Research on New Intelligent Building Electrical Energy Saving Technology Based on Internet of Things Technology

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Abstract. In order to continuous the advancement of technology, the development of Internet of Things technology will greatly promote the intelligent, we make information and automation of buildings, which is of great significance for promoting intelligent buildings. The modern intelligent building electrical energy-saving design measures can not only realize the energy-saving design, the real purpose is to save energy and reduce emissions, promote energy-saving emission reduction can promote China's sustainable development, implement scientific methods, and assist China's economic development. When designing, we designers should consider various factors and rationally design electrical energy-saving measures.

1. Introduction
With the development of the Internet of Things technology, the energy-saving research of building electrical has a new idea. In the construction of intelligent building electrical equipment, in order to ensure the safety and stability of the use of electrical systems, through the use of Internet of Things technology, the smart grid can focus on the use of electrical design, combined with the basic characteristics of building construction, energy-efficient building construction The solution is determined to improve the overall efficiency of the use of smart electrical equipment and meet the design needs of modern construction projects[1].

2. Internet of Things technology and intelligent building electrical related concepts

2.1. The concept of the Internet of Things
The Internet of Things is actually a combination of various information sensing devices, including radio frequency identification devices, laser scanning, infrared sensors and other different devices and the Internet, and then build a huge network, which is currently the general Internet of China. Concept. In fact, the most important thing for the Internet of Things is to make it easier and faster to identify and manage by connecting various items to the Internet. Therefore, through analysis and summary, we know that the Internet of Things is actually an Internet that connects things and things together, and with the continuous development of this technology, it will gradually become a key component of new information technology.
2.2. *The basic framework of the Internet of Things*

Through a more comprehensive analysis of the basic framework of the Internet of Things, we learned that it is mainly constructed through three layers: network layer [2], sensing layer and application layer. The network layer needs to involve the access network and the communication network, and contains various communication protocols such as TCP/IP protocol and Internet application protocol, and Internet protocols. Most of the sensing layer is from the sensor on the object, such as laser scanners and infrared sensors, and then combined with some other control and execution device networking. For the application layer, it is mainly through the use of Web browsers, such as the application of a certain field in urban management, smart home and smart grid [3].

2.3. *Intelligent Building Electrical Design*

Through the analysis of the electrical design status of intelligent buildings, in the intelligent building electrical design, the optimal layout of electrical engineering should be carried out on the basis of observing the traditional building construction, and the comprehensive application of computer technology [4], electronic control technology and electrical and electronic technology should be improved. The effectiveness of intelligent electrical systems is used to meet the efficient use of building construction projects.

![Figure 1. Intelligent building electrical energy saving equipment](image)

3. *New intelligent building electrical energy-saving technology*

3.1. *Energy-saving design of power supply and distribution system*

Energy-saving and energy-saving research on intelligent buildings should consider the building function, electrical equipment characteristics, equipment layout and power load capacity, and make reasonable determination of the best power supply and distribution energy-saving facilities to ensure that under low power consumption conditions, the device can operate normally. The energy-saving design of the intelligent building power supply and distribution system needs to start from the following aspects, combined with the specific power consumption conditions, the power supply voltage is reasonably selected[5], usually under the condition that the requirements of the power equipment are satisfied, the loss rate is related to the power supply voltage. Reduce and reduce; the electrical system should be
3.2. Intelligent building air conditioning ventilation system electrical energy saving

