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A Study on the Plan to Construct the Comprehensive Perception System and Intelligent Operation and Maintenance System of the Intelligent Pipe Corridor

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ABSTRACT. *With the help of Internet technologies such as the Internet of Things, cloud computing, big data, and cim, the integrated pipe corridor has created an integrated pipe corridor comprehensive monitoring perception system and intelligent operation management intelligent system. The traditional distributed integrated pipe corridor emergency monitoring operation and maintenance management of the integrated pipe corridor is combined with advanced modern network information management technology to create an integrated management system for integrated pipe corridor emergency supervision, operation and maintenance services. This comprehensively improves the intelligent management level of the emergency monitoring and command and operation and maintenance management services of the integrated pipe corridor, so as to better realize the comprehensive perception and intelligence of the emergency perception, operation and maintenance, management and decision-making of the integrated pipe corridor.*

KEYWORDS: *Smart Pipe Corridor, Perception System, Smart Operation and Maintenance System*

1. Introduction

With the rapid construction and development of China's modern cities in recent years, the monitoring and operation management of the traditional city-level comprehensive pipe corridors and the advanced modern network information technology management system have been deeply integrated to create an urban-level comprehensive pipe corridor Integrated system of supervision and operation and maintenance. This comprehensively improves and enhances the monitoring and intelligent management level of emergency command and operation and maintenance management services of the city-level comprehensive pipe corridor, so as to better realize the comprehensive intelligence of emergency command

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perception, operation and maintenance, management and decision-making of the city-level comprehensive pipe corridor.

2. Introduction of Intelligent Pipe Corridor

At present, the technical specifications for the intelligence of the common ditch are relatively complete, but there is no unified concept and definition for the intelligence of the common ditch. With reference to Toppeta's view on smart cities, it is further believed that the smart city pipeline corridor collects, processes, and analyzes the data and information of the smart city pipeline corridor through management network and data combination management. This breaks the network and data barriers between management systems and realizes the intelligent control, scheduling, management and operation of urban pipeline corridors. It is necessary to achieve a high degree of informationization and intelligence in urban pipeline corridors.

3. Construction Principles

3.1 Advancement

The engineering planning, design, construction, and management of the smart rail urban traffic corridor system is still a long-term technical task, involving a wide range and a long construction period. Therefore, in the aspects of designing the system architecture, selecting basic materials, and formulating relevant technical standards using technical means, the comprehensiveness and advanced nature of the relevant information technology and problem-solving implementation plans should be fully considered.

3.2 Security

The intelligent integrated pipe corridor system is an integrated management platform that carries the key application and management data of the intelligent integrated pipe corridor. Its construction and operation and maintenance must fully consider the security of the system.

3.3 Openness

The functional construction management of the smart new urban governance pipe corridor system needs to fully consider the spatial sustainability of the functional construction and application development of the smart city governance pipe corridor information system and the spatial relevance and spatial information interaction with the internal and external public information application governance information system. In urban planning and the construction of smart city governance

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corridor systems, we believe that strict compliance with current international and domestic mainstream public information system technical standards should be strictly required. Adopt systematic and functional modular, interface and open information system function construction management strategy.

3.4 High Reliability

The system reliability of the smart city pipe corridor is the basis and core of the operation and maintenance of the smart city comprehensive pipe corridor system, which involves a huge amount of data and is highly concurrent with user needs. Therefore, it is necessary to consider how to improve reliability in smart city planning and information construction.

3.5 Scalability

As the basis and core of the operation and maintenance management of the integrated intelligent pipe corridor system, the scale of the intelligent pipe corridor system will continue to expand and expand with the business requirements and the scope of use of the operation and maintenance management of the integrated pipe corridor system. Therefore, this requires that the construction personnel of the operation and maintenance corridor system must fully consider whether the system's structure, capacity, communication transmission capacity, product upgrade, processing automation capability, database, software development, etc. have good system sustainable scalability and flexibility.

3.6 Fast Development and Easy Maintenance

The construction of the intelligent pipe corridor system should be easy to implement and maintain, with high quality, high efficiency, high scalability and high reusability.

4. Construction Scheme

4.1 System Structure

The system is constructed according to “GB 50838-2015 Urban Comprehensive Pipe Gallery Engineering Technical Specifications”: System Architecture

Physical layer: unified communication interface. Various software, hardware, and electronic devices transmit information sensed by the physical layer and other processable data through the unified interface of the physical layer.

Data layer: It will comprehensively process the data information perceived by users in a highly structured manner, and perform complex data association on the

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data to realize the aggregation of all user-perceived data and at the same time store important data information.

Application industry data management: a data subsystem that integrates application management in various industries. In multiple application data layers, application data of different data layers can be shared among different application subsystems.

The system is mainly composed of four parts: comprehensive perception system, communication control system and smart city operation management system.

4.2 Design of Comprehensive Perception System

The comprehensive information perception system of the intelligent building pipe corridor has a wide range of information perception and can include ecological environment, fire protection, safety, video, equipment, structure, etc.

