Ekoloji 28(108): 2267-2271 (2019)

LETTER TO THE EDITOR

Design of Noise Environmental Pollution Information Management System in Construction Engineering Construction

Shaohui Dang*, Bingqi Zan, Hongbo Lu, Fan Wang
China Construction Seventh Bureau Installation Engineering Co., Ltd., Zhengzhou 450001, China
*E-mail: dsh1982311@163.com

This paper integrates computer technology, network technology and virtual instrument technology, and uses NI compact DAQ acquisition platform to monitor building construction noise information.First, summarize and summarize the occurrence and harm of building construction noise.And analyzed the development of automated monitoring systems and the development of existing noise measuring instruments,Summarize the main research directions and shortcomings of the existing seminars.the research objects and methods were determined.Secondly, through the analysis of the functional requirements of the noise monitoring system, the NI compact DAQ is used as the hardware collection platform of the system. The connection between the acquisition chassis, the acquisition module, the microphone and the main controller and the working principle of each hardware are introduced in detail. , performance, technical characteristics.Then, based on the LabView graphical programming language, the overall function of the system is designed, and the modular design method is used to design the system's parameter setting, collection control, data display, analysis, alarm and storage functions.Finally, a noise measurement experiment was carried out to test the feasibility of the system by testing the connection of the system, hardware configuration, acquisition software settings and noise monitoring display.The real-time monitoring system proposed in this paper can be used for real-time monitoring of noise, aiming at the locality of building construction noise.

Construction engineering; noise; information management; noise measuring instrument

1 Introduction

In recent years, with the development of the economy and the further promotion of “urbanization” by the state, cities around the country are actively planning to transform urban areas.Intensify the improvement of infrastructure construction, and the construction scale is still huge (Hammer et al., 2017). On the one hand, these construction activities can greatly satisfy people's needs in various aspects such as production and life. However, on the other hand, it will inevitably have an impact on the surrounding ecological environment. Especially in construction and construction activities, construction noise (Çolakkadıoğlu et al., 2018). It is a relatively obvious environmental pollution problem in construction and construction, and even seriously affects the image of a city.

Cao and Zhang (2019) published an article in the journal Ekoloji's 2019 Issue 107 entitled “Research and Implementation of Suppression Method of Dust Pollution Environment in Large-Scale Construction”. In order to realize the green construction of large buildings, this article reduce the incidence of workers' pneumoconiosis,research and implement a method to suppress dust pollution in large-scale construction.Taking the representative process of dust generation in construction construction as the research object, the fusion simulation method and on-site measurement analysis method are used to analyze the dust distribution at the construction site.Construct a rock drilling net model and use the FLUENT software in the computational fluid.

The rock drilling process was simulated. The variation curve of dust concentration around the dust source was obtained by using the turbulence model. On-site investigation, data collection and data analysis at the construction site, study the dust concentration distribution of representative construction links in the construction, and provide protection suggestions for workers according to relevant industry standards and actual measured concentrations. Qualitative and quantitative analysis of dust distribution during representative processes during construction from a system dynamics perspective. The results show that the method can effectively determine the safety area and dangerous area during the construction process, and can accurately measure the dust concentration during construction during the actual construction, and effectively analyze the effectiveness of dust prevention measures in different processes. At the same time, combined with relevant standards, reasonable suggestions for dust prevention during construction are given.Inspired by this article, the information management system for noise and environmental pollution in construction engineering was designed.

2 Application of building construction noise information management system

2.1 Noise standards for construction site boundaries

Building construction noise refers to the sound that is generated during the construction process and disturbs the surrounding living environment.Mainly caused by various construction operations and transportation machinery work (Lokhande et al 2018). And mental health poses a threat, and conflicts between residents and construction workers caused by noise problems also occur from time to time, causing construction and construction projects to stagnate (Herbertread et al .2017, Nam et al., 2018; Liew et al., 2018). Moreover, in all environmental pollution complaints in recent years, complaints from the public are also a problem of building construction noise disturbance, and the proportion is showing an upward trend. In the noise emission standard, the noise emission limit in day and night construction work is clearly defined, especially in the vicinity of sensitive buildings such as hospitals, schools, and houses. It is also necessary to pay strict attention to the discharge of construction noise and make construction activities. Strict requirements, Table 1 is the noise emission limit of the construction site boundary.