The intelligent building air conditioning system is suitable for the application of advanced water source heat pump air conditioners. The water source heat pump is continuously maintained in a constant state due to the full utilization of groundwater or underground soil temperature, so that it can achieve environmental protection, energy saving, pollution-free zero emissions, compared with the traditional central air conditioning has improved the efficiency of the unit and saved 35%-75% of energy. In addition, based on the water source heat pump has a constant water temperature, the unit operation is more reliable and stable, and low energy consumption. The elevator system needs to make a reasonable choice of the elevator equipment model. The conventional elevator can be replaced by a small machine room elevator. The application of the gearless traction machine can significantly reduce the power consumption, and the energy saving effect is very obvious. The design of the water supply system can apply the current non-negative pressure water supply equipment with the best energy saving and environmental protection effect, which can effectively purify the water quality. In addition, compared with the conventional equipment, the energy consumption of the non-negative pressure equipment is lower, achieving energy saving and environmental protection purposes. At the same time, it is necessary to rationally design the ventilation system for the specific difference of electric power, so as to comprehensively analyze the requirements of equipment such as fans. Furthermore, scientifically and rationally select products that are energy-saving, environmentally friendly and economically beneficial.

Energy-saving design of lighting system the electrical energy consumption of the building can be controlled by controlling the number of intelligent electrical equipment. It can be assumed that the total energy consumption in the building is \( Q(x) \), the number of electrical equipment is \( X \), and the overall power consumption. Converted to \( f(x) \), you can first derive the base consumption \( Y \).
Then analyze the overall energy consumption $Q(x)$ in the whole building.

$$Q(x) = \sum_{i=1}^{N} \left( Y_{ij} \ast f'(x) \varepsilon \right)$$

3.3. The use of clean energy resources

Intelligent building electrical technology introduces clean energy, renewable resources and ecological energy into the electrical energy-saving design of intelligent buildings. By recycling resources, you can truly achieve energy savings. On the one hand, the existing clean energy is fully utilized, such as wind energy and solar energy. For the design of building electrical systems, solar energy systems need to be considered and designed by using solar energy. The building has a certain heating and heating service, thereby reducing the dependence on traditional energy, fuel, etc., to achieve the purpose of truly controlling emissions and reducing pollution, so that the level of skills and environmental protection can be effectively improved. The use of wind energy, especially natural wind, requires natural ventilation inside the building. In the public space, vents can be placed on the wall to ensure the penetration of natural wind. In addition, we will continue to develop and promote new energy sources, and new energy sources are environmentally-friendly and energy-saving materials, such as wall insulation materials and eco-friendly interior decoration materials. Renewable energy and resource utilization can promote sustainable development as soon as possible and make the internal environment of the building more complete. Energy saving and ecological.

3.4. Scientific setting of intelligent building transformer facilities

Internet of Things technology requires scientifically setting the number of transformers. Different buildings have different power supply requirements at different times. For example, in the peak demand, the power supply demand needs multiple transformers to meet. In the low peak demand, the power supply only needs one or two transformers. The number of transformers is not scientifically set, and neither too many transformers can be used, resulting in waste of energy. It is also impossible to use insufficient transformers, and the power supply requirements of buildings cannot be fully satisfied. Due to the difference in power of the transformer, the power combination scheme of the transformer is scientifically formulated, and there are different energy consumption conditions. When designing the power of the transformer, it is necessary to fully consider the percentage data of the no-load current, the load loss, and the no-load loss. To better analyze the transformer power, we chose a transformer power combination scheme with low energy consumption and good stability.

4. Energy-saving design of new intelligent building energy based on Internet of Things

4.1. Reducing active power loss

From the perspective of the specific composition and operating characteristics of the transformer, the active loss does not change under the conditions of fixed voltage and frequency, and has no relationship with the load of the transformer. The use of no-load testing helps to determine the specific model of the transformer as quickly as possible, while reducing the eddy current loss of the transformer through "smart" processing. When selecting the transformer, it is necessary to preferentially select the winding with a small resistance value, such as a copper core transformer, and adopt a new type of transformer, which not only has good quality, but also can effectively reduce the loss, thereby ensuring good energy...
saving effect. Therefore, transformers have been widely used, and energy-saving transformers should be selected as much as possible.

