

Smart Village System Design based on the Background of "Internet Plus"

Zhibiao Wang^a, Feng Shi^{b,*}, Jiayi Yu^c, Youcheng Zhao and Ye Tao

University of Science and Technology Liaoning, Anshan, 114051, China

^a144181362@qq.com, ^{b,*}alanstone7772003@126.com, ^c1551009136@qq.com

Abstract

We have developed a comprehensive smart rural system based on the rapidly evolving IoT technology. Its aim is to address challenges in rural life and promote modernization, technology, and intelligence of rural life to improve the quality of life of rural residents. The system will solve two main issues in rural life: (1) improving agricultural management for intelligent and large-scale agricultural production; (2) enhancing the comfort and safety of rural home life and providing convenience for villagers' lives. The system will change traditional rural life, improve agricultural production efficiency, facilitate rural production and management activities, and enhance the quality of life of villagers. Its adoption will generate significant economic and social benefits.

Keywords

Internet+; Smart Village; Rural Revitalization Strategy; Urban and Rural Development.

1. Introduction

With the rapid development of IoT technology, smart rural systems have emerged as a promising solution to address various challenges in rural areas. These systems aim to promote modernization, technology, and intelligence in rural life to improve the quality of life of rural residents. In this context, this paper presents a comprehensive smart rural system that leverages IoT technology to improve agricultural management and enhance the comfort and safety of rural home life. The system aims to establish a smart living value system that meets the needs of rural residents and contributes to their overall well-being. This paper discusses the challenges in rural life, the proposed solution, and the potential economic and social benefits of the system's adoption.

2. Research Background

As of 2022, there are still approximately 500 million farmers in China, accounting for 36.11% of the population and an important component of the Chinese people. Therefore, achieving rural revitalization is an important issue. In this era of the rise of the Internet, rural revitalization relies on the Internet to demonstrate its unique advantages, realize the development model of "Internet + various fields", effectively solve the urban-rural development problem, and achieve the goal of using the Internet to develop agriculture and assist agriculture. In recent years, with the continuous implementation of the "Internet +" policy, intelligent urban construction has made significant progress, and the quantity and quality of urban population have also been significantly improved. However, in contrast, the development of rural areas is still in a sluggish state, and the gap between urban and rural areas is becoming more and more prominent, with weak infrastructure in farmland, backward agricultural science and technology, and a decline in the living quality of farmers. With the development of society, "Smart Villages" as a new way of thinking aims to promote the modernization of towns, improve the social situation of towns, promote the sustainable prosperity of

towns, and is based on cutting-edge IoT technology, aimed at improving the infrastructure and social structure of towns, promoting social justice in towns, promoting social civilization construction in towns, making the social environment of towns more harmonious and stable, and promoting the sustained prosperity of towns.

3. Project Content

3.1 Determination of System Design Objectives

The Android IoT based smart rural system integrates two fields, namely smart agriculture and smart home, to meet the needs of users, including but not limited to: accurate farmland planting, efficient animal husbandry, health monitoring of farmers, and ensuring the well-being of township residents. By establishing an advanced intelligent agricultural management system, the daily life of farmers can be greatly improved, the wealth disparity between urban and rural areas can be reduced, and the harmonious coexistence between agriculture and urban can be promoted, thus solving the problem of China's economic and social shortcomings.

3.2 Analysis of System Functional Requirements

In order to meet the diversified needs of users, the system uses intelligent agriculture and smart home two modes, the former mainly involves soil moisture, pH, greenhouse CO content, temperature and humidity, light detection and control, and the latter is mainly involved in human health inspection, light, temperature and density, so as to realize the effective monitoring and management of the family environment.

3.3 Overall System Design Scheme

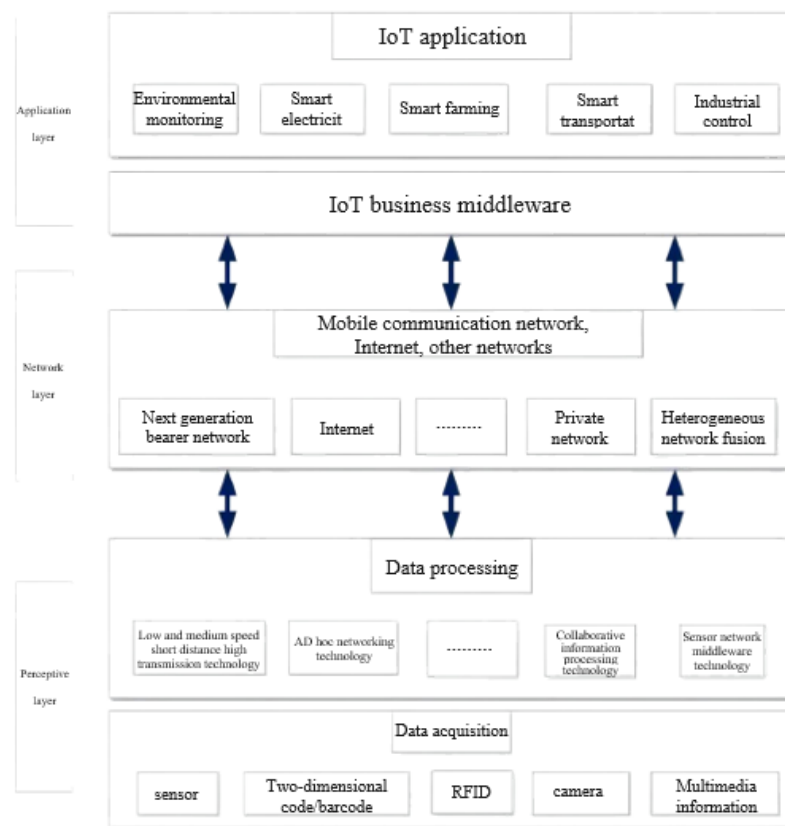


Figure 1. Smart rural system structure

The smart rural system consists of a bottom-level structure and an upper-level structure. The bottom-level structure includes terminal equipment nodes and a home gateway. The terminal equipment nodes are composed of smart agriculture equipment nodes and smart home equipment nodes, and

