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Intelligent door lock system based on the Internet of Things and intelligent identification technology

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Abstract

Nowadays, intelligent door locks have been popularized under the rapid development of artificial intelligence technology, and people's requirements for the quality of life are also increasing, which also greatly improves people's happiness. Because of the particularity and privacy of its own application scenarios, its security problem has always been the focus of people's attention. And the security door closely related to life can not meet people's needs for safety, intelligence, convenience and other aspects. At present, the development of intelligent door lock has become increasingly mature, for the way of intelligent door lock, is not a simple way of unlock, but a variety of ways combined with each other. Therefore, the development of a safe, intelligent anti-theft door house system has become the need of The Times.

Keywords

Internet of things; intelligent door lock; Intelligent recognition technology.

1. Introduction

In recent years, in the face of the rapid development of artificial intelligence technology, intelligent household already into all aspects of people work and life, not only to people's daily work and life brings very profound influence, "smart home", "intelligent" concept is deeply rooted in the hearts of the people, people demand the quality of life, also greatly improve the happiness of people use furniture products. Among them, the smart door lock, as the most widely used category in the smart home, because of the particularity and privacy of its own application scenarios, its security problem has always been the focus of people's attention. And the security door closely related to life can not meet people's needs for safety, intelligence, convenience and other aspects.

At present, most of the security doors on the market still have a single function, low anti-theft level and low degree of intelligence. According to the statistics of the public security department, in many big cities, up to 50% of burglary cases are opened by criminals to carry out criminal activities, while more than 20% are violent destruction. These criminals have a common feature: they are aimed at the lock and destroy. When the lock was opened, the door was opened naturally. At present, the development of intelligent door lock has been increasingly mature, for the way of intelligent door lock, is not a simple way of unlock, but a variety of ways combined with each other. So a safer, smarter, and more convenient door lock is needed.

2. System design

Intelligent door lock system with intelligent door lock system with RT-Thread real-time operating system, the hardware part is composed of power module, NB-IoT module, GPS positioning module, data storage module, Bluetooth communication module, lock tongue detection module (photoelectric switch module), motor drive module, door magnetic detection module, etc. Through data storage chip used to store single chip and NB-loT module interactive data will be uploaded to the cloud platform, when the user use the APP to the cloud platform

lock operation permission, cloud platform administrator (and the user is the same person) after receiving the operation permission approval, can through the mobile phone APP issued switch lock instructions, and lock to the cloud platform after complete the status of the lock. At the same time, the motor drive chip is used to drive the motor to drag the lock tongue to switch the lock. The lock tongue detection module reads the high and low levels through the photoelectric switch, and then confirms the state of the lock.

3. Key technologies

Using RT-Thread as a real-time operating system to facilitate the development of multi-threaded threads. RT-Thread is a domestic embedded real-time multi-threaded operating system. One of the basic attributes is to support multi-tasks. In RT-Thread system, tasks are realized by threads, and tasks and tasks are switched very quickly by the task scheduler (the scheduler determines the task to be performed at the moment according to the priority). In this system, a total of four threads are designed, namely Task_IC, Task_Finger, Task_Key, and Task_Board, representing IC card thread, fingerprint thread, key thread and main thread. Each thread communication adopts the message queue, which can receive messages from the thread or interrupt service routine, and cache the messages in their own memory space. Other threads can also read the corresponding message from the message queue, and you can suspend the read thread when the message queue is empty. When a new message request arrives at this time, the suspended thread is automatically awakened to receive and automatically process new messages.

By cooperating with the use of NB-IoT communication technology, compared with the traditional communication technology Zigbee communication has deep coverage, low power consumption, large connection, low cost advantage, Huawei is the domestic NB-strong development of loT, so far, NB-IoT has been applied to wisdom city (intelligent parking, intelligent meter reading, street lamp detection, etc.), wisdom industry (intelligent agriculture, equipment testing, logistics, tracking, etc.), intelligent life (intelligent building, tracking escort, environmental monitoring, etc.). You can receive control instructions from the cloud monitoring platform at any time.

Cloud monitoring platform to control and process the data of the whole system, cloud monitoring platform, platform can display the information of the location of the lock, the number of locks, lock switch number records, the status of the lock, the administrator to the user application permission request for approval, management door lock ID number and confirm whether the effective ID, the status error lock issued adjustment instructions, when the Bug platform administrator will timely background repair.

Lock-tongue detection module design.When the switch lock execution is completed, the door lock information acquisition terminal meeting to the cloud control platform at the state of the lock tongue, in general, the cloud control platform will display normal lock or lock, not the lock tongue adjustment instructions, if the lock tongue position error, upload the information will display status error, cloud platform will give the door lock information acquisition terminal adjustment instructions until the lock tongue position is correct.

4. Intelligent door lock system innovation point

4.1. Real-time monitoring function of the system

The monitoring of the intelligent door lock system consists of front-end equipment (cameras, sensors and related auxiliary equipment), transmission equipment, central equipment (monitoring center) and other equipment. To realize a complete and reliable monitoring system, it must have the following properties:

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① Real-time, the system monitors the operation status and parameters of the equipment at time, timely find faults and send relevant information;

② Practicability, from the user's point of view, the system to meet its monitoring function, but also need to simplify the operation, reduce the cost, improve durability;

③ Security, the system has security precautions and confidentiality measures, strict encryption for the system information, not leakage, for illegal intrusion to prevent in time.

4.2. Dangerous alarm and abnormal work function of the system

A perfect intelligent door lock system, the danger alarm function is essential. The danger alert function is similar to the watchdog, but in addition to the threat, it can also send a danger alert to the user, the user receives the alarm, can eliminate the danger in time. The alarm function is realized from two aspects, one is to the induction of danger, the other is to respond to the danger found, such as alarm and sending information. Under the premise of realizing these two aspects, the accuracy of the induction and the timeliness of the reaction should also be guaranteed. The cloud platform is also used to detect whether the keylock system is abnormal. The current mainstream method is to use sensors to sense related hazards. Reacting to the perceived danger can send signals to users through instant messaging, which has the advantages of fast speed and high information accessibility rate.

4.3. User management and personalized setting of the system

In addition to the functions of the door itself, it is also necessary to ensure the security of the user account. Before opening the account, it is necessary to judge whether the account is an effective account, whether it has the power to open the door, and strictly monitor and encrypt the account to avoid cracking the fake account. When these conditions are met, then consider their personalized setting. The first is the way to open the door, anti-theft door system open in various ways, including fingerprint door, face door, password door, etc., authorized users can freely open or close according to personal interests. At the same time, according to the distance between the user and the home can also open the door into remote door and face to face door two methods. Secondly, the user account can be authorized by wechat or APP account, and controlled on the mobile terminal APP or wechat small programs. At present, wechat small programs are mostly used. And different accounts have different roles, and different roles have different permissions. The person with the highest permission can grant or delete the permission of all other roles. Ordinary users can set up personalized voice broadcast after authorization.

5. Conclusion

The rapid development of the Internet of things will inevitably cause a wave of science and technology, especially the security problems, through the analysis of the application of traditional door lock and theft cases, based on the Internet of things and intelligent recognition technology of intelligent door lock system will stand out in the future environment, can ensure the safety of residents, reduce the failure.

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