

The System of Intelligent Switch Based on WiFi

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Abstract. This paper describes the development of the smart home intelligent switch system and the necessity and convenience of the office, The intelligent switch can be connected to WiFi network to control appliances through mobile APP, what get people generally favored is its small size, convenient operation, reasonable price.

1. Introduction

Currently, Internet of Things (IOT) rapidly into people's vision, science and technology determine the quality of life. Convenient, efficient and time-saving is the theme of this era, but also the direction of scientific development. As a new smart home industry, designed to provide people with a more comfortable living environment, improve home safety, rationality, and to improve the living standards of the modern and well-being index, with the upgrading of the level of consumption of people and ideas, smart home is the inevitable trend of the future home field.

However, for most people in modern society, for the entire smart home system, regardless of price or other aspects of the installation, there are some limitations, and we must change the house structure largely to meet the need for the system [1]. Therefore, we introduced a small intelligent remote control switch, compared with the huge system, intelligent switches are easy to use, safe, low cost, small size, etc. just to make up the problem that the entire smart home system reflected. What is more? This device are accepted by most people. Not only for it offers convenience, but also for smart home long-term development and lay a solid foundation.

Wifi technology is an integral part of the smart home, look around us, everybody has a smart phone, and the fact that WiFi can be seen everywhere reflects the widespread of WiFi technology. Moreover, Wifi socke is just the theme of the "robot butler." For example, before returning home to open air, you will be able to enjoy a refreshing after getting home; before returning home to open the domestic solar water heater, then you can enjoy a hot bath and so on, All in all, the researchers about wifi smart switch is to make people's lives more convenient as a starting point.

2. The Index and Application of WIFI Technical

2.1 Wireless Communication Technology in Smart Home

Intelligent household refers to use the advanced computer technology, network communication technology, integrated wiring technology to get the point that the various subsystems of household life unifies in together organically. Through the integrated management, the household life will become more comfortable, safe and effective [2].

Main communication technology of smart home wireless as follows:

- 1) Infrared communication technology;
- 2) Radio frequency (RF) technology;
- 3) Bluetooth technology;
- 4) ZigBee communication technology;
- 5) Z-Wave technology;
- 6) WiFi technology

Here, we mainly introduce the technologies of WiFi; Many people will ask "What is WiFi?" WiFi is a technology that can get PC, handheld devices and other terminals connected to each other; WiFi Wireless Fidelity is the full name of WiFi, its biggest advantage is that a higher transmission speed can reach 54Mbps.

WiFi Indicator:

- 1) WLAN standard is IEEE802.11b / g, 2.4G ISM band;
- 2) Supporting Ad-Hoc mode to set up wireless networks;
- 3) Supporting WEP 40 and WEP104 encryption (64/128), WPA / WPA2PSK encryption, and the encryption algorithm of AES and TKIP;
- 4) WiFi can recovery automatically after the connection is break ;
- 5) The time Module from reset to establish a WiFi network is less than 5 s (WEP encryption) or 10 s (WPA encryption);

2.2 Advantage of WiFi Technology.

As we all know, WiFi technology's impact on human life to be reckoned with. This technology has greatly increased the breadth of information transmission. Addition, it can be used as a dot for dissemination of information, of course, it can also be used to propagate from point to point. WiFi technology is an integral part of the project. First, WiFi intelligent nodes can be connected to a wireless router directly, so that we can access to the Internet network. Second, it does not require the home gateway node, which could be expanded; Installation is simple, and does not undermine the existing decoration; Least but not last, the control is flexible, we can use the smart phones to complete local area network (LAN) control and remote control. What is more? Ordinary families have an AP is enough, even the neighborhood of the user's authorization, you do not need to add ports to a shared Internet, is shown by equation 1;

$$L(x_1, x_2, \dots, x_n; \bar{\theta}) = \max_{\theta_i \in \theta} L(x_1, x_2, \dots, x_n; \theta) \quad (1)$$

And in terms of electrons, the emergence of the MCU result in great changes of life and production, using the MCU to control or to deal with some affairs reduces the labor time, improves the work efficiency and the accuracy [3]. Therefore, the purpose is to use intelligent switch to connect WiFi with MCU through the phone, so as to realize intelligent control, constituting the basic unit of smart home.

3. The Solution of Smart Socket Based on WiFi

3.1 Principle of WiFi socket control

In this paper, we study the intelligent switch socket which is the small unit of intelligence household, people can cut off the electricity through the mobile phone APP, which brings a lot of convenience to everyday life. This design first has carried on the hardware circuit design, the main content of design is to use the MCU chip to control on_off circuit through the control relay, relay can suck or action and thus drive switch socket. MCU via WiFi modules communicate with mobile phone APP, so the intelligent switch can be controlled directly by the APP.

WiFi socket is composed of the WiFi module, relay control circuit and the relay output contacts. As is shown by figure 1.

