Electrical Automation Technology in Smart City

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Abstract. Since the beginning of this century, with technology and data as the core, the urban transformation plan of "smart city" has emerged, which is aimed at realizing a more convenient, efficient and accurate life of human beings. However, the current practice of global smart cities tends to rely on technology excessively, and blindness and homogenization are common. The importance of electrical automation technology in the field of modern industrial production is very obvious, and the demand for talents is also expanding. This paper describes the concept of electrical automation and smart city, designs and tests an electrical automation system based on smart city model. After testing, the transmission success rate of the system is more than 80%, and the real-time data measurement deviation is about 5%, which can meet the basic needs.

Keywords: Smart City; Data Analysis; Electrical Automation; Experimental Platform

1. Introduction
Since the beginning of this century, "smart city", an urban renewal plan with technology and data as the core to achieve more convenient, efficient and accurate life for human beings, has emerged, triggering a wave of building smart cities. However, the current practice of global smart cities tends to over-rely on technology, and blindness and homogenization are common. The 21st century is called the "century of cities". Today, the urbanization rate in some developed countries even exceeds this level. At the beginning of this century, a technology company led by IBM proposed a brand new urban development model, namely, the construction of "smart city", an urban transformation plan with technology and data as the core, in an attempt to open up a new way for urban living environment governance and human development through the application of technology [1]. All of a sudden, there has been a wave of building smart cities all over the world, and various ideas and the so-called "success model" have been emerging. However, it is a pity that although the urban problems of individual countries and cities have been alleviated in the vigorous process of building smart cities, and the realistic contradictions between
human and environment have been alleviated to some extent, many problems of survival and development faced by human beings have not been substantively solved, and smart cities in the real sense do not exist yet [2].

As the "barometer" of national economic development, the electricity consumption of the whole society in a region often reflects the local economic development and people's living standards. Therefore, Premier Li Keqiang has included the electricity consumption into the index to evaluate China's GPD growth [3]. At the same time, the electric power industry is also the "vanguard army" for development and construction. The so-called "army and horse are not moved, grain and grass are in the first place". The popularity and utilization rate of electric disturbance sensitive electrical equipment also rise, which puts forward higher demand for power quality, and the operation condition will have the most direct and significant impact on customers' electricity experience. The increasing electricity demand and to the contradiction between the distribution network is weak, but because before the national grid attaches great importance to the overall development strategy of the construction of the grid, power compared to the power transmission network in the advanced equipment, operation reliability, automation management there is a big gap, the gap in distribution network does not have to provide more high quality, safe, reliable, power capacity, is becoming the primary power supply enterprise biggest weakness. Customer complaints and claims are increasing, and the overall situation of increasing production and operation pressure forces more and more grassroots power supply enterprises to realize that they need to change the operation and management mode of the existing distribution network to adapt to the development demands of production and operation situation [4].

Based on the nature of artificial objects and the three functions of adsorption, storage and culture of cities, the construction of smart cities should be based on the theory of wholeness, which should not only give consideration to the organic unity of society and nature, but also maintain the necessary tension between science and culture, so as to achieve the free and comprehensive development of human beings. City and the concept of electrical automation technology in this paper, the wisdom and generalizes the key principles, at the same time to the era of information technology, the misunderstanding of the concept of intelligent city, through the electrical automation experiment simulation platform design, final test, the test results show that the corresponding time and meet the requirements of the required speed, can be in the future city wisdom of meet the needs of electrical automation.

2. Related Concepts of Electrical Automation Technology in Smart City

2.1. What is A City

In Aristotle's philosophical thought, "activity" in the broadest sense belongs to each kind of being. The activity of being belongs to itself as its nature and ability, and this activity has a certain purpose [5]. The city is the product of human activities with the purpose, and the purpose is the final perfect state contained in the activities. Therefore, the emergence, development and main functions of the city must be in line with the requirements of human existence and activities for good, and constantly evolve and improve. Throughout the history, cities have many forms. In history, cities have many roles, such as political center, economic center, religious center and Art Center. Different cities have their own unique features. Modern city has developed into the main place for human survival and activities. With the passage of time, the vast majority of people will live in the city. The city plays many functions such as residence, production, trade, culture and entertainment. It carries the pursuit of truth, goodness and beauty of human beings, and also preserves the human civilization that has lasted for thousands of
years [6].

