

Research on the Construction of Group Elderly Care Service Platform Based on IoT Technology

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Abstract: Internet of Things (IoT) technology is widely used in various fields, and its application in elderly care services has been highlighted in recent years. This study aims to explore how IoT technology can improve the efficiency of group-based elderly care services. The concept, characteristics, and current application status of IoT technology in elderly care services were introduced. Secondly, the characteristics and needs of group elderly care services were analyzed, including advantages and challenges, as well as the expectations and needs of the elderly for elderly care services. The evaluation methods and future development directions of IoT technology in improving the efficiency of group elderly care services were discussed, including data collection and analysis methods, selection and measurement of efficiency evaluation indicators, challenges, and development directions.

Keywords: Internet of Things technology; Group-based elderly care services; Efficiency improvement

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1. Introduction

With the acceleration of global population aging, the demand for elderly care services is constantly increasing. The pursuit of quality of life and the gradual decline in self-care ability of the elderly pose significant challenges to traditional elderly care methods. To address this challenge, group-based elderly care has emerged. Group-based elderly care refers to a group of elderly people living together, taking care of each other, and sharing resources to improve their quality of life while reducing the cost of elderly care. However, traditional group-based elderly care systems often come with some disadvantages, such as low efficiency of elderly care services and insufficient resource integration. Therefore, the utilization of the Internet of Things (IoT) to improve the efficiency and quality of group elderly care services has become a hot topic for research.

The IoT is a technology that connects objects through a network and intelligently manages them. It achieves real-time monitoring, remote control, and intelligent analysis of objects through sensors, smart devices, and cloud computing. In terms of group-based elderly care services, Internet of Things technology can be applied in areas such as health monitoring, environmental control, and smart homes. By employing the IoT, elderly people can monitor their health status in real time and identify health issues promptly. Management

personnel can remotely control and monitor the environment of the home to ensure the safety and quality of life of the elderly; smart home devices can provide convenient and comfortable living experiences for the elderly.

2. The IoT and its application in elderly care services

The Internet of Things is a network based on the Internet, which closely connects the physical world with the information world through technologies such as information collection, transmission, and intelligent processing, achieving interconnectivity between all things ^[1]. The Internet of Things technology mainly covers various technological means such as sensors, embedded systems, cloud computing, big data, etc., which can achieve information exchange and intelligent control between objects. In the field of elderly care services, IoT technology has achieved real-time monitoring and intelligent management of the living environment, health status, and other aspects of the elderly through various intelligent devices, sensors, and other means.

2.1. Characteristics and needs of elderly care services

The main characteristics of elderly care services include the specificity of the service recipients, the decline in physical function of the elderly, the weakening of self-care ability, and the need for more care and attention. Elderly people have diverse needs, varying from person to person, including basic care, healthcare, and psychological care, and cultural entertainment. As society ages, the demand for elderly care services is also constantly increasing. Elderly people need more care and attention and a safe, comfortable, and convenient living environment ^[2]. Furthermore, they require convenient information exchange and service support. Additionally, elderly individuals aspire to enhance their quality of life through technological advancements, alleviate the burden on their children, and embrace the convenience offered by technology.

2.2. Potential advantages and application scenarios of IoT in elderly care services

The potential advantages of IoT technology in elderly care services mainly include improving service efficiency and reducing labor costs ^[3], achieving real-time monitoring and intelligent management, providing personalized services, resource integration, and improving the quality of services. The application scenarios of Internet of Things technology in elderly care services mainly include the following aspects

(1) Health monitoring

Wearable sensors, smart wristbands, and other devices enable real-time monitoring of the health status of the elderly, including parameters like heart rate, blood pressure, and sleep quality. This proactive approach allows for timely detection of health issues and implementation of necessary interventions.

(2) Environmental monitoring

Environmental sensors enable real-time monitoring of environmental indicators such as temperature and humidity, air quality, and lighting. This ensures a comfortable living environment for the elderly.

(3) Smart home

Smart home devices such as smart lighting, smart curtains, smart water dispensers, etc. enable remote control and automated management of the homes.

(4) Security monitoring

By installing monitoring cameras and other equipment, real-time monitoring and security protection of the environment can be achieved ^[4].

