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Design of Intelligent Heating System for Internet of Things Classroom

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Abstract: In China, with the deepening of reform and opening up and the rapid development of urban and rural economy, great achievements have been made in various constructions, but huge resources and environmental costs have also been paid, and the contradiction between economic development and resources and environment has become increasingly acute. If we do not speed up the adjustment of economic structure and change the growth mode, the resources will not be able to support it, the environment will not be able to accommodate it, society will not be able to afford it, and economic development will be unsustainable. Only by persisting in economical development, clean development and safe development can we achieve sound and rapid economic development. In the modern times with less and less energy, on the one hand, all countries are looking for alternative energy sources, such as solar energy and bio-energy, on the other hand, the development of energy-saving equipment and methods is also an important way to solve the energy problem. The weather in northern China is rather cold, and the heating system is an essential equipment in winter, but it also consumes a lot of energy.

Keywords: Design, Heating System, Internet of Things Classroom.

1. System design scheme:

This project incorporates the Internet of Things technology. It can not only fully meet the heating needs of students in class and study in the classroom, but also stop heating when there is no one in the classroom, saving energy.

Comprises a heating pipeline provided with a state control switch, a radiator in a classroom, a wireless sensor network, a network communication unit, a cloud server and a PC, wherein a shell is arranged on the radiator, a motor is arranged at the bottom of the shell, an output shaft of the motor is arranged inside the shell, a transmission shaft is arranged on the output shaft of the motor, A protective cover is arranged at the top of the shell, the transmission shaft, the rotating block and the

pyroelectric infrared sensor are all located in the protective cover, an opening is arranged on one side of the protective cover close to the pyroelectric infrared sensor, and a spring is arranged on the opening, one end of the spring extends into the side wall of the protective cover, and one end of the spring far away from the protective cover is provided with a buffer pad adapted to the pyroelectric infrared sensor, which communicates with a cloud server via a wireless sensor network, and the cloud server controls a state control switch, and the cloud server is also connected with a PC through a network communication unit. The motor is a servo motor. Heat insulation pads are arranged in the protective cover.

2. Hardware design:

Internet network, wireless temperature sensor, wireless remote control solenoid valve, wireless repeater, wireless gateway, USB detection module, Web server and central monitoring system.

The wireless relay and wireless network management in the project do not need construction wiring and support plug and play, which reduces the maintenance cost of the system and can run stably for 24 hours without human intervention. At the same time, the system has good performance in network expansion, and the number of terminals can be increased and decreased at will, which can support thousands of terminal nodes

The wireless temperature sensor consists of a wireless module, a temperature sensor module, a battery and an antenna. Wake-up period: when wireless

Inter-period; Automatic receiving time: the normal operation time of the module in a sleep cycle, during which time duplicate data can be received

Improve the number of retransmissions when it fails; Communication channel: multi-channel, 0-63 can be set; Wireless frequency: supports fixed and FM modes, and can be set at 425-440MHZ; Wireless rate: multi-rate communication, 2.0-256kbs can be set; Adjustable power: 1dbm-20dbm.

Wireless relay consists of wireless module, memory, power supply and antenna. The performance is as follows: active uplink ID- the address of the higher-level equipment of the information on the wireless; Active downlink ID- the address of the next-level equipment for the wireless relay to download the command; Each wireless relay has a data cache function, with a maximum of 65536 records.

The wireless gateway consists of a wireless module, a memory, a network module, a power supply and an antenna. The performance is as follows: Data storage capability- Wireless gateway also has data cache function, recording the data of 10,000 users for 2 years at most.

The wireless USB module consists of a wireless module, a USB-to-RS232 module and

an antenna. The performance is as follows: the power can be adjusted from-1 DBM to 20 DBM; Long transmission distance: the open distance test reaches 2400 meters. Embedded Web server is composed of SQLServer2000 database server, which is used for database support of wireless temperature monitoring system.