2.2. What is Wisdom
The word "wisdom" is closely related to the subject person, which has more profound, complex, interactive, educational, cooperative and lasting meanings. For human beings, wisdom is to realize self-improvement in activities and pursue group happiness. Wisdom can be understood in the following aspects: the wisdom of human beings is embodied in human civilization; the wisdom of getting along with people is reflected in the self-consistency of human groups; and the wisdom of human beings and their surroundings is reflected in the aspects of human and nature. Wisdom is internalized into subject or thing, and its essence is to point to truth, goodness and beauty. This kind of demand for goodness is not a specific aspect, but is realized by human beings as the creative subject with the help of wisdom and rationality. Aristotle appreciates the endless creative ability of life itself. It is for this reason that human survival and activities can not only stimulate their own potential wisdom and creativity, but also lead and explore the development potential of cities. The discussion of smart cities in this paper will be based on the understanding of wisdom and wisdom.

Both East and West, understanding wisdom is complementary. From the perspective of practice, wisdom mainly lies in human activities, such as artifacts, and the city is the largest artifact so far. From the birth and development of the city, we can understand the embodiment of human wisdom in practice. We can think that whether it is the choice of human activities or the creation, as long as they are conducive to the human group good or can realize the individual good in a smaller scope, that is, this activity is logically consistent with human survival, reproduction and development, then this practice is wisdom. The practical wisdom is more instrumental rationality, most of which can be tested in a specific space-time range. The test results often have enlightenment significance and value for human later behavior. Therefore, it can be considered that wisdom can be reflected in the process of activities and results in the dimension of practice. The generation and construction of cities is the realization of human wisdom in practice. The wisdom of cities is not only reflected in meeting the needs of human survival and development, but also in the development of cities as artifacts [7].

2.3. Smart City
The smart city construction proposed by famous science and technology companies is mainly based on information technology, in order to pursue the intelligence of urban system by information technology. The main point of the definition focuses on providing reasonable and effective urban management means through the application of modern technology perception, interconnection and intelligence, so as to solve the problems existing in the city and create a better life. From London to Barcelona, from Rio de Janeiro to Seoul, from San Francisco to Shanghai, from Santiago de Chile to Bogota, the concept of smart city has been expanded and the construction of smart city is in full swing. It should be affirmed that the smart city is in line with the pursuit of human beings for good and their yearning for a better life. Its development goal is to realize the free and comprehensive development of human beings and realize the harmonious coexistence between human beings and nature. The understanding of the concept of smart city should be based on the basic functions of the city, beyond the dimension of technology, and understand everything related to people behind it [8].

2.4. Misunderstanding of Smart City
The construction of smart city advocated by science and technology companies has become a model that most countries in the world follow. For enterprises, the smart city based on modern science and
technology is an emerging market in the digital economy. For governments of various countries, major cities hope to solve more and more urban problems with the development of information technology, and do not hesitate to invest a lot of manpower Material and financial resources are used to introduce or upgrade the latest science and technology, which makes the application of scientific and technological achievements universal, without taking into account the technical risk, social risk consequences and other factors. It seems that the smart city is a science and Technology City, a high degree of mechanization, the convenience of staying at home, and an increasingly intelligent urban management system. We have never found any trace of human beings, human intelligence, integration of people and cities, and more harmonious relationship between people. Today, no matter whether we live in any city in the world or in China, we can hardly feel discomfort and difference obviously. This is not because the city has brought people the comfort of living, but because of the same urban development ideas and the "bringing doctrine" that we have in mind. The misunderstanding of the construction of smart city has made our city lose the essence of development for thousands of years. The increasingly complex and surprising technical equipment has become the characteristics of the city, and has become the limitation of people and city. How can we talk about wisdom.

Smart city is a concept of the future. The reason why it is put forward and considered at present means that it must realize the perfect connection and transition from history to the future. Wisdom must resolve the problems left over by history, the problems facing the present and the problems that may arise, so as to realize the sustainable development of people and cities, which is full of the differences and characteristics of different regions, nationalities and cultures In particular, these can not be achieved by improving a certain aspect of urban function alone. The wisdom of urban construction should aim at achieving a better life for human beings and realize the free and comprehensive development of individuals and groups. It should include many factors, such as adjusting measures to local conditions, foresight, taking precautions, reasonable layout, complete functions, people doing their best, risk prevention and so on. It is extremely inclusive, forward-looking, special and sustainable, so as to achieve the harmony between human and nature Harmonic symbiosis [10].

