

Design of Smart Home Cruise Cabin Based on LORA Technology Module

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Abstract:

The purpose of this study is to explore the concept and implementation of smart home cruise cabin design based on LORA(Low-Power Wide-Area Network) technology. The potential advantages of smart home technology in comfort, convenience and energy efficiency prompt us to study how to introduce it into the field of cruise travel. The research results show that LORA technology has obvious applicability in cruise environment, which can realize real-time monitoring and control of cabin environmental parameters and improve passengers' comfort, convenience and energy efficiency. However, the implementation of this concept requires careful consideration of key issues such as data security and privacy protection. This study provides a new idea for the cabin design of smart home cruise ships, and is expected to contribute to the sustainable development of the cruise industry and improve the passenger experience.

Keywords:

LORA, Smart Home, Cruise Cabin

1. Introduction

The rapid development of smart home technology has gradually changed all aspects of our lives. Integrating technology into our family life provides a more convenient and intelligent living experience [1]. With the continuous maturity of Internet of Things technology, smart home system is gradually evolving into a more efficient and sustainable solution. At the same time, cruise travel, as a luxurious and pleasant way of vacation, is also welcoming the wave of technological innovation.

This paper will focus on the design of smart home cruise cabin based on LORA technology. Cruise travel has always been famous for its excellent service and exquisite environment, but how to integrate the latest intelligent technology into cabin design to improve the comfort and safety of passengers is a topic of great concern. LORA(Low-Power Wide-Area Network)technology is designed for this purpose. It can not only realize the seamless connection of smart home devices, but also provide a long-distance, low-power and highly reliable communication network for smart home systems.

By integrating the latest LORA technology into the cabin design of smart home cruise ship, it will have the opportunity to provide passengers with an unprecedented holiday experience, integrate high technology and luxury, and provide a smarter, safer and more comfortable travel environment. This paper will discuss this concept in

depth, and provide a powerful reference for the development of cruise design and travel experience in the future.

2. Intelligent Demand of Cruise Cabin

With the rapid development of science and technology, cruise travel has become a popular holiday choice. As the “home” of passengers on the cruise ship, the intelligent demand of cruise cabin has gradually attracted the attention of researchers and cruise operators. The cruise travel market continues to grow, and cruise companies constantly improve their service quality to attract passengers [2,3]. As the accommodation of passengers on the cruise ship, the cabin of the cruise ship plays a vital role. In recent years, with the rapid development of intelligent technology, the intelligent demand of cruise cabin has attracted more and more attention.

The intelligent demand of cruise cabin mainly includes the following aspects:

Automatic control: Passengers expect to easily control all kinds of equipment in the cabin, such as lighting, temperature, curtains, etc., through intelligent devices, such as smart phones or tablet computers. Automatic control can provide more convenience and comfort, but also help to save energy.

Interconnection: Cruise cabins need to provide a seamless interconnection experience. Passengers want to be able to easily access the Internet, keep in touch with family and friends, and enjoy smooth entertainment experiences, such as online movies and music on demand. In addition, interconnection with other cruise facilities is also essential to provide better service.

Safety and emergency: the intelligence of cruise cabin needs to focus on safety. Passengers need to be able to get information and help quickly in an emergency. Intelligent systems can provide security functions such as fire alarm and leak detection, and also provide relevant information to passengers [4].

Personalized experience: Cruise passengers want to be able to personalize their cabin experience. This includes personalized welcome information, customized entertainment recommendations and cabin layout. Intelligent system can provide personalized advice and services according to passengers' preferences.

By meeting the intelligent needs of passengers, cruise companies can improve passenger satisfaction. Passengers will be more willing to choose and recommend those cruise ships that provide modern intelligent cabins. Intelligent system can improve the energy efficiency of cabin and help reduce the waste of resources. Automatic control can also reduce operating costs and improve efficiency. Through automatic control, interconnection, safety and emergency handling and personalized experience, cruise companies can improve passenger satisfaction, save resources, improve efficiency and promote industry innovation [5,6]. Therefore, cruise companies should actively invest in and meet these needs to ensure that cruise travel continues to attract and meet the growing demand of passengers.

3. Application of LORA Technology in Cruise Cabin

3.1. Overview of LORA technology

With the continuous development and renewal of modern cruise ships, the intelligence and comfort of cruise cabin have become an important concern. LORA technology is a wireless communication technology with low power consumption and

long-distance communication, which has the characteristics of long-distance transmission and low power consumption. Modern cruise ship is no longer just a traditional means of transportation, but a resort that provides luxurious and diverse experiences. In order to meet passengers' demand for high comfort, safety and interconnection, cruise companies are constantly seeking innovative solutions. LORA technology, as a wireless communication technology with low power consumption and long-distance communication, is expected to provide better service and experience for cruise cabins [7].

LORA technology is a wireless communication technology for long-distance, low-power and large-scale Internet of Things (IoT) communication. LORA technology was developed by Semtech company, and its main features include:

Long-distance transmission: LORA technology can cover tens of kilometers under ideal conditions, making it very suitable for long-distance communication, especially in rural areas, areas with insufficient urban coverage or hard-to-reach places.