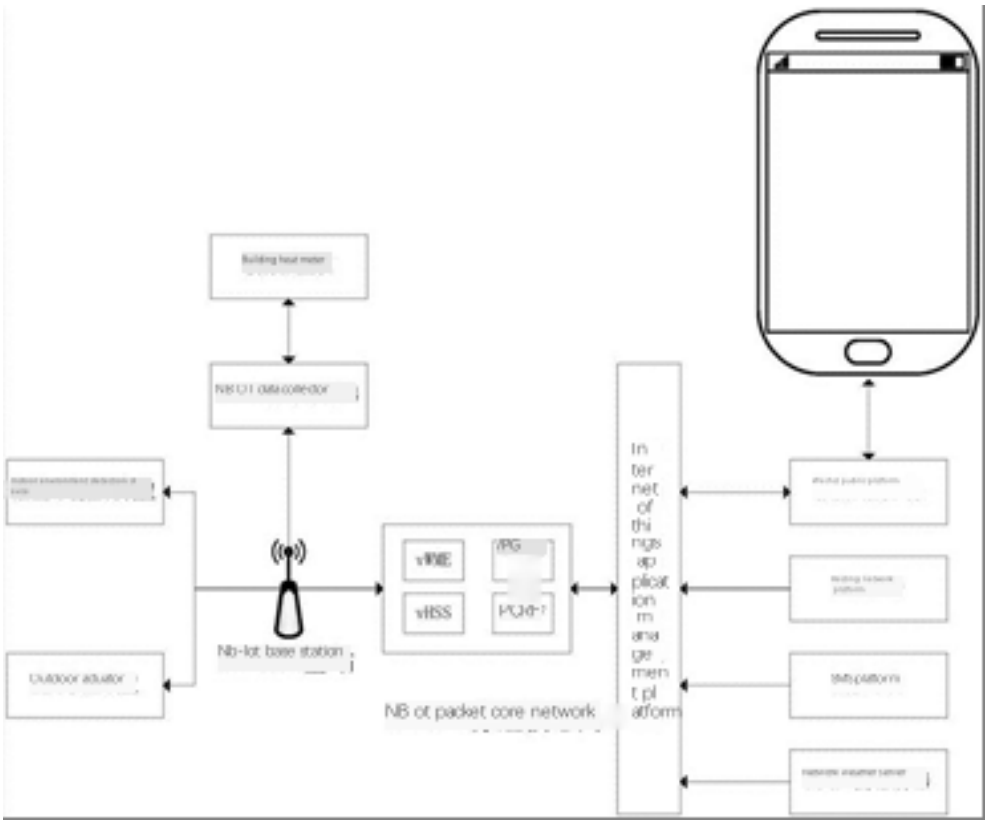
Sixth, the central monitoring system is composed of an authorized computer with database and monitoring software installed, which adopts WindowsServer2003 and supports the access and modification of SQL database and database data.

Seventh, the wireless remote control solenoid valve or pipeline booster pump system is composed of wireless module, solenoid valve or pipeline booster pump, AC contactor, relay, delay circuit, power supply and antenna, and sends instructions to each remote control solenoid valve system to control the heating solenoid valve or pipeline booster pump. In order to realize the communication between a data collection and communication controller and multiple heat metering and temperature control devices, the wireless networking technology is adopted in the system. In this way, the field data (such as hot water flow, heat consumption, indoor temperature, etc.) collected by the heat metering and temperature control device can be collected and sent to the Web server located on the Internet in a unified way. By processing and analyzing the received data on the server, the heating company can realize the functions of monitoring the heating pipe network and heating control through the Internet. Heat users can also inquire about the heat utilization through the Internet, and at the same time, heat users can also remotely set their own indoor temperature and other operations. To sum up, the real-time automatic monitoring, monitoring and control system for indoor temperature of central heating is a comprehensive application of various technologies, including the reception of front-end signals, the control of field parameters, the establishment of data communication network, etc. Each technical node involved in the system needs to be carefully designed and studied. Only after careful study and strict design to solve these problems in the heating system can we truly realize intelligent monitoring and management in the real-time automatic monitoring, control and control system of indoor temperature in central heating. Integrating and using the Internet of Things technology into the real-time automatic monitoring, monitoring and control system of indoor temperature in central heating will have an important impact on the concept and management mode of central heating, and it is also a strategic measure and application for developing green and low-carbon economy.

3. Software design

In order to realize the communication between a data collection and communication controller and multiple heat metering and temperature control devices, the wireless

networking technology is adopted in the system. In this design, the field data collected by heat metering and temperature control devices can be collected and sent to the Web server on the Internet in a unified way. By processing and analyzing the received data on the server, the heating company can realize the functions of monitoring the heating pipe network and heating control through the Internet. Heat users can also inquire about the heat utilization through the Internet, and at the same time, heat users can also remotely set their own indoor temperature and other operations.