3. Design and Development of Electrical Automation Technology Platform in Smart City

3.1. Practice Objective:
The application of fieldbus technology has greatly changed the electrical equipment. The integrated intelligent equipment with communication interface not only replaces a large number of intermediate conversion and interface equipment, but also realizes the integration, intellectualization, decentralization and automation of the original necessary functions. Its economy is self-evident. Through the design and development of the electrical automation system based on the intelligent city model, it can help the city intelligent to a certain extent. The standard Ethernet interface is used to realize the data communication with the upper computer and the communication connection with various controllers.

3.2. Practical Steps
The basic experimental platform of electrical automation adopts HMI + atv312 + m218 architecture, which can realize configuration software, computer control technology, programmable controller, etc. The output frequency range of frequency converter is 0 ~ 500Hz. CANopen communication protocol is built in to realize communication with other control equipment. It can realize starting and speed
regulation and realize motor control. AC motor can also be well controlled by external voltage or current signal. The communication experiment design of PLC inverter connects m218 to the frequency converter and realizes the communication through MODBUS. The control is set to remote mode, and the control of atv312 is realized. M218 has built-in standard RS485 serial port, among which COM1 is connected with touch screen and com2 is connected with frequency converter.

1) Electrical automation real-time data test record and analysis;
2) Simulation test and analysis of accident;
3) Data transmission success rate analysis.

4. Test of Electrical Automation Technology Platform in Smart City

4.1. Real Time Data

| Station | Temperature | Light intensity | Time       |
|---------|-------------|-----------------|------------|
| A001    | 23          | 90.8            | 13:30:00   |
| A002    | 23.9        | 97.7            | 13:30:10   |
| A003    | 23.3        | 93.8            | 13:30:20   |
| A004    | 23.3        | 99.7            | 13:30:30   |
| A005    | 22.4        | 95.2            | 13:30:40   |
| A006    | 23.1        | 88              | 13:30:50   |
| A007    | 23.9        | 83.4            | 13:31:00   |

According to table 1, write the temperature signal test program, display the data, baud rate transmission format, get the temperature control accuracy, adjust again, can reflect the temperature function relationship. The data of temperature test program of single chip microcomputer fluctuates greatly. The standard baud rate is realized by replacing 12m crystal oscillator with 11m. Connect the pressure sensor, communication interface module, etc., and the human-computer interface communication is normal. Then the whole machine test was carried out. The temperature measurement and control included temperature sensor, signal conditioning, communication module, etc. the integral separation PID control process was smooth; the speed measurement and control test showed that the error was within the acceptable range, and the motor finally turned smoothly; the pressure weighing measurement module, the measurement deviation was 5%, within the allowable error range of the experiment.

4.2. Accident Simulation Test

| Time of accident | Accident line          | Accident content    |
|------------------|------------------------|---------------------|
| 10-31 17:12:32   | Yanshan Road Line 1    | Accident total      |
| 11-01 19:50:47    | No.19, Liuyuan          | Over current        |
| 11-03 09:13:41    | Xuecheng 28 general long line | Over current    |
| 11-04 17:12:51    | Beixin 15hua power line | Quick break         |

According to table 2, the system can well report and feedback the accident, and meet the basic accident alarm requirements of electrical automation system.

4.3. Data Transmission Success Rate Test
According to figure 1, in the data transmission success rate test project of the platform, after three rounds of tests, each test time is one minute, the transmission success rate basically meets the demand of more than 80%.

4.4. Survey Statistics

According to figure 2, the picture is changed to the teaching survey of electrical automation system among automation teachers and students in our school under the background of smart city after testing. According to the data statistics, more than 85% of the students agree with the design and implementation of the system, and only 5% do not.
5. Conclusion

The construction of smart city lies in providing a good ecological and social environment suitable for people's living, working, leisure and communication, maintaining an appropriate urban scale, carrying out reasonable urban planning, enhancing the participation and creativity of multiple subjects, and realizing the circulation and self-consistency of internal system and natural system. In the construction of automation experiment platform, the principle from easy to difficult is adopted to analyze the design and development of automatic experimental platform.

1. Based on the basic experimental platform of electrical automation, the control of inverter is tested.

2. A variety of signal conditioning circuits and control circuits are set up in the comprehensive experimental platform, and the experimental platform software system is developed, and the human-computer interaction interface is designed based on the touch screen.

In the construction of the experimental platform, there is no further analysis of the control of programmable logic controller, frequency converter and motion controller. In the design, more in-depth research on PID analog adjustment and high-speed counting input is needed.

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