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Application of Internet of Things and embedded technology in electronic communication

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ABSTRACT

In order to explore the energy-saving control method of electronic communication, the author proposes the application of Internet of Things and embedded technology in electronic communication. The application makes full use of the "Internet of Things" and embedded technology to create an energy-saving system, send data to the energy-saving system to control the power supply, and control operation of electrical appliances to achieve energy saving results.

According to the test results: The energy consumption of the system designed by the author after energy saving is 4.8335kWh, which is lower than that of the device before energy saving, which is 5.8424kWh and saves electricity. At different load current, the system output voltage is controlled at 220 V and the performance of the system is stable.

Conclusion: The system designed according to the model proposed by the author has a good performance in terms of energy consumption and has a connection with Internet technology and embedded technology in fire communication power.

1. Introduction

With the continuous development and advancement of information technology, effective technology is constantly being used in many areas of human life. People are gradually understanding computer technology and are appreciating the ease that computer intelligence has brought to their lives and work. The Internet of Things technology means that all mechanical devices have the ability to store and compute, meet people's needs, install easily, and create connections between the product connection. Cloud computing is a method that includes parallel computing, distributed computing, and network connectivity. Cloud computing technology will become an important foundation for the development of the Internet of Things [1–3]. Internet of Things technology is a cloud computing platform combined with cloud computing technology, which collects and organizes data and information from smart devices such as wireless sensors and radio frequency identification, and then sent to the application layer to exchange, exchange and process data. Manage and control the entire system.

Embedded technology is a technology that organically combines software and hardware into an independent working device, embedded technology is widely used in life and work [4–6]. Microprocessors appeared in the 1970s, and with the emergence of microprocessors, it became possible to make microcomputers into devices and use smart device management. The definition of Embedded is as follows: "software and hardware based on computer technology that must be configured and are suitable for special purpose computer systems with strict requirements of functionality, reliability, cost, big and powerful." With the rapid development of microelectronics technology, the connection between computer technology and the whole life is deepening, accelerating the application and development of embedded technology and complete the embedded system. Embedded technology integrates computer technology, microelectronic technology and software technology in the development process.

Conduct research on the use of energy-saving communication technology, develop communication technology in the power management system, and then provide the technology output Internet of Things and now Internet of Things by using technology to create an electronic communication system, which is better for improving electronic communication.

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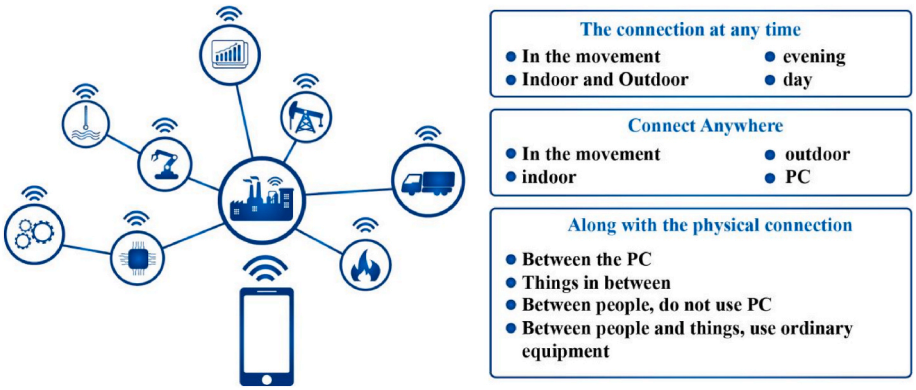

Fig. 1. The new 3D mode of character interconnection.

2. Literature review

With the advent of electronic communication, China's communication network has been constantly updated and the transmission efficiency has been constantly improved. In order to improve communication technology and adapt electronic communication technology for social development, it is necessary to deepen and update electronic communication technology and study the application of electronic communication. Analysis of the application and network architecture of electronic communication technology can effectively improve people's understanding of electronic communication technology, better application of electronic communication technology.

The Internet of Things is an unstoppable product of the rapid development of science and technology, especially in areas related to information technology. In 1999, the Automatic Recognition Laboratory of the Massachusetts Institute of Technology created the first term "Internet of Things". Its basic definition is: Combining all items in the network system with the Internet through sensing equipment, radio frequency technology, etc., expand the network into a collection that can cover everything in the world, and then realize intelligent identification and management through high-speed and high-performance equipment and technology, and carry out effective data exchange and sharing.