4.2.1 Security Precaution System

Through the use of monitoring equipment video, access control, infrared, intrusion safety detection, patrol inspection and other security monitoring automatic sensing technology and monitoring equipment, safety and accident prevention integrated monitoring and automatic perception control system performs real-time and automatic monitoring and safety awareness of the daily activities of all workers in the urban comprehensive management pipeline corridor. The perceptual video data is transmitted to the intelligent monitoring and control center of China's intelligent and livable city through the wireless video data transmission technology network to the monitoring and control center system of the building management and maintenance management system for video analysis and data collection and tracking. This obtains emergency early warning video information and timely high-visibility optimized video presentation, which is convenient for timely detection and handling of emergency alarm situations, and ensures the normal management and operation of the comprehensive operation and maintenance management corridor.

4.2.2 Pipe Corridor Structure Perception System

The main structure of the pipe corridor for the anti-sinking and falling wall perception vibration control management system consists of the main structure of the pipe corridor. The two main control system components are composed of the vibration control perception of the anti-external settlement broken wall and the vibration control perception of the anti-external settlement wall of the main structure of the pipe corridor. The vibration monitoring and sensing system for preventing trauma and destruction in the internal structure of the pipe corridor continuously monitors the vibration of all buildings and sediments located outside the pipe corridor within a set height. The data is sent to the smart city operation and maintenance management center through wireless transmission or directly through the network to analyze and visualize the system management and visually present it to prevent the pipe corridor from being damaged by the outside.

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The settlement sensing and monitoring system monitors the relative height of the pipe corridor, especially the joints in the pipe corridor, as well as its horizontal and vertical displacements. The data is sent directly to the intelligent operation and maintenance management center through the wireless information transmission network to analyze and process the system and visually present it. For the trend of settlement and deformation of the main structure of the pipe corridor, timely judgment and automatic early warning were made, which was convenient for timely measures to prevent damage to the main structure of the pipe corridor.

4.3 Communication System

The communication control system cable, as an important channel for comprehensive sensing control system data information return, needs to be safe and reliable. The communication system uses a communication method that combines wired communication and network wireless communication. Cables for network wired communication must be configured in a redundant <br> way. The wireless communication form of ring network is adopted to ensure the safety and reliability of wired communication network.

Wireless communication is mainly aimed at the mobile devices and mobile terminals in the pipe corridor. The wireless transmission signal must completely cover the internal space of the pipe corridor to ensure that the wireless communication of the mobile equipment and mobile terminals does not interrupt.

In order to fully ensure safety and reliability and at the same time easy to manage, an independent control power management control zone can be set up every 150 ~ 200 meters. The iareacu (each control management unit in the area control unit control area) of each power control management area can be set to have an independent control power line and control management unit, communicator and control processing unit, collector and control processing unit, etc.

4.4 Smart Operation Management System

All basic operation management data and information of the pipe corridor, such as overall perception information data, equipment operation information data, equipment fixed asset information data, geographic location information data, etc. At the same time, the intelligent operation information management system also integrates customer demand information, business process information and other data that meets user needs, and organically integrates information into visualized intelligent operation information management through cloud computing, big data analysis and other technical means system. At the same time, it is pointed out that with the intelligent operation information management system, the pipeline corridor can realize the visualization of comprehensive pipeline corridor operation and maintenance, management and decision-making.

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4.5 3D Digital Model

The three-dimensional data that comprehensively realize the comprehensive perception of the scene and the highly visual data cim are organically and closely combined. A three-dimensional scene digital model of the scene comprehensive processing pipe corridor is constructed to intuitively and accurately display the scene perception of the entire system scene comprehensive processing pipe corridor inside and outside. At the same time, it also combines a comprehensive enterprise scene dynamic perception integrated management monitoring system and an all-round intelligent enterprise operation scene comprehensive management system to perform real virtual automatic visual scene restoration of specific scene operation information in the entire enterprise comprehensive operation pipeline corridor. This is the main visual presentation method that the entire pipe corridor visual display system can present by comprehensively utilizing the visual display effect in the pipe corridor.

4.6 AR Demonstration

Through the ar technology, the information of the underground comprehensive pipe corridor can be queried and visualized during the ground construction, and the entire ground real-time inspection is realized. Thus, the above-ground and underground traffic information management system of the entire smart city can be integrated.

5. Conclusion

This paper focuses on the research and design of the comprehensive intelligent perception system of the intelligent integrated pipe corridor and its intelligent operation management system. However, since the intelligent comprehensive corridor is still in the construction stage, the business process and related management systems are constantly being improved and further updated. In the specific implementation stage, it is not appropriate to rush, and it may be necessary to gradually adopt multiple iterations of intelligent management to re-develop the technology. By realizing the three-step intelligent management method of informatization-intelligence-smart operation, we can finally realize the comprehensive perception and intelligence of the perception, collaboration, and wisdom, management and decision-making of the intelligent comprehensive corridor.

References

[1] Zhong Chao, Sun Jian. Talking about the construction plan of the comprehensive perception system and intelligent operation and maintenance system of the intelligent pipe corridor [J]. Electronic World, 2019 (11).

ISSN 2616-5667 Vol.3, Issue 2: 66-72, DOI: 10.25236/AJETS.2020.030209

[2] Jiang Shifeng. Talking about the Construction Idea of the Operation and Maintenance Management System of the Urban Comprehensive Pipe Corridor [J]. Computer Products and Circulation, 2018 (04): 234 + 236.
[3] Zhang Xiaoyu. Research on the construction of the operation and maintenance management platform of urban comprehensive pipe corridor based on BIM + GIS [J]. Building Materials and Decoration, 2019 (16).