In addition to the aforementioned scenarios, IoT technology can also be applied to resource integration and management of elderly care services. For example, achieving rational allocation and sharing of resources through Internet of Things technology to improve the overall level of elderly care services. At the same time,

personalized service solutions can also be provided to the elderly through technical means such as data analysis.

2.3. Intelligent health monitoring system

2.3.1. System architecture and function introduction

An intelligent health monitoring system mainly consists of three parts: data collection module, data transmission module, and data analysis module. The data collection module includes various sensors, such as heart rate sensors, blood pressure sensors, temperature sensors, etc., for real-time monitoring of the health status of the elderly. The data transmission module transfers the collected data to the data analysis module, achieving real-time processing and analysis of the data. The data analysis module adopts cloud computing and big data technology to analyze and process the collected data, providing health monitoring reports and early warning services.

2.3.2. Application effect evaluation and user feedback

An intelligent health monitoring system is found to be practical and effective. The system can monitor the health status of elderly people in real time, allowing timely detection of abnormalities. Corresponding warnings and suggestions can then be provided to help improve their lifestyle and health status. In addition, the system can also provide personalized health services to meet the needs of elderly individuals. User feedback indicates that the system has strong usability and convenience, which can improve the quality of life of the elderly and also reduce the burden on children.

2.4. Smart home and environmental control

2.4.1. Equipment and platform integration solution

A smart home and environmental control system consists of two parts: smart home terminals and cloud platforms. Smart home terminals include various smart home devices, such as smart lighting, smart curtains, smart air conditioning, etc., used to control and adjust the elderly care environment. The cloud platform connects smart home terminals through Internet of Things, achieving remote control and intelligent management of smart home devices.

2.4.2. Energy consumption management and user experience evaluation

The smart home and environmental control system has good energy efficiency and user experience. This system can achieve intelligent management of the elderly care environment, improve the efficiency and quality of elderly care services. At the same time, the system can also achieve energy conservation and management, and reduce the cost of elderly care services. User feedback indicates that the system has strong usability and convenience, which can improve the quality of life of the elderly and also reduce the burden on children.

3. Promotion and application of IoT in the group elderly care service platform

With the intensification of population aging and changes in family structures, elderly care services have become a major concern. As a new type of elderly care service model, group-based elderly care has gradually received social attention. As a new type of information technology, the application scope of Internet of Things technology has gradually expanded from smart homes, intelligent transportation and other fields to the field of elderly care services. In the group service platform, the promotion and application of Internet of Things technology can effectively improve service efficiency and quality, providing a more convenient, comfortable, and safe living environment for the elderly ^[5].

3.1. Resource integration and sharing

In the group elderly care service platform, the promotion and application of Internet of Things technology can improve service efficiency and quality through resource integration and sharing. The IoT technology can monitor the health status and elderly care environment of the elderly in real time through various intelligent devices, sensors, and other means, such as heart rate, blood pressure, temperature and humidity, and transmit these data in real time to the service platform. The service platform can analyze and process this data through cloud computing and big data technology and provide health monitoring reports, early warning services, and personalized care services for the elderly. In addition, IoT technology can also achieve automated management of elderly care services through devices such as smart homes, such as smart lighting and smart curtains, providing a more convenient living environment for the elderly ^[6].

3.2. Information communication and management

In the group elderly care service platform, the promotion and application of IoT technology can improve service efficiency and quality through information communication and management ^[7]. IoT can monitor the health status and elderly care environment of the elderly in real time through various intelligent devices, sensors, and other means, and transmit this data to service platforms in real time through cloud computing and big data technology. The service platform can use this data to timely understand the health status and needs of the elderly, and communicate and manage information with elderly care service providers, providing more personalized elderly care service solutions. In addition, IoT can also achieve automated management of elderly care services through devices such as smart homes, such as smart lighting and smart curtains, providing a more convenient living environment for the elderly.