As the name suggests, the Internet of Things is still the Internet of Things, and its core and foundation is still the Internet, but compared to the Internet, the Internet of Things has expanded Broaden, expand, and improve many functions. With the effective support of advanced technology and equipment, the Internet of Things has been successful in the direct exchange of information and communication between objects. In particular, infrastructure such as RFID tags and wireless sensors are installed in railways, power grids, bridges, highways, buildings, dams, oil and natural water pipelines. , and other items used to build the terminal. This last network is connected to the existing Internet and was created using the connection between the human body and the physical body, where a huge computer with super processing power is created of this network to exchange information on the Internet of Things and real. Management and management of all network products can be done. The Internet of Things is an important part of the Internet in the new era, its purpose is to realize the exchange and sharing of data between any person and any object at any time, any place, and to provide convenient services. The Internet of Things connects the real world, and what needs to be realized is the communication and dialogue between things, people and things, and even between people and nature [7].

As a hot spot in the field of information industry both at home and abroad, the Internet of Things technology has gradually been recognized as a successor to computer technology, the third information technology revolution of the information industry after the Internet, its most important sign is that the infrastructure of the "physical world" and the IT infrastructure of the "computing world" have gradually moved from separate development to integrated development. This will bring about a change in the way of communication between human society and the physical world and the computing world, as well as a further improvement in information acquisition, flow and processing capabilities, in this way, it can effectively improve the cooperation and cooperation of key links in various industries, improve the internal operation efficiency of enterprises, and reduce the cost of economic operation, it can be said that the prospects are bright.

For China, the current pattern of economic development has become an important change, and at the same time, the development of information technology has established a stable and gradual foundation. Develop to a new level of everything. The integration and development of the Internet of Things and cloud computing has also reached an important moment. Whether it is the Internet of Things or cloud computing, in the process of its development, it is still inevitable to face the definition of industrial categories, the formulation and unification of internal standards in the industry, breakthroughs in core technologies, application promotion and scale, network security, and privacy protection technologies. And many other difficulties [8].

The rapid development of electronic technology, especially with the advent of microcomputers, the result of large-scale integration, modern science and technology research has to be effective, and the advent of technology has led to new changes in this field. The most obvious advantage of embedded systems composed of embedded microcontrollers is that they can be embedded in various devices. In a broad sense, as long as it is not a general-purpose programmable computer device, we can think of it as an embedded computer system; In a more detailed sense, the signature process refers to a professional computer whose basis is the application, the basis of computer hardware, software, and hardware. Hardware, and which have strict requirements for performance, reliability, cost, size, and power. Three characteristics of embedded system - "embedding", "specialty" and "computer system" are its main concepts.

Based on the above research, the author proposed a good electronic communication management system based on the Internet of Things and art tools, together with advanced features of Internet of Things technology, the development of electronic communication technology, and electronic communication.

3. Research methods

3.1. Introduction to IoT technology

3.1.1. Definition of IoT technology

The definition of Internet technology is a network system that uses connections between things and things based on the Internet. It basically consists of two things: (1) The foundation of the Internet is still the Internet, which is the extension and expansion of the Internet foundation; (2) It expands to many products to fulfill its function of information

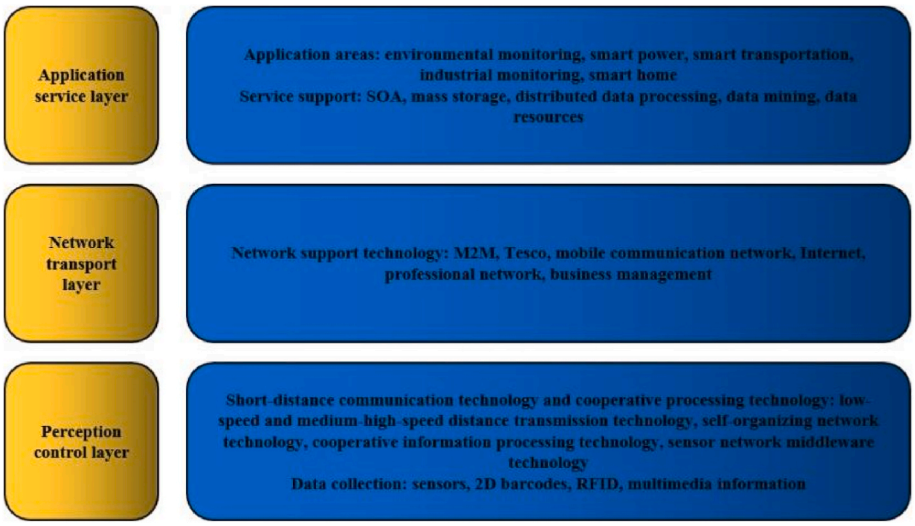

Fig. 2. The technical framework of the Internet of Things.

sharing and exchange.

