

Research on construction site violation monitoring platform with target detection

KunAo Zhang^{1,*}, Yuheng Wang²

¹ Department of computer science, Shaanxi, China

² School of Xi'an University of Science and Technology, Shaanxi, China

* Corresponding Author Email: w13279334665@163.com

Abstract. This mainly describes the construction site supervision platform design purpose, determine in different areas of internal detection and target detection of site violations in the supervision of the link, should be done to visualize the market site standard model, early warning type violation of work and safety class risk hidden danger, real-time monitoring of the site. With this as the basis condition, the systematic structure design of the supervisory platform is launched, and the intelligent voice recognition technology and in-depth learning technology of monitoring images are used to establish a sound design of this system, which maximally meets the requirements of construction site violation monitoring and supervision.

Keywords: Target detection; area detection; construction site; supervisory platform.

1. Introduction

Along with the high-quality development of China's economy and the orderly improvement of people's living standards, the number, type and scale of different engineering projects in various regions have increased, which has also increased the risk of site safety. The construction work of engineering projects is basically crossed and three-dimensional construction, along with the deepening of construction progress, the position of relevant construction personnel will also change, and most of them are outdoor operation production mode, involving construction production equipment and facilities, personnel management mode is more complex, coupled with the many participating units, the reasonable construction of each participating unit, civilized construction, standardized construction, safe construction of thinking awareness The possibility of the consequences of non-compliance with regulations is high. In order to prevent construction personnel from such risk hazards, completely remove the hidden danger, fully combined with the actual situation of construction site operations, some advanced technology should be adopted to real-time monitoring of construction site production operations, so as to ensure that construction personnel achieve safe production operations.

2. Purpose of regulatory platform design

In order to optimise construction site safety management, promote the orderly improvement of the effectiveness of construction project safety supervision, reduce the possibility and probability of accidents, and ensure safe production operations at construction sites, it is necessary to establish a sound intelligent safety management system in conjunction with relevant information technology, and adopt a working mode that combines the mobile phone software end and the computer end to ensure construction site production safety. The general design objectives are as follows: firstly, to visualise the construction site standards through real-time video monitoring. Second, through intelligent image analysis system, advance warning of some illegal operation and safety sharing hidden dangers at the construction site. Third, comprehensive detection of all the working conditions of the construction site, timely understanding and mastering the production and operation conditions of the construction site. Fourthly, make full use of mobile phone software to push early warning information data and video monitoring information in time.

To the maximum extent possible to meet the construction site civilized and safe construction, standardized construction requirements, the establishment of a sound construction site wisdom safety management system, will be several types of cameras installed directly in the construction site to collect personnel construction screen, coupled with the mobile phone software platform for daily management board, testing centre board, mobile management board, wisdom safety management board and other functions to develop data analysis and processing. The site is generally to choose more than sixty inch LCD TV, the implementation of the rotation, rolling construction site screen, convenient construction management personnel timely want to understand the actual situation of the construction site, to platform analysis and processing to determine whether the construction site has staff violations of production operations, the construction site security control reasonable, to do up and down, local screen synchronous broadcast, real-time broadcast, prevention before it is too late.

3. Regulatory platform system design structure

3.1. Generalised design

The project uses monitoring image intelligent voice recognition technology and in-depth fusion learning technology to establish sound system content, according to the B/S design module to establish sound system functions, relevant users can make full use of mobile phone and computer browser software to access the operation, without the need to install other similar software.

The intelligent safety management system internally includes three parts: client-side display, back-end end display, and front-end collection of information data. Front-end collection data information function board choose Hikvision camera, AL specialized server, real-time capture business processor in the transmission over the recognition results and related information data, timely capture construction site staff action and site environmental conditions, the photo or video with AL service runner for 24 hours a day real-time calculation, can fully analyze the construction site of some standard violation operation operation Information data, for the middle and back-end business processing board conveying voice recognition results and related information data, after the server unified calculation, processing, storage, the results will be sent to the mobile phone and computer user end, by its mobile phone mobile software, monitoring centre, management platform, can show the final results of information data.

Systematic overall structure of the establishment of sound in the internal centre of the local area network can easily achieve the delivery of data and information to ensure the security and timeliness of information data, using the user only need to directly log in the computer or mobile phone browser software inside the local area network to access the system inside, the business processing server is in the mobile phone software is not able to connect with the outside, the construction site cannot be carried out in a timely manner in the condition of public The business process server is a public network for accessing the system when the mobile phone software is not connected to the outside or the construction site in a timely manner.

3.2. Platform internal structure design

Intelligent management system architecture can include interface service, display service, application service, etc. Among them, the display service includes mobile phone software, computer browser software, LCD TV, etc. The application service is designed in accordance with the business service structure of the systematic functional segment, which basically includes the monitoring centre, intelligent management of the construction site, daily management work and mode, the construction and erection of the mobile platform, etc.; the interface service mainly provides business interface functions for the display service, which mainly includes activity documents and information, station shift meeting The interface mainly provides business interface functions for the showcase office, which mainly include activity documents, handover records, daily work and construction task plans, holiday breaks and other arranged activities.

