Universe Scientific Publishing

DOI:10.18686/ahe.v7i28.10550

Homier Smart Home Whole House Control System

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Abstract: A modular smart home control system designed based on Hongmeng system, which utilizes Hongmeng touch black technology and LoRa MESH wireless communication technology to realize an intelligent controller that supports third-party eco-smart products, the controller adopts a modular design, and the modules realize magnetic expansion and modular design, which can facilitate the user to add or remove the required functions at any time, and the user can personalize the Smart home, while supporting voice, gesture, WeChat applet, APP and Web, etc., which provides great convenience and comfort for users' life.

Keywords: Hongmeng system; LoRa MESH wireless communication technology; NFC short-range communication technology; Voice control

Fund Project:

2022 Guangdong University Students Innovation and Entrepreneurship Training Program, Project No.: S202210579017

1. Introduction

Based on the rapid iteration of 5G, Internet of Things (IoT) and other technologies, smart home products are developing rapidly. Compared with the traditional home, smart home still has many problems in the process of moving towards the mainstream trend: low degree of intelligence of the product itself, lack of "interconnection" between single product and single product, "system barriers" between brands, smart home industry has not yet formed a unified standard, and so on. The smart home industry has not yet formed a unified standard.

Combined with the market demand and quantitative analysis, this team designs a modular smart home control system based on Hongmeng system. This project aims to provide users with a healthier and more comfortable living environment while facilitating their lives. The project utilizes Huawei Hongmeng System's "black technology" functions such as touch and intelligent sharing to provide more convenient and comprehensive support for third-party smart devices. Magnetic expansion and modularization are implemented between modules, making it easy for users to add or remove required functions at any time. The project adopts LoRa MESH communication solution, which can reach a communication distance of several kilometers, and the devices can intelligently network and automatically select the connection to a higher quality network, so that users can conveniently expand the scope of home control and truly realize integrated control. At the same time, the project greatly reduces the difficulty of docking different devices through the characteristics of Hongmeng system of interconnection of everything, supports voice, gesture, WeChat applet, APP and Web and other ways of controlling at the same time, providing users with smoother, more comfortable, safe and rich control methods and experience, so that users can enjoy the convenience brought by science and technology.

2. Project Introduction

The project is based on Hongmeng system to realize modular smart home control system, the system uses Hongmeng system to touch the ability to touch to complete the product configuration for normal use, and then can receive module data through LoRa MESH self-organizing network. In addition, the intelligent controller can also receive and process function module data through serial communication, and then instantly synchronize to the cloud platform through MQTT protocol after data analysis. Users can quickly set the parameters of the function modules while viewing the dynamics of the smart home in real time through multi-platform terminals

such as applets, APPs or Web. In addition, the intelligent controller can meet the user's customized design according to the user's function settings in the platform terminal. Modular design, so that the user to define their own smart home system, functional settings have autonomy, with magnetic interface, can be used with the connection, replace the functional modules at any time, to achieve a truly customized smart home. For third-party eco-smart products such as Ali, Huawei and Xiaomi, we also provide communication relay modules based on different communication protocols, which can support convenient access to third-party devices.

Most of the existing smart home devices are based on Android or IOS systems, if the user intends to control dozens of devices such as smart TVs, refrigerators, air conditioners, electromagnetic stoves, smart lamps and so on through the cell phone, it is necessary to install a number of corresponding smart control APPs, which is a cumbersome and inconvenient experience. There are many varieties of smart home equipment on the market, and due to the different ecosystems of mainstream manufacturers of smart hardware, many smart hardware can only be paired with a brand of smart gateway, it is difficult to interconnect, and the device requires complex configuration to use, the ordinary user to install their own difficulties. At the same time, the rapid iteration of equipment, users need to add new features can only buy new equipment. In order to solve these market pain points, we intends to solve the following problems:

(1) Simpler hardware identification and distribution process. Adopting Hongmeng system for development and testing, developing the ability of touching one touch based on Hongmeng system, realizing application cross-device service flow through NFC short distance communication technology. Accurately identify three-way devices through simple and unified interaction language, and realize efficient and concise interaction logic. It eliminates the complex configuration work of the previous smart home devices and solves the problems of the traditional APP cross-device connectivity, device mating and transmission difficulties.