they are equipped with ZigBee network communication modules for data collection and transmission. The gateway is the coordinator of the ZigBee wireless communication network and is equipped with a Wi-Fi module for external communication. The upper-level structure includes servers, databases, clients, and mobile clients, which manage the ZigBee network and related devices, including the database, control terminal support, data packet analysis, and device manager. The control terminal is an Android smartphone that serves as the operating and management interface of the system, allowing for real-time monitoring, remote control, and environmental data monitoring. Figure 1 shows the Smart Village architecture.

4. Implementation of System Function Modules

4.1 Design of Intelligent Agriculture Module

By using a variety of sensors and ZigBee modules built intelligent agriculture system, can real-time monitoring of the environmental conditions in the greenhouse, and can remotely control the operating status of water slurry, fans, rolling curtain and other equipment. The collected parameters are displayed in real time on the client, which is convenient for users to view at any time. If the specified danger parameter exceeds the limit value of the interval, an alarm message will be issued to remind the user to deal with it. The data information collected by the sensor is uploaded to the database regularly and stored for the convenience of users to view at any time. The design of intelligent agriculture module includes the design of title bar, environmental monitoring interface and remote monitoring interface :1) The design of Toolbar of title bar, the design of navigation icon returning to the main interface, and the design of connection setting of gateway server port number;(2) Real-time display of illumination, air temperature and humidity, soil PH, soil temperature and humidity and other parameters collected by sensors in the environmental monitoring interface; Switch control of water pump, shutter, and fan on the remote monitoring interface.

4.2 Smart Home Module

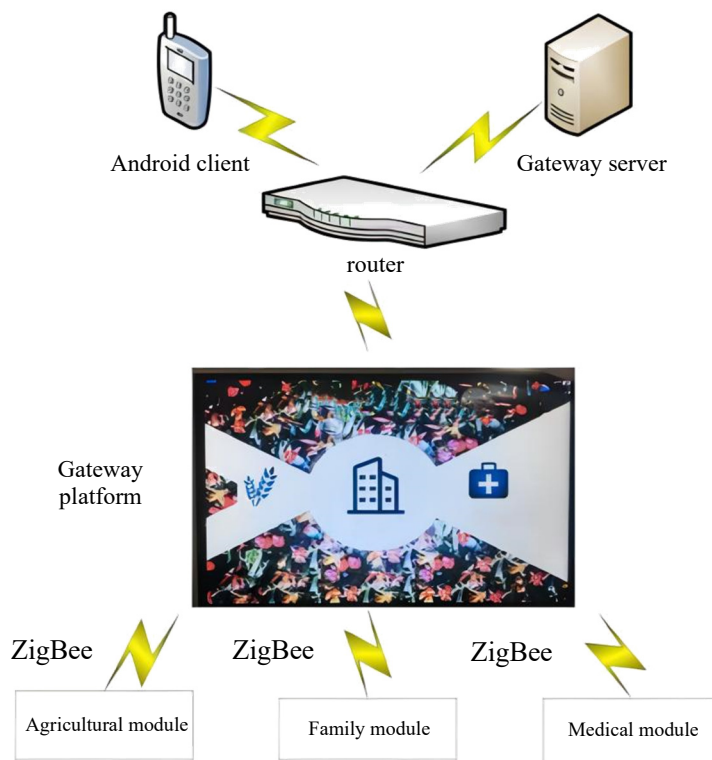


Figure 2. Intelligent module

Smart home is to interpret and process specific sensor node parameters in the customer's mobile phone system. The core function of this module is to realize the intelligent operation of facilities. In the field of environmental monitoring, sensors are used to collect important indoor parameter information. In terms of remote control, the switch management of lighting, curtain, sound and light alarm facilities is achieved. Through the monitoring of the user's living conditions; The user's home life becomes more convenient and more intelligent. The development of smart home module includes two parts: one is the development of Toolbar in the title bar and the connection arrangement of navigation items and server slogans back to the main page; The second is the 24h presentation of important parameters such as illumination and smoke obtained by sensors in the environmental monitoring page, and the in-depth monitoring of important parameters such as lighting and curtain in the remote monitoring page. The smart module is shown in Figure 2.

5. Conclusion

Today's world has gradually stepped into the Internet era, and the whole society is also making continuous progress with the development of the network. Through the combination of smart agriculture and smart home, not only precise farmland planting, efficient animal husbandry, health monitoring of farmers, and ensuring the well-being of township residents, but also making home life more convenient and intelligent for users. By establishing an advanced intelligent agricultural management system, the daily life of farmers can be greatly improved, the wealth disparity between urban and rural areas can be reduced, and the harmonious coexistence between agriculture and urban can be promoted, thus solving the problem of China's economic and social shortcomings.

Acknowledgments

This study is the research result of "International Internet + rural intelligent Service platform", an innovation and entrepreneurship funding project of University of Science and Technology Liaoning.

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