4. Programming

The system internal application at the application and interface applied JAVA development style language, using the SSM internal and external framework structure, it's as the current mainstream network framework structure, suitable for most of the enterprise application system establishment sound. source framework structure for spring, first appeared in 2003 lightweight open network framework structure, can effectively deal with the enterprise development of different applications of all kinds of complexity, can easily achieve the development of the server port, in terms of testability, simplicity, loose coupling, this development of applications can all be obtained in spring, which belongs to the lightweight face of the cut, the The container structure model that controls the inversion. And the management of data information, add, delete, check and change the network framework protocol for mybatis.

5. Storage and retention of data information

Mybatis, as a relational management type of information database internal system, is one of the best application network software for the application of web in the development process of the enterprise. The decentralised storage and retention of document data and information database is mongodb, a data and information database between relational and non-relational, very rich in functional types, very comprehensive in different categories, supporting a loose and decentralised information and data architecture, with more different types of data and information storage and retention, which can easily support multiple language queries and access, ultimately achieving similar or identical queries to relational data The single list function board of the information base, establish the index of the sound data information base and other quick and convenient functions.

6. Construction site target detection of irregularities

Within this intelligent security management system, the implementation of the relevant hardware and software testing functions requires software programs as the entry point for planning and design, while the relevant software platform requires the implementation of the relevant foundations with the basic type of hardware facilities as the main testing means.

First, face recognition technology. Face recognition technology based on the different characteristics of the human face features and other identification information class technology, can make full use of biometric technology, mainly with the camera, the camera as a person it facial features capture means, constantly collect the face of the photo, video, in the graphical board to achieve automatic tracking, detection of the face, recognition of the face, judgment of the face of the relevant behavior. This system includes internal inspection and detection of face graphics, collection of information data, and extraction of graphic patterns of different features of faces, pre-processing of face images in the board, face image feature conforming style, and matching recognition. Among them, the collection of face graphic information collection function can be fully collected with the help of cameras and camcorders, including different expressions, positions, sizes, structures, dynamic and static features of human faces, etc., can be collected, and the relevant construction staff can automatically realise the shooting and collection of different people's face graphic features when they are in the shooting range. The face detection function accurately determines the size, position and orientation of the face in the graphic area and detects the face using head and tail features, structural model features, colour appearance features etc. The image features extracted by the face image pre-processing board are more obvious, and the functions of processing noise size and grey scale correction of the face are now more optimised.

Second, accurate identification of a number of violations of the rules and regulations. These include: firstly, construction personnel wearing helmets, safety clothing, safety belts and other irregularities to identify and judge. Then, whether the construction site has personnel smoking violations identification judgment. This is followed by the identification of outsiders entering the area

or unidentifiable persons and their capture. Then comes the identification and judgement of clutter and rubbish littering the construction site's personnel pathways. This is followed by the identification and judgement of early warning alarms such as fire hazards associated with the construction site. Finally, there is the identification of construction site edge support protection, perforated tunnels, deep foundation pits and smoke pipe passages.

7. Test and analysis process

In order to ensure the effectiveness and rationality of this system internal platform in the use process for construction sites to carry out information data test content. Relevant construction staff should first login to the platform software home page information, in the left side of the menu function bar area includes a violation violation warning class, graphic analysis processing class, construction plan planning class, the left side of the menu function bar area includes statistical work ticket class and so on. In the system internal platform software to support the planning system within the function, and can achieve good use effect, the maximum degree to meet the regional internal, target detection of violations related to the monitoring requirements of violations, etc.

8. Conclusion

To sum up, in the construction process of engineering projects, there are problems such as a large number of construction personnel, difficulties in timely management of construction sites, and hidden some potential and risky safety hazards. Faced with the problems of wide point surface of safety supervision platform, wide distribution range of engineering projects, large number and regional span, in order to effectively strengthen construction site safety risk management and enhance the effectiveness of platform supervision, Hikvision cameras or cameras are effectively used, together with some special servers or processors, to identify and capture some irregularities of construction site staff in real time, and after database Storage and retention are delivered to the customer service end to effectively monitor the production and operational behaviour of construction personnel.

Reference

- [1] Research on Smart Street Light System Applying Edge IoT Agents [J]. Liang Shuang, Cui Min, Chen Sen. Smart City. 2020(02)
- [2] Research on the construction site control system based on dynamic auditing [J]. Ren Hengjie, Hu Yunwei. Power Equipment Management. 2020(01)
- [3] Design and research of a secure interaction system for video surveillance data [J]. Wu, Liping, Liu, Yimin, Wu, Qiang. Electronic measurement technology. 2020(02)
- [4] Research on video surveillance fusion technology for important transmission channels [J]. Sun, Rong-Rong, Li, Qing, Tao, Wei-Wei. Digital Technology and Applications. 2019(11)
- [5] Research and Application of Real-Time Control System for Safety of Power Grid Infrastructure Construction Sites [J]. Liu Yunfei, Xu Chaofeng. Anhui Electric Power. 2019(03)