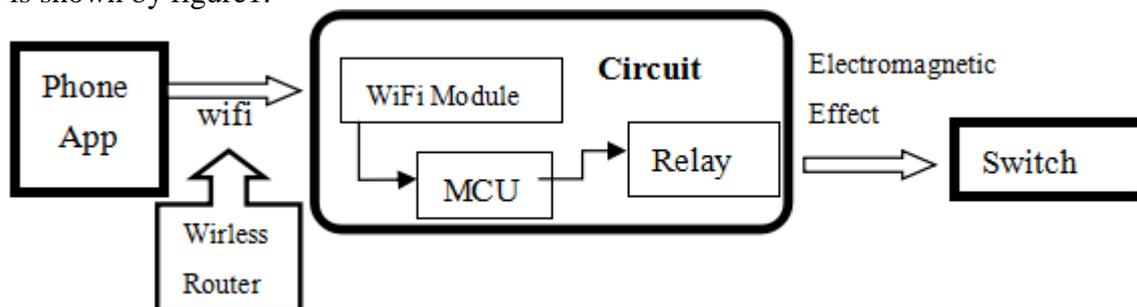


Fig. 1 Structure of WiFi smart socket

Relay: according to the principle of electromagnetic effect, by using the electromagnetic relay can control the electric switch, implements the large current, weak current control circuit diagram is as follows:As is shown by figure2

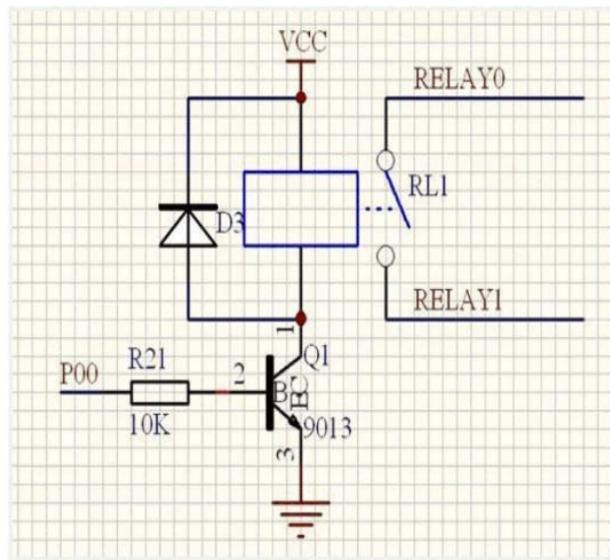


Fig. 2 Relay circuit

Through the analysis of the demand for the module structure of design in general. Set up in Multisim circuit simulation model of the environment, access to simulation data, further proof of the correctness of the circuit design. Compared select the actual completion of the hardware components and designed for quick set up in the bread plate.

3.2 The wifi module

WiFi Internet training suite core module built-in WIFI protocols and communication protocols, the clouds transplant simplified Arduino electronic building blocks of programming software environment, expansion can be achieved through a simple periphery of iot system fleetly[4].The schematic as follows,as we can see in figure3

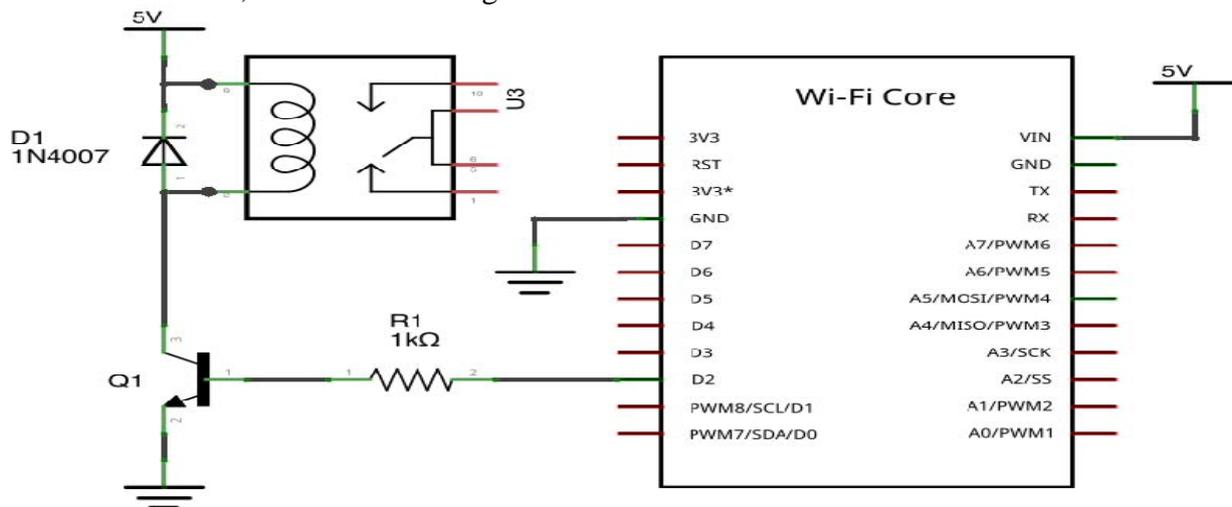


Fig. 3 The principle diagram of the WiFi module experiment

3.3 The design of mobile phone APP

This article describes the major technology including the technology about WiFi signal recognition,the technology of signal receiving and signal processing,the technology of app recognition and hardware paired .

First we discuss the technology about WiFi signal recognition through Mobile phone app:WiFi feature on your phone is generally only used to connect to a wireless network, you need to use wifi signal as a control signal, and chose a safe, stable, fine short, high fault tolerance and easily

recognizable as the coding control commands through experiments. App should also have the ability to send and receive judgment processing (when send a command does not open or close the power successfully ,app need to transmit a second or third control commands automatically).

Second is the technology of signal receiving and signal processing:The control commands that the phone send ,a particular string, were received by receiving module ,and then determining the command to identify the contents through the microcontroller embedded programming ,and making different treatment by using single-chip microcomputer control relay.

Last but not least,when a user needs to control a plurality of switches, namely the need to use multiple hardware devices, in order to distinguish between different hardware devices, which requires different hardware devices to encode, to each controller application affix a label ,only through control device-specific code can be paired with a mobile phone app to control,so you can prevent malicious outsiders control your home electrical equipment.

4. Summary

In short, smart home concept has been widely accepted,it is necessary make a research on intelligent switch . through the use of WIFI technology, this switch provides people with more comfortable, safe and convenient smart home living space, thus gives users a new, comfortable home life.

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