As shown in Fig. 1, the ultimate goal of IoT technology development is to realize the connection of things anytime, anywhere, as close as possible to the formation of the Internet of Things among all things. The core of the Internet of Things is to realize convenience and intelligence, the realization of the Internet of Things technology must have the dual support of infrastructure and high-end technology. The technical formula of the Internet of Things is as follows: 1.

$$(\mathrm{NSID}-\mathrm{IOT})+(\mathrm{NB}-\mathrm{IOT})+(\mathrm{OID}-\mathrm{IOT})=IOE/IOE*N=IOT \tag{1}$$

The "things" in IoT must have special properties to be included in the scope of IoT, these basic characteristics include: It must have a data transmission path; It must have a certain storage capacity; It has its own processing capacity; It has a control and management system; It has a special application that allows the exchange and exchange of information; It follows the communication standards of the Internet of Things; Unique identification number.

How IoT technology can form a large-scale high-tech market in the future must have the following characteristics:

(1) The understanding of the underlying information of the Internet of Things, which is the basis of the Internet of Things technology, is characterized by a large amount of information and various information in the understanding layer of the Internet of Things. Therefore, it is very good to set up different types of sensors, different types of sensors receive different data and data types, in addition, the sensor is real time, and the data of perception layers change rapidly and continuously. If updated, the sensor should receive constant data. In such an environment, people can access a lot of information from the virtual world as well as the physical world. Information is the basis of information services and can provide support for human decision-making and decision-making with the help of information [9].
(2) The core and core of the Internet of Things technology is still the Internet, and after collecting data on the Internet, the understanding process, data and the information must be transferred by combining with the Internet through the transmission layer. Technology and understanding layer to deliver the collected data in real time and accurately.
(3) The development of the Internet of Things technology is to realize global intelligence, which requires the support of various good equipment. Cloud computing platform solves this problem effectively and allows information to be shared and exchanged. Due to the characteristics of many user needs of the Internet of Things, special solutions must be provided for specific problems, and virtualization that can be done in cloud computing. Voluntarily achieve this goal. Only with advanced technology support can IoT technology realize cross-industry and global smart data services.
3. Architecture of the Internet of Things: Today, the business application of the Internet of Things is very broad and covers all aspects of the IT industry, the Internet of Things is divided into three layers according to the classification work on business; Perceptual control layer, network transport layer and application program. The technological process of the Internet of Things is shown in Fig. 2.

The use of new technologies in the Internet of Things will lead to unprecedented improvements in the human environment, which shows the need to use this new technology. From the perspective of Internet of Things infrastructure, it is the management of the Internet, the ultimate goal of the use of information management that improves performance, management respect, and the use of resources of the world [10]. Because the Internet of Things will create a lot of data and information that must be shared and exchanged in real time to realize the physical world, information management on the Internet of Things will have the following characteristics.

1. Unpredictability: The physical world changes randomly at all times, and the information perceived by the perception layer from the physical world has the characteristic of real-time, this makes the perception layer produce a large number of unforeseen events, and the Internet of Things must have the ability to process relevant information and data at any time.
2. Intelligent information processing: The intelligent goal to be achieved by the Internet of Things is to manage data with as little manual operation as possible, so intelligence is very necessary. Only by realizing the intelligent processing of data can all functions in the Internet of Things be successfully completed.
3. Multi-dimensional dynamic changes: In the IoT perception layer, there are many types of data, and the dynamic changes are obvious, the IoT management system must have the ability to adapt to the corresponding changes in a timely manner.

From the above properties, it can be seen that the IoT management system must have the ability to exchange and share large amounts of data. Building a cloud platform on the IoT operation platform can