Table 1 Noise limit of building construction site noise limit unit: db

diurnal	nighttime
70	55

Therefore, monitoring and management of building construction noise is essential.However, nowadays noise measurement is mostly manual measurement, and managers use sound level meter for measurement, or use noise measurement instrument connected with noise sensor to read data.This method of artificial noise measurement is tedious and error-prone due to the multiplexing button design of the noise instrument, which does not conform to the habit of the measurement personnel.Moreover, noise measurement reports need to be filled in manually, so the measurement data is easy to be lost in manual sorting and storage, and the monitoring efficiency is low.In addition, the supervisors cannot monitor the construction noise emission all the time (Zhang, 2017), which may easily lead to the problem that the managers will lose control of the noise pollution as soon as they leave.

2.2 application research of noise pollution information management system

With the development of computer technology and information technology, and the complexity of construction environment, more and more monitoring systems are applied in the construction field. Take the temperature monitoring system as an example, its structure is shown in Fig 1.

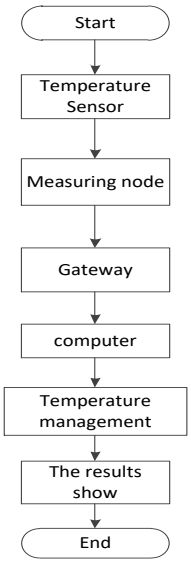

Fig .1 temperature monitoring management system

3 Design of noise environmental pollution information management system

3.1 the LabView

The real - time monitoring system in this paper is based on virtual instrument.Virtual instrument is composed of computer, software and modular hardware. The combination of software and hardware can simulate the function of traditional hardware instrument after configuration.The composition of the virtual system, the role of hardware and software are different, hardware is the basis, can complete the physical signal to digital signal conversion, transmission;Software can be used to achieve the control of the hardware, and can achieve the function of the system, the user can through the development of software programming, increase or decrease the application function of the system, so that "software is an instrument".. In the noise monitoring system of this paper, LabView graphical programming software is adopted.LabView is the laboratory virtual instrument engineering platform, which is the virtual instrument software product launched by NI company in 1986.Since its development in 1986, LabView has launched several different versions, which can support multiple currently popular operating systems. LabView has become the most widely used and powerful graphical programming language. LabView is a graphical programming language.Different from traditional text programming language, LabView adopts graphical programming and is called block diagram programming in the graphic framework, which replaces the previous text programming methodIn FIG. 1, the graphs represent functions, and the lines between ICONS represent the data flow. The data flow between nodes determines the execution order of the program.Graphical programming can greatly reduce the developer's programming time. Graphical programming is simple and convenient, and it can well eliminate the grammatical details in text programming, thus reducing the programming time exponentially.LabView has a large library of functions and subroutines, which can provide a series of completed functions to helpCheng staff quickly set up a collection procedure.LabView can not only establish contact with NI hardware and complete data display and analysis, but also integrate all interface programming of other hardware connection, which is widely used in monitoring field.LabView's advantages over other programming languages are as follows:

(1) adopt the graphical programming method, with a large number of controls, greatly reducing the programmer's programming work.

(2) the model data flow adopted by LabView can realize the automation of multi-threading.

(3) the built-in compiler automatically completes the translation in the background when the user writes the

program, eliminating many grammatical details involved in text programming.

(4) mixed programming with other programming languages can be easily realized through DLL, CIN and other nodes.

(5) LabView has a large number of analysis programs, which can help users complete data analysis and processing.

(6) the LabView program contains a lot of low-level hardware drivers, which can realize the connection and control of many hardware instruments.

