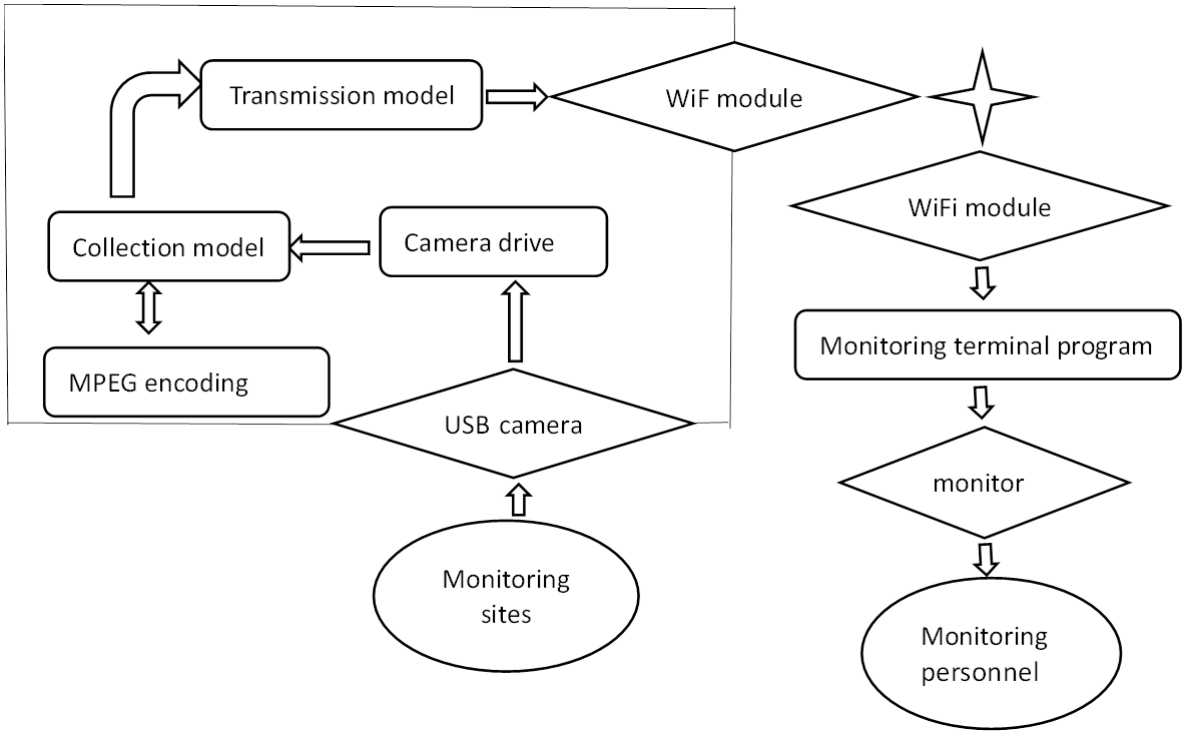

Fig.2 Software Design of Mobile Monitoring System of Smart Home

The specific work flow is as follows: send the relevant instructions to the WiFi signal transmission module through the upper computer, then converse signal through the router, and finally transmit the instructions to the single-chip microcomputer for the execution of relevant commands. At the same time, the upper computer should also transmit the video of the request part to the upper computer through the processing of the system and USB camera. When obtaining video signal, the upper computer takes decoding operation, and gets the instruction video content. The

common upper computer includes home computer, mobile phone, tablet computer, etc.

The software control design of the computer end is mainly realized through the design of operation interface. The system programming language is applied to write the PC software control program, and the two-way data engine is taken to send back the collected video and data. In this process, event driven mode is usually adopted, which can greatly improve the accuracy of data, ensure the big data exchange of the lower computer and realize the stable transmission and security of data.

In the software control design of mobile terminal, the basic mobile monitoring operation is realized through software design. In addition, a variety of control environments are set in the system to enhance the operation of gravity induction and realize the path identification function and cruise function of the mobile car, providing more convenient conditions for the operation of mobile terminal.

4. Problems in the System Settings

4.1 System Circuit Welding

In the circuit welding of hardware equipment, there are often welding errors. Therefore, in the actual operation, before the chip is inserted, the circuit board and power supply should be tested comprehensively to ensure that the circuit is normal. However, in the past, it is often found that many power grounding parts are not welded well, and the detection is often ignored. Therefore, special attention should be paid to the detection, and corrective measures must be taken in time in case of problems.

4.2 Fast Reset of Circuit System

After compiling the system, the program should be copied into chips, and then the connection of circuit should be checked repeatedly. Four numbers often reset repeatedly in the circuit system in a short period of time. At this time, the crystal oscillator circuit and reset circuit need to be taken as the main body of the check. The circuit should be checked in all directions, and then the debugging reset must be carried out to ensure the normal operation of the program.

4.3 Communication Operation Can Not Be Completed If Two Single-Chip Microcomputers Are Used

In the process of signal transmission between the lower computer and the upper computer, when the situation is out of control, it should be debugged in time. In debugging, firstly, use oscilloscope to test the upper computer. If no waveform is found, use a multimeter to measure the level of the single-chip microcomputer. If the level still shows normal, it is necessary to check whether the single-chip microcomputer is in the normal working state, and observe whether the single-chip microcomputer is in crystal vibration or not. Two single-chip microcomputers are operated independently, so oscilloscope is applied to measure and observe whether there is square wave. If two single-chip computers are still unable to communicate normally, the oscilloscope is advised to be used to observe the lower computer and whether the square wave can be seen. If not, it may be a mistake in the preparation of the receiving program. Then, it is essential to check the whole program. Through repeated debugging, the program and circuit will be finally improved, and the predetermined function can be achieved.

5. Conclusion

With the continuous development of the intelligent era, people’s living standards and quality of life have undergone qualitative changes. Based on the application and development of single-chip microcomputer, many functions have been automatically controlled, bringing more conveniences for people. In terms of current development status, smart home system has gradually covered thousands of households. In a few years, smart system will be fully applied to our work and life. Our smart era is within reach. The mobile monitoring system of smart home can achieve good

mobile monitoring function. Through wide-angle regulation and flexible monitoring effect, it realizes the smart home system. Meanwhile, the WiFi signal transmission technology help avoid the tedious line layout in the family, make the operation more simple and convenient, and adapt to the development of the technology era. In the development trend of the new era, it has broad application prospects.

References

[1] Zhou He, Tan Haoqiang. (2011). Implementation of IEEE802.11 Protocol to Linux Kernel. Tianjin: Tianjin University.

[2] Wei Dongshan. (2008). Application Manual of Embedded Linux to Mobile Monitoring System of WiFi Smart Home. Beijing: People's Post and Telecommunications Press.

[3] Liu Yunbo. "Application Research of STM32 single chip microcomputer in smart home." China new communication 20.18 (2018): 107-108.

[4] Liu Jing, Yang Zhengxiao, Shen Jian. (2014). Design of Android Smart Home Control and Monitoring System Based on WiFi. Software, no. 35, vol. 6, pp. 19-22.

[5] Liu Mei, Xu Xiaoling, Hu Yingliang. (2014). Smart Home System Design Based on S3C6410. Electronic Design Engineering, no. 22, vol. 12, pp. 85-88.