Low power consumption: LORA devices are usually powered by batteries, so they need very low power consumption to extend battery life. When transmitting data, the power consumption of LORA equipment is low, so it can run for a long time and reduce the frequency of battery maintenance.

Wide-area coverage: LORA technology has strong signal penetration ability, and can cross buildings, walls and obstacles to achieve reliable indoor and outdoor coverage.

Low cost: LORA modules and chips are relatively cheap, which makes them cost-effective and suitable for large-scale deployment of the Internet of Things.

Multi-connectivity: LORA technology allows hundreds or even thousands of devices to connect to a single LORA gateway, achieving extensive connectivity.

Flexible data rate: LORA technology supports different data rates and can be configured according to requirements. This allows lower power consumption at a low data rate or higher data transmission speed at a high data rate.

Open standards: LORA technology follows open communication standards, making it a universal solution for interoperability between different devices and applications.

The main application fields of LORA technology include smart city, agriculture, environmental monitoring, industrial automation, smart home, Internet of Things sensor network and so on. It provides low-cost, low-power and long-distance communication solutions for many Internet of Things applications, enabling devices to be monitored and controlled remotely, thus promoting the development of the Internet of Things.

3.2. Application mode

The application of LORA technology in cruise cabin has great potential, which can improve safety, energy management, comfort and interconnection. By solving challenges and continuous innovation, cruise companies can provide passengers with a better holiday experience, improve their competitiveness and achieve the goal of sustainable development [8]. The application modes of LORA technology in cruise cabin include:

(1) Security improvement

LORA technology can be used to enhance the safety of cruise cabin. By deploying sensors and monitoring equipment, emergencies such as fire, water leakage and smoke can be monitored. These devices can send alerts to the crew and passengers in time, thus increasing the chances of dealing with emergencies.

(2)Energy management

Cruise companies can use LORA technology to improve energy management. By monitoring power consumption and equipment status, more efficient energy use can be achieved. This will help reduce operating costs and help achieve the goal of sustainable development.

(3)Comfort improvement

LORA technology can also improve the comfort of the cruise cabin. Through the intelligent control system, passengers can adjust the temperature, lighting, curtains and so on to meet their personal preferences. This personalized comfort experience can improve customer satisfaction.

(4)Interconnection enhancement

LORA technology can help cruise cabins achieve better interconnection. Passengers can interact with the services and entertainment facilities on board, order food, book activities and so on through smart devices. This provides a more convenient experience and can increase the source of income.

4. Research on Intelligent Home in Cruise Cabin

The design of smart home system in cruise cabin aims to provide passengers with more convenient check-in experience and increase the attraction and competitiveness of cruise ships. With the rapid growth of the cruise industry, providing high-quality and intelligent services has become an important competitive factor to attract passengers [9].

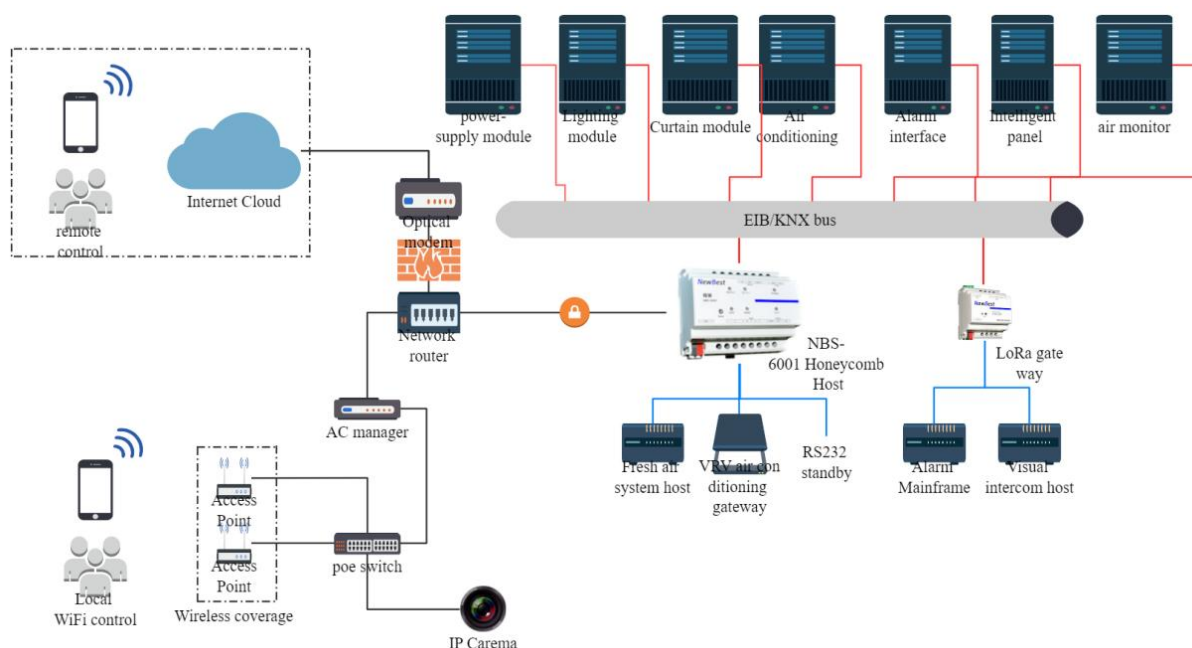


Figure 1. Intelligent home system structure of cruise cabin.