4.2. Increasing the load rate
The new intelligent building electrical technology under the Internet of Things technology is in-depth analysis of the transformer load rate, combined with the actual operation of the power grid, because the power demand will change at any time, so the specific load will change accordingly. This change is the peak and valley of the load and can be better displayed by the curve. The smaller the peak-to-valley difference, the smaller the transformer loss and vice versa. The transformer needs to be as close as possible to the optimum load rate during operation to ensure that the transformer achieves optimum energy savings. For some buildings, there is more than one transformer. When facing multiple transformers, it is necessary to combine the actual load to reasonably determine the number of transformers. Under the condition that the transformer meets the load requirements, the number of transformers should be minimized to achieve the best energy saving effect.

4.3. Utilization of renewable resources
Electrical energy is a non-renewable resource. In order to achieve the goal of energy saving and emission reduction in electrical energy-saving design, it is necessary to use and open renewable resources, such as solar energy and wind energy. Reasonable use of these new types of renewable resources in the intelligent energy-saving optimization of intelligent buildings can effectively reduce energy consumption. In addition, technicians can also use these energy-saving and environmentally-friendly materials as decoration materials for intelligent building electrical design, effectively improving the design optimization effect.

5. Application of Internet of Things technology in intelligent building electrical energy saving

5.1. Environmental Monitoring Subsystem
Through the environmental monitoring subsystem, the illumination, temperature and humidity, and air quality of each area of the building can be effectively detected, and then the obtained data can be analyzed and integrated, and the data can be transmitted to the central air conditioning control system and fresh air control in the server. The system and the lighting and air conditioning control system and other related systems, and provide more scientific and reasonable data for the indoor environmental regulation, in order to have practical reference value.

Figure 3. Intelligent application based on Internet of Things technology
5.2. Remoting meter reading subsystem
Through the remote meter reading system under the Internet of Things technology, the power consumption of each electrical equipment in the building can be easily, quickly and reliably read, and the relevant data can be automatically saved. It is possible to analyze the operating state of the distribution transformer, the load rate, and whether the economic operation is achieved by reading the data, and also analyze the operation of the reactive power compensation equipment. Through this system, managers can obtain comprehensive energy demand statistical reports and analysis reports, comprehensively understand the power consumption according to the daily, monthly and annual power consumption, assist in the formulation and continuous optimization of energy-saving solutions, and intelligent adjustment of energy-consuming equipment.

5.3. Building Fresh air control subsystem
The new intelligent building electrical fresh air system can integrate most of the air quality data of the environmental monitoring system, and then compare the air quality parameters with the system threshold to understand the more realistic situation. If it is in a more reasonable environment, because its main purpose is to promote the role of air circulation. If the air quality does not meet the required indicators, then some emergency solutions will be adopted to promote the high-power fresh air circulation to achieve the effect of improving air quality. For the traditional fresh air exchange method, the outdoor air is directly converted as a gas source, and for the fresh air control subsystem, the system transmits the outside air to the room by adopting a two-way ventilation method, and then The heat exchange is carried out in combination with the material having high thermal conductivity and promote the indoor and outdoor air flow cycle more scientifically and rationally and achieve the purpose of energy saving and emission reduction.

5.4. Building Home Energy Management Subsystem
The system divides household electricity into three categories: electrical loads, distributed power supplies, and energy storage devices, in which electrical loads are divided into schedulable and schedulable loads. Using the indoor environment, personnel activities and equipment working status information collected by the sensor, the equipment is dispatched and controlled by analyzing the information, and the power consumption is reduced and the power consumption efficiency is improved while satisfying the user's comfort; The dispatch able load is arranged as much as possible during the low load period to adjust the peak-to-valley difference of the power system, thereby reducing the backup capacity of the power system.

6. Conclusion
With the continuous development of science and technology, the Internet of Things technology has also been rapidly developed and widely applied, and combined with building electrical energy conservation, so as to reduce energy consumption more effectively. In today's evolving social environment, the Internet of Things needs to continuously strengthen the central computer cluster, and in a more comprehensive and detailed way to more comprehensive management of people's daily life and production, in order to achieve a truly intelligent state. Thereby effectively improving the resource utilization rate and production level of the people's daily life, and providing more sufficient momentum for promoting the overall development of the social economy.

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