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Implementation of Secure Smart Butler Control APP System*

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Abstract. Since the birth of smart homes, people have a more comfortable, safe and intelligent living environment. Nowadays, the economic level is growing at a high speed, people's demand for quality of life is getting higher and higher, and smart home is indispensable in people's lives. With the rapid development of mobile networking technology and Internet of Things technology, there is a higher requirement for smart home control systems. Therefore, the smart home APP platform has become an important part of a smart home system. This paper proposes a secure smart butler APP with security monitoring. In addition to the functions required by ordinary people, it can also guarantee the security of information in the home.

1. Introduction

In recent years, the rise of major mobile phone brands at home and abroad, the rapid development of mobile phones, tablets and other devices, people have become accustomed to using APP to help us access information and communication [1]. APP can also be used in the smart home field. As the basis of smart home control, Internet of Things technology can connect people with smart homes, making it more convenient and more powerful [2]. Nowadays, the number of smart home systems on the market is very large, and all use WiFi for information transmission. In the WiFi environment, the information is almost completely public, and any hacker can easily crack and eventually lead to information leakage at home. Therefore, we propose a security smart housekeeper, and once someone forcibly breaks the system, it will issue an alert on the APP, which improves security to a certain extent.

2. The overall overview of the system

The system is divided into two parts: APP part and communication part [3]. In this paper, Arduino development board is used to connect APP with other smart home. The system frame diagram is shown in Figure 1.
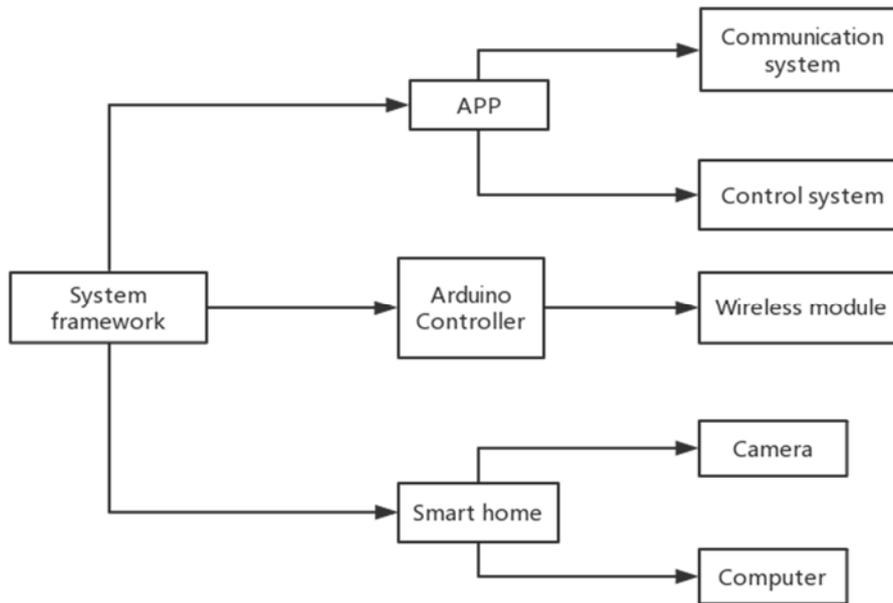
Figure 1. System design framework

2.1. Demand Analysis

Smart homes, as a smart appliance that provides people with a convenient, comfortable and comfortable lifestyle, are now widely be used, but smart homes are just a robot that can't automatically understand people's ideas and people's needs [4]. Therefore, APP is a tool that allows people to control robots.
The functions required for the APP are as follows:

2.1.1. Ability to control multiple smart homes. With the development of technology, the variety of smart homes will become more and more, which requires an APP to control multiple homes at the same time, instead of intelligently controlling one type of furniture for each APP, which can greatly reduce the complexity of operations. Give the user a good experience.

2.1.2. Ability to remotely control smart homes. When people are not at home, they need to open some equipment such as air conditioners in advance, and they can directly enter the room at the right temperature when they get home.