(2) More comprehensive third-party device support. Adopt magnetic modular expansion design to support third-party gateways or devices. For traditional eco-smart products such as Ali, Xiaomi and Huawei, or non-standard 433MHZ RF communication and other devices, this project designs a magnetic suction type connection structure, which can automatically connect and activate third-party devices by contacting the automatic suction. Then you can view the real-time data of these devices in the WeChat small program or APP, and carry out intelligent control. It can be done at any time to replace the function module to meet the user's daily needs, plug and play.

(3) More convenient interactive operation. You can manipulate smart home and other hardware devices in a variety of ways through offline or online voice control, gesture recognition, WeChat small program, APP.

3. Project Design Program

3.1 Intelligent controller

The design of the intelligent controller is based on the Hongmeng system, and its interface adopts magnetic suction connection, which can be automatically suctioned by placing the equipped home function modules, and up to six function modules can be connected at the same time. After successful connection, the user does not need to configure information resources, the function module is automatically activated and quickly connected to the controller to realize interconnection. After the controller receives the data from the function modules, it synchronizes the data in real time through the MQTT protocol, and users can view the data and set the functions of the intelligent controller and function modules in multi-platform terminals such as applets, APPs, and Web.

3.2 Smart Home Function Module

The smart controller mainly plays the role of a hub and gateway, while the functions of this project are all undertaken by the smart home function module. LoRa MESH self-organizing wireless modules are integrated in our smart devices by default, and the communication range can reach several kilometers. And the modules will self-organize the network when some nodes have power outages or poor signals, making full use of the routing redundancy in the network. The device only needs to touch with our intelligent controller to complete the auto-configuration before the first use, and then it can communicate wirelessly through the LoRa MESH wireless gateway module, and gather the data from the wireless receiver module to the intelligent controller to realize the information transmission. The details are introduced as follows:

3.2.1 Touch Information Interaction Module

Adopting Hongmeng system OneHop technology, OneHop Engine is a solution technology for multi-terminal business collaboration, relying on NFC short-distance communication protocol to open multi-device touch interaction capability to cell phones, intelligent terminal applications and third-party devices. It realizes application cross-device service flow through NFC short-distance communication technology. When you need to add a new smart home device, you only need to touch the smart home device that needs to be newly added, and the NFC module in the interaction module will read the key networking configuration information from the NFC chip in the new device, so as to automatically add the new device to the current network. It eliminates the tedious steps of

traditional APP network allocation and other methods. After the device completes the network allocation, it will receive the successful activation information of the function module in the platform terminal, and will be automatically online in the applet, APP and Web, and the user only needs to learn to control the device in these terminals. The schematic diagram of touch information interaction module and function is as follows.

3.2.2 Voice Control Module

Provide offline voice recognition, users can preset their own wake-up words, when the user sends voice commands, the control template will be awakened from dormancy to make the specified response, which improves the efficiency of human-computer interaction. For example, after waking up the voice function, answering to turn on the TV, the infrared remote control module will send an infrared signal to turn on the TV.

4. Summary

Nowadays, smart home has quietly flown into the "ordinary people's home", a variety of functions of the smart home have everything, but there are huge differences between the products, can not be connected to each other is the biggest obstacle to the development of the home industry "pain point". Like millet, Huawei, such as different brands of products have their own unique coding and processing programs, resulting in smart home systems are prone to operational compatibility issues. The platform "Doodle Intelligence" only provides customers with smart home control programs and ideas but not implemented. The team is committed to solving the smart home system operation compatibility problems, the use of Hongmeng system of the characteristics of the Internet of everything to achieve intelligent control of different devices home, improve the user's ability to more humane intelligent control of the equipment, the development of a variety of functional products, through the modular design, can be combined and matched by the user to independently select the functions needed to allow the user to customize the personalized home system, the function module object handle The handle of the functional module object is designed to conform to the ergonomics of the human body's handgrip posture, to meet the diversified needs of users and provide customized services.

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