3.3. Technical support and training

In the group elderly care service platform, the promotion and application of Internet of Things technology can improve service efficiency and quality through technical support and training. The Internet of Things technology can monitor the health status and elderly care environment of the elderly in real time through various intelligent devices, sensors and other means, and transmit this data to service platforms in real time through cloud computing and big data technology. The service platform can use this data to timely understand the health status and needs of the elderly, and communicate and manage information with elderly care service providers, providing more personalized elderly care service solutions. In addition, IoT can also achieve automated management of elderly care services through devices such as smart homes, such as smart lighting and smart curtains, providing a more convenient living environment for the elderly ^[8].

4. Impact of IoT on the efficiency of group-based elderly care services

The improvement of efficiency in group elderly care services is an important evaluation indicator of the impact of IoT ^[9]. To evaluate the effectiveness of IoT in group-based elderly care services, we can evaluate it from three aspects: data collection and analysis methods, selection and measurement of efficiency evaluation indicators, case analysis, and result discussion.

4.1. Data collection and analysis methods

To evaluate the effectiveness of IoT in clustering, we need to collect and analyze relevant data. Data collection can be achieved through IoT and smart devices, such as smart health monitoring systems, smart homes, and environmental control systems. Data analysis methods include statistical analysis, machine learning, data

mining, etc., which can analyze and process data and provide health monitoring reports, early warning services, and personalized care services for the elderly.

4.2. Selection and measurement of efficiency evaluation indicators

Efficiency evaluation indicators can include service efficiency, management efficiency, user satisfaction, etc. Service efficiency can be achieved through the optimization and automated management of service processes, such as intelligent health monitoring systems, smart homes, and environmental control systems. Management efficiency can be achieved through the integration and optimization of elderly care service resources, such as the group elderly care service platform. The evaluation of user satisfaction can be achieved through user feedback and evaluation, such as user satisfaction surveys ^[10].

4.3. Case analysis and result discussion

To evaluate the effectiveness of IoT in group elderly care services, we can conduct case studies and result discussions. For example, typical elderly care service platforms and intelligent health monitoring systems can be selected to evaluate their application effectiveness. The evaluation results can be obtained through analysis and statistical methods, such as service efficiency, management efficiency, user satisfaction, and other indicators. In addition, by discussing and analyzing the results, we can further understand the advantages and disadvantages of IoT in group elderly care services, and propose corresponding suggestions and improvement measures.

5. Challenges and future development directions

There are still some challenges in the future development of IoT technology in group-based elderly care services. Firstly, there are privacy and data security issues. With the widespread application of the IoT, privacy and data security have become a concern. Group-based elderly care services involves the collection, transmission, and storage of a large amount of personal health data, such as data related to physical health monitoring. Therefore, maintaining user privacy and data security is crucial. In the future, it is necessary to strengthen privacy protection and data security measures, such as encrypted transmission, identity verification, access control, etc., to ensure that the personal privacy and sensitive information of users are fully protected. Secondly, there is technical standardization and interoperability. The application scenarios of Internet of Things technology are numerous, involving a wide variety of devices and systems. However, due to the lack of unified technical standards and interoperability between different vendors and platforms, there are issues such as device incompatibility and data communication. This has brought certain obstacles to the promotion and application of group elderly care services. In the future, it is necessary to strengthen the formulation and promotion of technical standards, establish a unified IoT technology framework, improve the interoperability of devices and systems, and enable seamless integration and collaborative work of various devices and platforms. The third is scalability and popularity. The application of IoT in group-based elderly care services still faces challenges in terms scalability and popularization. Although there have been some successful application cases, the overall coverage and popularity are still relatively low. In addition, as the population ages, the demand for elderly care services will also continue to increase, requiring more extensive application coverage. In the future, it is necessary to promote the scalability of animal networking technology and further improve its popularity, further benefitting elderly care providers and recipients.

6. Conclusion

In the process of exploring the application of IoT in group-based elderly care services, we found that the IoT

technology has brought many advantages to elderly care services. The application of IoT has achieved real-time monitoring, remote control, and intelligent management, improving the efficiency and quality of elderly care services. Through IoT, personalized elderly care services can be provided to meet the different needs of the elderly. IoT can achieve the integration and sharing of resources and improve the overall level of elderly care services. However, it also poses challenges in terms of privacy and data security, technological standardization and interoperability, scalability and popularity.

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Disclosure statement

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