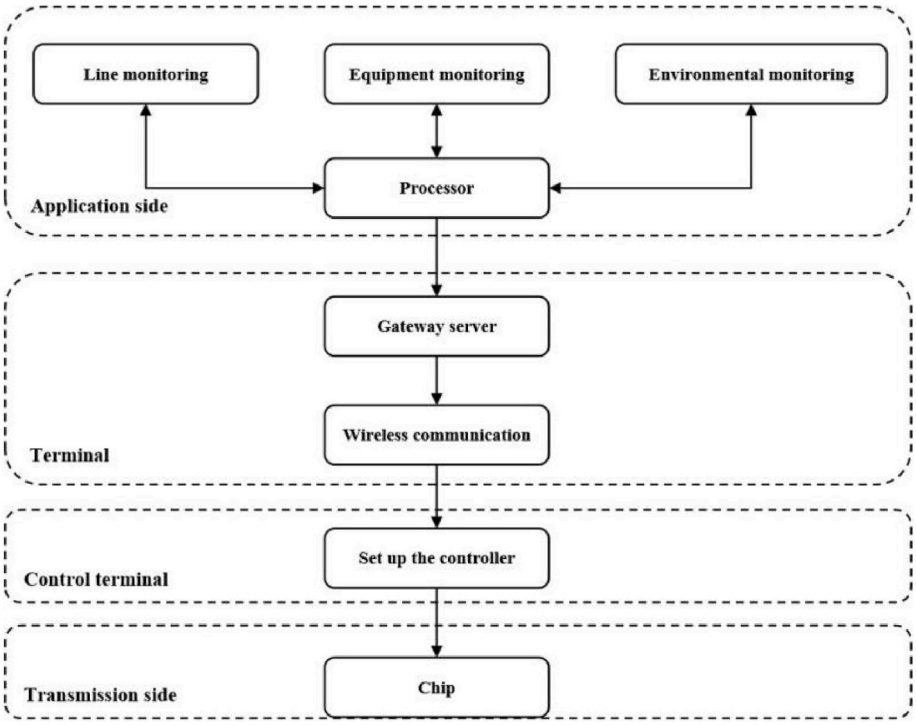

Fig. 3. Overall architecture of the system.

effectively solve this problem. The main application technology of the cloud platform is to virtualize resources, which completes the sharing and exchange of resources between different fields or between different users in the same field. Cloud computing is a technology that combines different types of computing that can set up network nodes, collect data, work at low cost and high performance, and make data secure paper. Therefore, the exploration of the new technology of the Internet of Things with the cloud will be the next big change in the intelligent information services, which is an important support.

3.1.2. Embedded technology in IoT technology

As the Internet of Things devices are connected, it is necessary to obtain information on each product, as well as the use of special controls and functions of each product, which requires smart devices in the connected devices. Embedded technology is a simple support for implementing certain functions of IoT technology. An embedded system is a combination of software and hardware that controls and controls machines and devices, often with mechanical devices to perform auxiliary functions. Embedded system is a technology application developed and extended by computer technology, which creates computers that combine software and hardware. By adjusting the check system, it is possible to meet the customer's specifications and use different products, prices, packaging and so on [11].

With the development of the Internet of Things technology and the popularization of information appliances, the embedded operating system continues to develop and improve from weak functions to strong functions. It has outstanding characteristics in many aspects such as system real-time efficiency, hardware dependence, and software curing specificity. The embedded operating system is very suitable for the connection between things and things in the Internet of Things application environment, and it is also an excellent technical means.

3.2. Embedded system construction of electronic communication technology

Based on the above research, we can know that there are embedded systems in the Internet of Things technology, then, we combine the

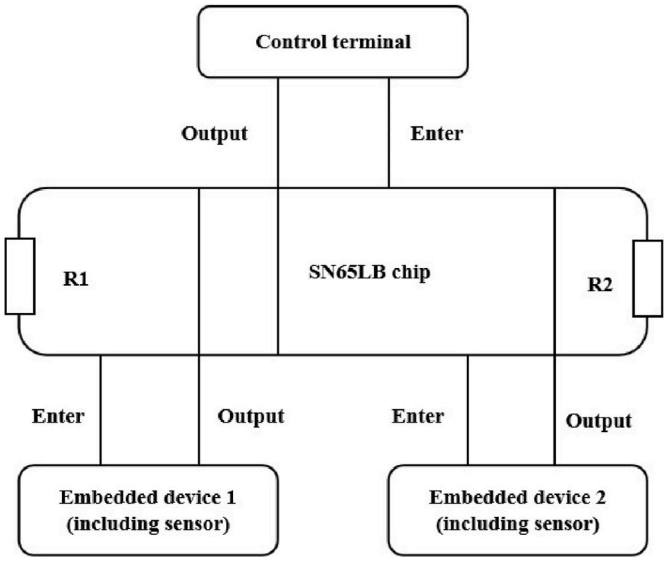

Fig. 4. RS488 bus transmission serial port diagram.

Internet of Things technology with a separate embedded technology, which not only has a very good harmony, and can better design electronic communication energy-saving control system. Let's do our research.