3.2 overall function design of the system

The software modularization design method is adopted in the construction site noise real-time monitoring system. The main program is divided into several modules, and the functions of the modules are defined respectively, so as to form the overall functions of the system. Adopting modular design can not only simplify the complexity of program design, but also enhance the readability of the program, reduce the debugging and maintenance of the program, and improve the efficiency of system development. LabView software is adopted in the noise monitoring system of construction site. The system software functions mainly include parameter setting, data collection, display, analysis, alarm and storage.

3.2.1 data acquisition control design

The acquisition control module can realize the system start, pause and end functions after the main program starts.

The program takes the while loop as the external structure. When the user clicks the start button, the system will start to run and collect noise data.The exit system program is designed by using the event structure program and the double-button program. When the button is clicked to exit, the system will pop up the dialog box of confirm and cancel to remind the user whether he is sure to exit the system. The system pause function USES the single-button program to suspend data collection. When the pause button is clicked, the pause dialog box will pop up, and the system will resume operation after clicking to continue data collection.

3.2.2 data acquisition and display design

The data acquisition and display module can collect and display the noise value of the monitoring point. In LabView development system, DAQ assistant provided by software can quickly configure tasks, complete measurement test and automatic code generation, and Express VI can quickly establish a professional data acquisition system.DAQ assistant setup is very convenient, double-click DAQ assistant to access the collection system Settings.After connecting the compact DAQ chassis and module to the computer, the software will automatically identify the installed module and the physical quantity that can be measured. After the task is created, the acquisition channel, input range, acquisition mode and frequency can be configured. The configuration of the acquisition channel will be completed at 0K, and the LabView software will automatically generate the code.

4 Conclusion

Construction noise not only affects people's life, but also affects people's body and mind, so how to effectively manage construction noise becomes the key. The first step of noise management is noise measurement. Traditional noise measurement mostly adopts manual measurement, and measurement information cannot be timely fed back and processed and analyzed. Therefore, this paper combines computer technology, virtual instrument technology and civil construction management, adopts compact DAQ as the system acquisition platform, and USES LabView graphical programming language to design the software function of the system, so as to realize the real-time monitoring of construction site noise and provide a basis for noise monitoring and management.

References

Cao P, Zhang B (2019) Research and implementation of suppression method of dust pollution environment in Large-Scale construction. Ekoloji 28(UNSP e107315107): 2813-2823.

Çolakkadıoğlu D, Yücel M, Kahveci B, et al. (2018) Determination of noise pollution on university campuses: a case study at Çukurova University campus in Turkey. Environmental Monitoring & Assessment 190(4): 203.

Hammer M S, Yi F, Hammer S S, et al. (2017) Applying a novel environmental health framework theory (I-ACT) to noise pollution policies in the United States, United Kingdom, and the Netherlands. Journal of Environmental Planning & Management (2): 1-22.

Herbertread J E, Kremer L, Bruintjes R, et al. (2017) Anthropogenic noise pollution from pile-driving disrupts the structure and dynamics of fish shoals. Proceedings of the Royal Society B Biological Sciences, 284(1863): 20171627.

Liew RK, Nam WL, Chong MY et al. (2018) Oil palm waste: An abundant and promising feedstock for microwave pyrolysis conversion into good quality biochar with potential multi-applications. Process Safety and Environmental Protection 115(SI): 57-69.

Lokhande S K, Jain M C, Dhawale S A, et al. (2018) Realizing Modeling and Mapping tools to Study the Upsurge of Noise Pollution as a Result of Open-Cast Mining and Transportation Activities. Noise & Health 20(93): 60-67.

Nam WL, Phang XY, Su MH et al. (2018) Production of bio-fertilizer from microwave vacuum pyrolysis of palm kernel shell for cultivation of Oyster mushroom (&ITPleurotus ostreatus&IT). Science Of The Total Environment 624: 9-16.

Zhang Shuai (2017) Application of BIM Technology in Construction Safety Management. Automation and instrumentation (6): 220-221.