Research on privacy protection of intelligent construction

Jingshi Shang [1], Xiuwen Li [1] and Qingyong Wang [2]

[1] China Institute of Water Resources and Hydropower Research, Beijing 100048, China
[2] Xinjiang Erqisi River Investment and Development (Group) Co., Ltd, Urumqi 830000, China.

Abstract. With the application of new generation intelligent technologies such as big data, cloud computing and numerical simulation in engineering, the level of intelligent construction has been gradually improved. In the development process of intelligent construction, it faces many problems, such as new technology, safety, human recognition and so on. This paper studies the privacy protection of intelligent construction, analyzes the causes of privacy disclosure on the basis of information classification, and then puts forward privacy protection methods. The research shows that the privacy security of intelligent construction needs to clarify the scope and formulate effective protection strategies.

Keywords: Intelligent construction, privacy protection, information classification, privacy disclosure.

1. Introduction

Since the beginning of this century, China's water conservancy and hydropower construction has developed vigorously, and the intelligent construction technology represented by intelligent dam [1] has been widely used. Xiluodu hydropower station has created a precedent for intelligent construction of high arch dam. Baihetan Hydropower Station has built an intelligent construction technology system for key construction processes and business processes based on the theory of closed-loop control of comprehensive perception, real analysis and real-time control [2~5].

The development of intelligent construction is inseparable from the support of a new generation of technology. At the same time, like many new things, it also faces many new problems. In the information age, privacy security has become a big problem. Intelligent construction and its participants need to put forward reasonable suggestions on how to protect privacy. This paper studies from the perspective of privacy protection of intelligent construction, and the research results can provide suggestions for the development of intelligent construction of hydropower projects.

2. Question raising

The basic explanation of privacy is information that is not open to the public. The development of modern science and technology has not only provided many conveniences for human society, but also caused a series of problems, of which privacy disclosure is one of the more prominent. With the strengthening of people's self ideology and the relative lag of the legal environmental protection of social privacy, privacy protection has gradually attracted attention [6].

The technologies applied in intelligent construction include: structural safety and health monitoring technology, construction environment awareness technology, personnel safety and health monitoring technology, etc. Among them, the construction environment perception technology analyzes and identifies the surrounding environment, determines the location, matches the perception, and makes real-time prediction and early warning. The personnel safety and health monitoring technology monitors the physiological indicators of construction personnel, warns and guides their construction behaviors, and ensures their safety and health. This involves the privacy protection of personnel. In addition, from the macro level, all or part of the engineering information of intelligent construction is confidential, which should also belong to the category of privacy.

Therefore, the privacy protection of intelligent construction includes not only the pure personnel information, but also the intermediate links of intelligent construction, scientific research achievements and other information. This paper first classifies the information of intelligent construction, then analyzes the possible links of privacy problems, and finally puts forward the methods of privacy protection.

3. Intelligent construction information classification

Information in the process of intelligent construction can be roughly divided into four categories. (1) Survey and design information: mainly including geological survey, geological survey during construction, preliminary design, design data during construction, etc; (2) Intelligent construction information: including construction progress, scheme, quality, safety and other information; (3) Operation and maintenance: including patrol inspection, dispatching and other information in the intelligent operation stage after the completion of project construction; (4) Feedback evaluation: including calculation and evaluation of project safety and quality during construction and use. With a wide range of information sources, a large number of people and miscellaneous information, there is a risk of privacy disclosure at the source.

Information collection methods mainly include manual collection, monitoring equipment collection, image collection, and self information feedback of construction equipment. Due to the diversity of collection devices and processing methods, there is also a risk of information and privacy disclosure in the collection process.

The transmission modes of intelligent construction information mainly include optical fiber, Internet, wireless 4g/5g, Beidou, etc. With the development of information technology, there is a certain risk of privacy disclosure due to insufficient information protection.

The objects of intelligent construction information application can be roughly divided into nine categories. There are overlapping demands for information among various units, the division of application personnel is not clear, and there is a certain risk of privacy disclosure in the process of information transmission and application.

Table 1 Intelligent construction information application classification

Unit category	demand	application
Employer	Construction information, design information, quality information and other comprehensive information.	Comprehensive management of project progress, quality, safety and contract.
Design unit	Engineering geology, construction information, monitoring information, scientific research data, etc.	Preliminary design, design during construction and technical changes.
construction control unit	Construction information, supervision process information, design information, etc.	Construction process supervision, quality, safety, contract supervision, etc.
Construction unit	Engineering geological information, construction plan and progress information, etc.	Complete construction tasks as required.
Quality supervision unit	Construction process quality information, quality objectives, etc.	The whole process quality supervision shall be conducted for all parties involved in the construction.
Scientific research institutions	Geological, design, construction and other information required for scientific research projects.	Technical breakthrough and support for engineering problems.
Auxiliary support unit	Supply and demand information, production and living supporting information, etc.	Assist in the completion of various works other than project implementation.
Superior competent unit	Project construction, design, scientific research and other important information.	Project decision-making and supervision.
government sector	The owner reports the project quality, progress, safety and other information.	Policy formulation and supervision.