Therefore, it is very important to design a smart home system for cruise cabin based on LORA technology to improve the attraction of cruise ships and passenger satisfaction. The structure of smart home system in cruise cabin based on LORA is shown in Figure 1.

Sensors such as temperature, humidity and light are arranged in the cabin of the cruise ship to sense environmental changes. Temperature and humidity sensors monitor the temperature and humidity in the cabin to ensure comfort and automatically adjust the air conditioning system as needed. The light sensor automatically adjusts the illumination to provide the appropriate illumination level according to the time of day and night. Sound sensors detect noise levels and monitor warnings such as fire alarm and emergency broadcast. Water sensors are used to detect water leakage to prevent floods. Wireless connection and smart home integration connect all sensors to a central control system, so that guests can monitor and control the equipment in the cabin through smart phone applications or TV screens.

A smart home terminal refers to a device or interface used to interact with users, control smart devices and obtain information in a smart home system. These terminal devices allow users to remotely control all kinds of intelligent devices in the home, improving home automation and convenience. Smart phone application is the most common smart home terminal. Users can control smart devices, set plans and receive notifications through the application. Applications usually provide a user-friendly interface to simplify device control and monitoring. Users can interact and control with their smart home devices conveniently, so as to realize a more intelligent, convenient and comfortable life experience.

LORA gateway in smart home system can be used to monitor home security, control home equipment (such as smart lights, smart door locks, smart home appliances) and optimize energy management. LORA gateway is usually connected to the cloud platform to upload the data of LORA devices to the cloud, so that users can remotely access and control smart home devices at any time, or receive real-time alarms and notifications. LORA gateway usually adopts low-power design to ensure long-term stable operation [10]. This is especially important for home applications, because users usually don't want to change batteries or maintain equipment frequently. LORA gateway is responsible for collecting data from various LORA devices and forwarding these data to the LORA network server on the Internet. These data can include information such as temperature, humidity, light, door and window status.

The cloud platform of smart home system in cruise cabin is a key component, which is used for centralized management and monitoring of smart devices in each cabin, providing remote access, data storage and intelligent decision support. The cloud platform is responsible for collecting, storing and analyzing data from various sensors and devices, which helps to monitor system performance, provide historical data and insight, and support decision-making. The cloud platform of smart home system in cruise cabin helps to improve the management efficiency, comfort and safety of the system, and provides better monitoring and control means for crew and administrators, thus improving the overall experience in cruise cabin.

The mobile application of smart home system in cruise cabin is a key element to provide passengers with convenient, personalized control and interactive experience. This mobile application allows passengers to control smart devices, obtain information and interact with services and entertainment on board in the cabin.

Passengers can use mobile applications to control intelligent devices in the cabin, such as adjusting temperature, lighting, curtains, sound system and so on. Through the application, passengers can easily adjust the light and temperature in the room to provide personalized comfort. Passengers can use applications to monitor the status of doors and windows and security cameras to ensure the safety and privacy of the cabin. The application can be used as a media control center, and passengers can play music, movies and other entertainment content. The mobile application of smart home system in cruise cabin aims to provide passengers with a more convenient, comfortable and pleasant cabin experience, and at the same time provide them with a convenient way to interact with the facilities and services on board.

The smart home system of cruise cabin based on LORA will improve the passenger experience: passengers can easily control the cabin environment and enjoy a more comfortable stay experience. Energy saving and environmental protection: the system can automatically adjust the temperature and lighting, reduce energy waste and reduce the energy consumption of cruise ships. The data collected through the cloud platform can be used to analyze the internal usage of cruise ships, which is helpful to improve management efficiency. In the future, the smart home system of cruise cabin based on LORA may be further developed, for example, integrating more intelligent devices, enhancing artificial intelligence functions and providing more personalized services. This will further improve the competitiveness of the cruise industry and meet passengers' needs for convenience and comfort.

5. Conclusions

The development of smart home technology has gradually penetrated into various fields, including cruise travel. The application of LORA technology enables passengers to remotely control the equipment and electronic equipment in the cabin, including lighting, curtains, TV, air conditioning and so on, through smart phones or other terminal devices. This improves the convenience of the cabin and enables passengers to easily customize and adjust the cabin environment without leaving their seats. The cabin design of smart home cruise based on LORA technology can significantly improve the comfort, convenience and energy efficiency of the cabin. However, the successful implementation of this concept requires careful planning and design to ensure safety and privacy protection, while taking into account the unique environmental factors of cruise ships. This research provides a strong theoretical and practical basis for the cabin design of smart home cruise ships in the future, and provides a new idea for the sustainable development of the cruise industry and improving the passenger experience.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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