4. Features of the project:

In the existing school heating system, there are basically some fatal problems, such as low degree of humanization and disconnection between technology and modern intelligent development. In order to realize humanized and intelligent classroom heating and get rid of the limitation of manual adjustment to a great extent, this project constructs a classroom heating system with both humanized and intelligent by using pyroelectric infrared sensor, wireless sensor network and cloud server, which will completely change people's views on heating system, adapt to people's increasing living needs and guide people's consumption concept, which is also one of the competitive advantages of this project. In the traditional classroom heating system, unified heating is adopted. However, there will always be such a phenomenon. In the empty classroom, heating is still continuously provided, which makes the heating company increase some unnecessary extra costs. For the company, reducing costs to

a great extent is the way to maximize benefits, which just becomes the advantage of the project. Servo motor will be used in this project, which has high rotation precision and limits its rotation range by buffer pad, so as to avoid repeated scanning of pyroelectric infrared sensor and provide another guarantee for cost saving. At the same time, the thermal insulation pad will be added around the pyroelectric infrared sensor to prevent the pyroelectric infrared sensor from being interfered by the radiator, and the judgment error will appear. These are the unique innovative ways of the project, and the advantages are obvious compared with the traditional heating system. Most importantly, we have pushed the traditional heating mode to a new Internet stage. In the next ten or twenty years, we will realize the Internet of Everything and realize comprehensive intelligence. The traditional heating mode will be abandoned by the times. The Internet of Things classroom heating system constructed by this project will meet the needs of the times and become a substitute for the traditional heating mode. It will also be loved by people because of its convenience and flexibility and become the most important heating mode.

5. Production and operation:

We will build a capitalized and commercialized heating platform with complete intellectual property system, commodity system, human resource management system and brand operation system. Through the effective integration of existing social resources, and through the core innovative technology and reasonable management system, our heating mode can be branded, standardized, scaled and industrialized. We have defined our target market, established our core value of distinguishing and competing heating systems, and will unswervingly implement and realize it in marketing activities. This project needs to purchase large-scale heating equipment to guarantee the heating quality. In addition to large-scale heating equipment, it also needs a large number of radiators and heating pipes with state control switches, as well as a large number of wireless sensor networks, network communication units, cloud service machines and PCs. First of all, we need some mechanical technicians to install and debug the heating system in each classroom to ensure the normal operation of the equipment. At the same time, we need some computer technology personnel to build a cloud management and maintenance system, so that users can contact us in time or provide some suggestions. After all the equipments are installed and run normally, we will adjust the personnel to save costs and ensure that the equipments can run normally all the time. Compared with the traditional heating methods, we need fewer management personnel, but we will add some computer technical personnel to ensure the normal operation of the cloud management system. Of course, all these machines need to have good durability to

ensure that they can run normally for a long time. In addition to the above costs, the costs also include the costs of selecting and renting or purchasing central heating locations, as well as the renovation costs of these places, but these are only long-term costs. After normal operation, these inputs are no longer needed, but only some maintenance costs are needed.

6. Conclusion

Due to the cold climate in the north, many heating methods appeared as early as many years ago. However, these heating methods are more traditional and less intelligent, which can no longer meet people's needs for convenience and intelligence. With the maturity of Internet and perception technology, people have pushed their lives to intelligence through the combination of Internet and perception technology. At the same time, the most important heating system for northerners is also urgently moving towards intelligence, which makes the intelligent heating system of Internet of Things become the unanimous demand of people. Therefore, intelligent heating system will be favored by northerners and have great market potential. We are committed to specialization, and first look to the classroom heating system of northern schools. According to the survey, the heating systems of northern schools are still relatively traditional, and the degree of intelligence is low, which can no longer fully meet people's demand for convenience. It is the general trend to move towards intelligent heating. Because people attach importance to education, the scale of northern schools is huge, which will become the main market of Internet of Things heating system. Because of the change of people's educational thought, it is expected to popularize high school education in the future, and more children will enter the campus, the scale of the school will be further expanded, and our market will be expanded. Of course, in the heating industry, a large number of companies have already settled in. After years of heating practice, they have perfect personnel structure and heating facilities, which will be their most competitive aspect. However, the advantages of Internet of Things heating are also obvious. Intelligent heating systems have strong modern adaptability, and the equipment of each heating company has a long service life, a high degree of aging, and its basic life has come to an end. With the increasing demand of people for quality of life, a good learning environment has become their first choice. In order to attract students, schools generally adopt the method of improving teaching quality and quality of life together, which also provides an important guarantee for the sales market of intelligent Internet of Things heating system. In this project, the temperature measured by the temperature measuring system is compared with the set temperature, so as to adjust the valve and exchange heat to reach the specified temperature. The purpose is to

save resources, reduce heat waste, reduce the cost of old pipeline reconstruction, and improve students' learning comfort. From a long-term perspective, the system effectively uses the intelligent control principle. The system has significant social and economic significance in heating energy saving, and has a wide market application prospect.

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