3.2.1. Overall system architecture design

The energy-saving control system for embedded electronic communication equipment includes an application end, a terminal, a control end and a transmission end, and its overall architecture is shown in Fig. 3. The terminal of the system is responsible for the statistics, analysis and communication of embedded data, and its main component is the gateway server; The application side is mainly responsible for the monitoring and analysis of the embedded electronic communication

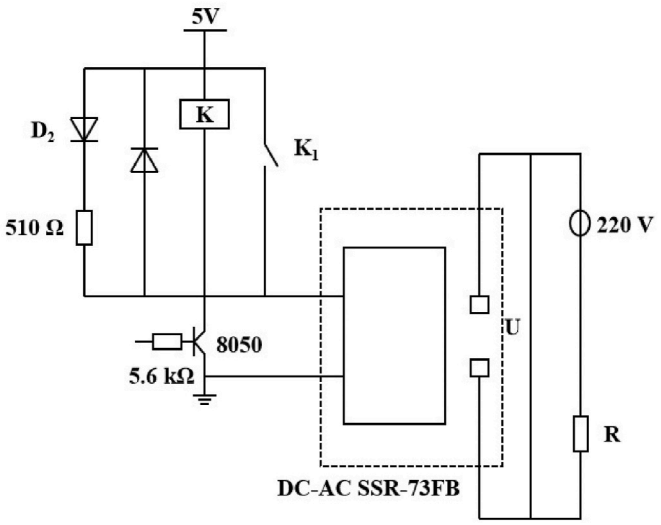

Fig. 5. Energy-saving control execution circuit.

equipment; The control side adopts the control method combining software and hardware according to the embedded theory to realize the high efficiency and energy saving of the embedded electronic communication equipment; The transmission side is responsible for the data transmission.

3.2.2. Transmission side design

The transmission end is the core part in the energy-saving control system of embedded electronic communication equipment, it receives the data transmitted by the gateway server using the transmission control protocol and the application end, the RS488 bus is used to connect with the control end, and the gateway server is the communication hub of the application end, the terminal, the control end and the transmission end. Fig. 4 is the RS488 bus transmission serial port diagram of the transmission terminal chip.

As shown in Fig. 4, the information of the electronic equipment is received from the terminal application, and the terminal uses the TCP/IP protocol to receive the information. Paper, and send the data to the terminal controlled by RS488 bus transmission. The RS488 bus transmission serial port adopts the radio frequency differential wireless transmission method to communicate with the control terminal half-duplex and full-duplex, at the same time, the SN65LB chip is used to control the monitoring and analysis of embedded communication equipment data. The SN65LB chip can complete the parallel transmission of data from 125 embedded electronic communication devices, and its transmission accuracy is high, and at the same time, it can improve the energy-saving effect of the system [12,13].

3.2.3. Design of energy-saving control execution circuit

The energy-saving control execution circuit is the core of the control terminal, responsible for energy-saving control of electronic communication equipment, it includes STC89C57RC microcontroller, relays and single-phase stable relays. The relay can isolate the microcontroller and the single-phase stable relay, protect the microcontroller, start the operation of the single-phase stable relay, and set the monitoring indicator of the single-phase stable relay. The circuit adopts DC-ACSR-73FB clearing type single-phase stable relay to control the voltage and current, the voltage of the energy-saving control execution circuit is DC3-30 V, the current is 4–12 mA, the rated working voltage is AC22-360 V, and the rated maximum working current is 53 A. The energy-saving control execution circuit is shown in Fig. 5.

3.2.4. System software

The system uses control software to control energy-saving control instructions. The control software issues instructions through a web page, the page of the web page is simple, clear and easy to operate, it can complete the energy-saving control of all embedded electronic communication devices in energy-saving places [14–16]. The command operation interface is shown in Fig. 6.

It can be seen that the command operation interface consists of 4 parts, which are divided according to the order of use by users: The first part can complete the system user registration, login and logout; The second part can query the room of embedded electronic communication equipment; The third part can complete the summary of all embedded device information in the required energy saving area; The fourth part is the core of the system software, which can show the energy-saving control scheme output by the control terminal, and the energy-saving