2.1.3. It can connect with the Internet and can filter the information used at any time. Such as weather conditions and indoor temperature [5].
    The smart home APP control system designed in this paper not only can complete the above functions, but also has a security verification system, which can guarantee the security of information in the home. The system flow chart is shown in Figure 2.
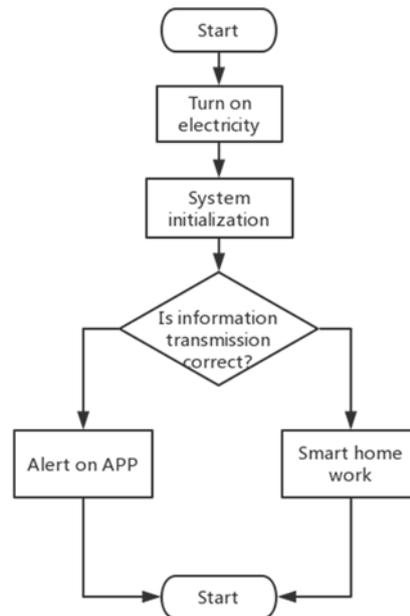
Figure 2. System Flow Chart

3. The design and implementation of the system

3.1. Communication protocol (HTTP)

We need to use Ethernet or WiFi to connect the Arduino control board to the Internet, where the protocol used on the site is HTTP. HTTP supports multiple transmission modes [6]. The interaction diagram between the smart device and the server is shown in Figure 3.
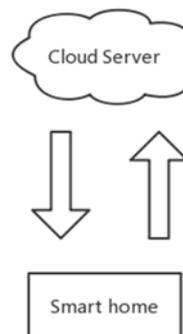

Figure 3. Intelligent device and server interaction diagram

First, define server variables.
Char sever [] = {"iot.eclipse.org"};
Int port = 80;
Client. Connect (sever. port) is used to determine whether to connect to the server. After connecting to the server, client. Println () is used to send the request to the server.

3.2. TCP communication

3.2.1. *Server.* First, create an object that can listen on a port on the local server.
ServerSocket serverSocket;
ServerSocket = new ServerSocket (1234);

Then need to listen to the client
Socket socket = serverSocket.accept ();
Get the input and output objects
ObjectInputStream buf = null;
ObjectOutputStream out = null;
Buf = new ObjectInputStream (client.getInputStream ());
Out = new ObjectOutputStream (client.getOutputStream ());
The data is then transferred, and after the transfer is complete, close () is used to close the connection.

3.2.2. Client. First create an object that can connect to the server
Socket client = null;
Client = new Socket ("localhost", 1234);
Associate the server with the data transfer of the client
ObjectInputStream buf = null;
ObjectOutputStream out = null;
Buf = new ObjectInputStream (client.getInputStream ());
Out = new ObjectOutputStream (client.getOutputStream ());
Data transfer is performed, and after the transfer is completed, the connection is closed.

3.3. Multitask processing system
Considering that there may be more users in APP, it is necessary to create multithreading. Creating multithreading has two advantages for mobile APP: 1. Increasing UI response speed; 2. solving concurrency problems [7]. There are two ways to create a thread, the first is to inherit the Thread class, the other is to implement the Runnable interface, and this article uses the way to implement the Runnable interface [8].

The process of creating the thread is as follows:
1) implement Runnable interface and rewrite run ().
2) generate a Runnable object.
3) use start () to start threads.

4. Testing and analysis
The APP interface is an important part of a successful system. The interface diagrams of APP studied in this paper are shown in Figures 4 and 5.

Figure 4. Smart home type
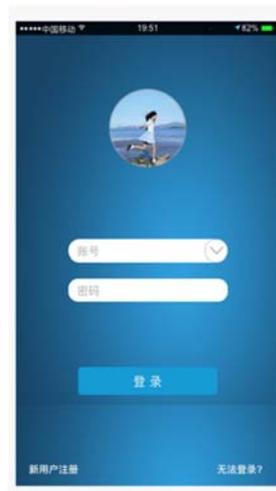
Figure 5. User login interface

After experimental testing, when the intelligent housekeeper is in operation, if there is no mobile phone APP control but directly control the smart home, the alarm will appear on the mobile phone APP. As shown in Figure 6.

Figure 6. Test status and security alerts

5. Summary
The security intelligent housekeeper APP system proposed in this paper can not only meet the requirements of ordinary users in function, but also ensure the security of the system and achieve the desired results. The APP system studied in this paper has strong practicability, security and many functions, which provides convenience for people to use in their daily life.

Acknowledgments

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