4. Analysis on privacy leakage of intelligent construction

The reasons for smart building privacy disclosure can be summarized as management, technology, personnel, unclear boundaries and other reasons. (1) Management reason: there is no clear information protection workflow, measures and personnel during the implementation of intelligent construction. (2) Technical reasons: it mainly

focuses on the transmission and timeliness of information in the process of intelligent construction, and ignores the security of methods and methods in the process of transmission. For example, many projects now transmit data through the establishment of wechat groups, which itself has great security risks. (3) Personnel negligence: the main reason is that the personnel do not have a strong sense of privacy protection. There is a large amount of engineering information on the mobile phone. Due to the current low security performance of the mobile phone, it is easy to become the source of privacy disclosure. In addition, short videos, circles of friends and other channels may become a way of privacy disclosure. (4) Unclear boundary: the main reason is that there is no clear industry standard to restrict what is engineering information privacy, and we do not know how to protect privacy during the implementation of intelligent construction.

5. Intelligent construction privacy protection method

By combing the application scenarios of intelligent construction data information, formulate targeted privacy protection strategies. In each application scenario of intelligent construction, the data collection and storage devices are complex, and the data processing capacity and protection capacity vary greatly. According to the characteristics of the collection devices and the data information involved (such as Internet of things data, personnel information, engineering construction data, equipment operation data, etc.), the data are classified, and different levels of privacy protection strategies are developed to prevent privacy disclosure and data abuse [7].

At the management level, attention should be paid to the definition of privacy permissions, such as granting corresponding permissions to relevant units and personnel according to the classification and application ways of intelligent construction engineering information. Second, in terms of storage, different storage methods are formulated according to the importance level of information, and information managers. Third, when using, it is necessary to leave traces of information such as the way of use and personnel to ensure that they are well documented.

Privacy disclosure risk involves the whole life cycle from information collection, information transmission, information storage, information processing, information use to information destruction. Among them, information collection and information transmission interface is the entrance of intelligent construction information platform, and its security is directly related to the operation safety of the whole intelligent construction project. Information collection needs to identify the types of information involved to ensure that the project and personal privacy are not disclosed; In the information transmission phase, it is necessary to use encryption, signature and other authentication mechanisms to manage the security of the transmitted information; The collected information needs to be stored on the information platform before

calculation and processing, which puts forward requirements for data storage environment, disaster recovery and backup capability, encryption measures, etc. In the information processing and use stage, it is necessary to ensure the security of the whole process and prevent data from being tampered with and leaked. At the last stage of the production process, the information needs to be encrypted and stored or destroyed according to the security level to ensure that important sensitive information is not disclosed.

According to the personal information protection law, the collection, processing, use and other activities of personal information need to comply with the relevant provisions of the protection law. Personal consent, desensitization and encrypted storage shall be obtained when collecting and processing biometric, financial account, whereabouts and other personal sensitive information. Improve data display and desensitization standards, and try to use source desensitization to protect personal privacy.

6. Conclusion

This paper studies the privacy protection in the frontier of intelligent construction, and the main conclusions are as follows:

(1) By analyzing the relevant technical fields of intelligent construction, this paper puts forward the possible leakage ways involved in intelligent construction, and then puts forward the research ideas of problems;

(2) From the perspective of intelligent construction information classification, reasons for privacy disclosure and protection methods, this paper analyzes the problems of intelligent construction privacy protection, and puts forward reasonable suggestions.

With the development and improvement of intelligent construction technology, privacy protection will also attract the attention of researchers, and continue to put forward reasonable methods and suggestions to promote the safe development of intelligent construction.

Acknowledgements

References

1. Q.B. Li, P. Lin: Demonstration on Intelligent Dam, Journal of Hydropower Engineering, Vol. 33 (2014) No.1, p.139-146.

2. P. Lin, R.N. Wang: Intelligent construction safety culture connotative development - from concept to action, Project Mnagement Rview, (2021) No.5, p.46-50.

3. P. Lin, Z.Y. Ning and M. Li: Study on prototype intelligent control test of cooling pipeline for a super-high arch dam, SHUILI XUEBAO, Vol. 52 (2021) No.7,p. 819-828.

4. Y.S. Tan, Q.X. Fan and Z.L Wang: Intelligent construction methods for the Baihetan super high arch dam, Journal of Tsinghua University (Sci&Technol), Vol. 61 (2021) No. 7, p. 694-704.

5. Q.X. Fan, P. Lin and P.C. Wei: Closed-loop control theory of intelligent construction, Journal of Tsinghua University (Sci&Technol), Vol. 61 (2021) No. 7, p. 660-670.

6. Y.Y. Zhang: Criminal law path choice for privacy protection in the era of big data, Journal of Shenyang University (Social Science), Vol. 23 (2021) No. 7, p. 625-630.

7. X. Zhang: Research on railway data security and privacy protection management strategy, Railway computer application, Vol. 30 (2021) No.11, p. 43-46.