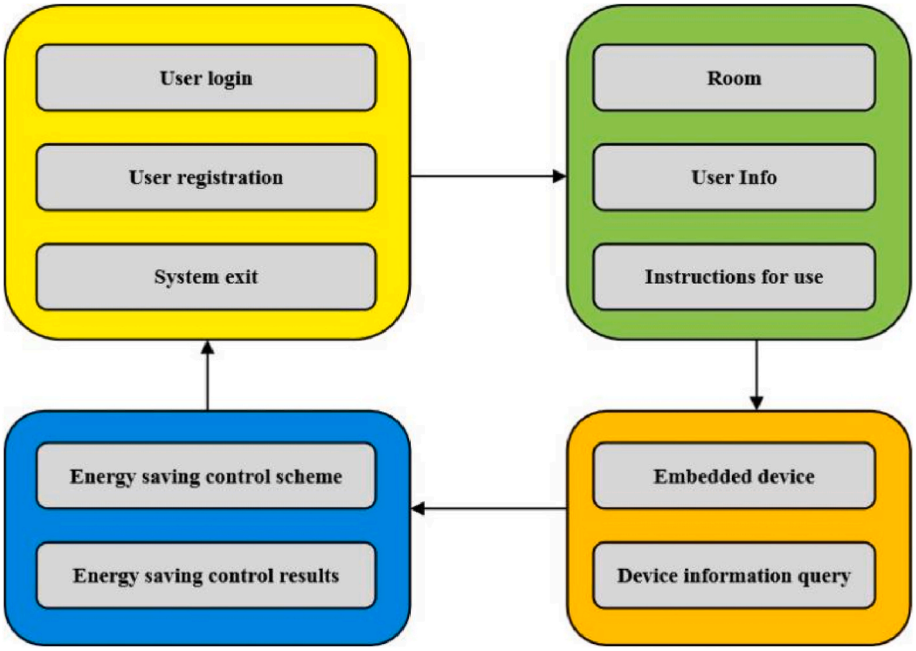

Fig. 6. Command operation interface.

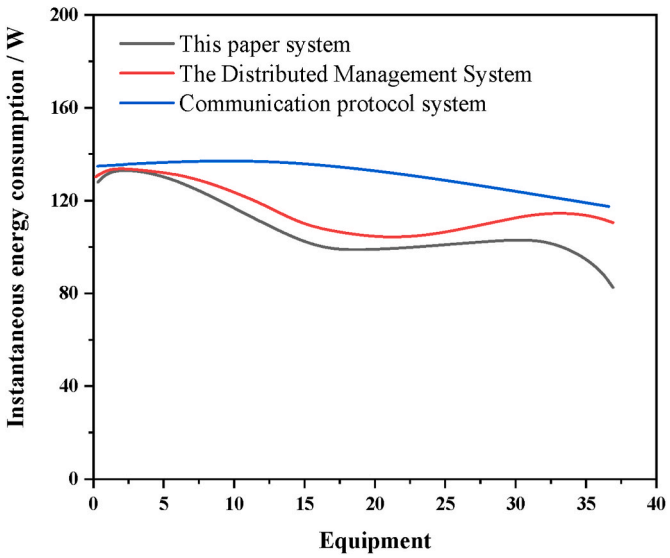

Fig. 7. Curve diagram of energy-saving control results of different electronic communication equipment.

control results of the system can also be viewed by the user here [17,18].

4. Results and discussion

To analyze the effect of energy saving on writing, writing process, energy saving management of distribution management, and energy saving management based as communication protocols were compared and evaluated experimentally. Three electronic communication devices were selected as the experimental objects, and the three devices were allowed to work normally for 36 h and the actual energy consumption was recorded, the three energy-saving control systems were applied to the three devices respectively, and complete 36 h energy-saving control, the experimental results of instantaneous energy consumption are shown in Fig. 6. As can be seen from Fig. 7, when the time of device 1 is 24 h, the instantaneous energy consumption of the author's system is 108 W, and the instantaneous energy consumption of the other two systems is 116 W and 135 W respectively [19,20]. In addition, in the same way as device 2 and device 3, the instantaneous energy consumption curve of the device of the author's system is applied, it has always been below the instantaneous energy consumption curve of the other two systems, indicating that the energy saving effect of the author's system is significantly higher than that of the other two systems.

5. Conclusion

The author suggests a design for effective electronic communication management based on Internet of Things technology and embedded technology. This approach combines the modern Internet of Things by using technology to create an energy-saving system for electronic communication and finally achieve energy-saving results. The experimental results show that: When the time of device 1 is 24 h, the instantaneous energy consumption of the author's system is 108 W, and the instantaneous energy consumption of the other two systems is 116 W and 135 W respectively. The energy saving effect is significantly higher than the other two systems. It shows that the energy-saving control system designed by the author's method has better energy-saving performance.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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