Research and Design of Campus Video Surveillance System

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Abstract. According to the engineering design principle and the transmission scheme of video surveillance system, the structure, composition, equipment and model of the system are discussed. The video surveillance system of university campus is mainly designed. It includes three parts, which are the design of main control room, the design of sub-control room and the design of surveillance point, and gives the concrete design scheme. The design takes full advantage of the existing network, the combination of material defense, civil air defense, strict requirements of the construction process, and try to use the most advanced and mature system to ensure the reliability and continuity of the system.

Introduction

In recent years, safety accidents on university campus usually, so teachers and students' safety become the focus of all sectors of society. With the development of electronic technology, network and digital technology, the use of high-tech means of campus surveillance and security has become an indispensable research topic.

Campus video surveillance system is a security technology system, which is an important part of an advanced, highly integrated system to prevent capacity. It can watch the school situation through the camera and its auxiliary equipment (lens, etc.) directly, and record the whole school image. It also can provide some convenient conditions and important basis for dealing with certain events in the future. Meanwhile, the campus video surveillance system can be linked with other security technology prevention systems such as burglar alarm, so that the university's prevention ability is more powerful and timely detection of accidents and events of the hidden dangers, prevent damage and avoid the adverse impact.

Design principles of Campus Surveillance System

The system's design must follow the design specifications of the relevant departments of the state, and the principle that is the advanced technology, full-featured, stable performance, cost-saving and so on. In addition, the design consideration contains the factors which is construction, maintenance, and operation, as well as the future development, expansion and modification factors such as expansion of leeway.

Based on the campus network video surveillance system design generally need to follow the following principles.

Advanced nature. If the investment cost of the university is enough, the system can adopt the new advanced technology and equipment. On the hand, it can reflect the advanced level of the system, on the other hand, the system has a strong development potential, that can accommodate the social development as soon as possible.

Reliability. The reliability is very important in the university surveillance system, because if the system is breakdown, it will have unimaginable consequences. So the system must be working reliably and continuously. Under the conditions of cost acceptance, the system's design must be strict with system structure, equipment selection, supplier technical service, Maintenance responsiveness and other all directions, which makes the possibility of breakdown as little as possible. Even in the event of breakdown, the influence area should be as small as possible.

Safety. For the security system, its own safety performance can not be ignored. When designed the university surveillance system, it must prevent the various form and ways of illegal destruction with the various measures.

Scalability. System design should take full account of future development needs, which have the capacity to expand and upgrade the possibility of updating.

Normative. Because of the strict integrated of the system, so when the system is designed and constructed, it should refer to all aspects of the standards and norms, and strictly comply with the technical requirements. The system will be good standardization and construction.

Campus Surveillance System Design

The design can be divided into module design, including three modules, namely the main control room design, the sub-control room design and the surveillance point design, the total design shown in Fig 1.

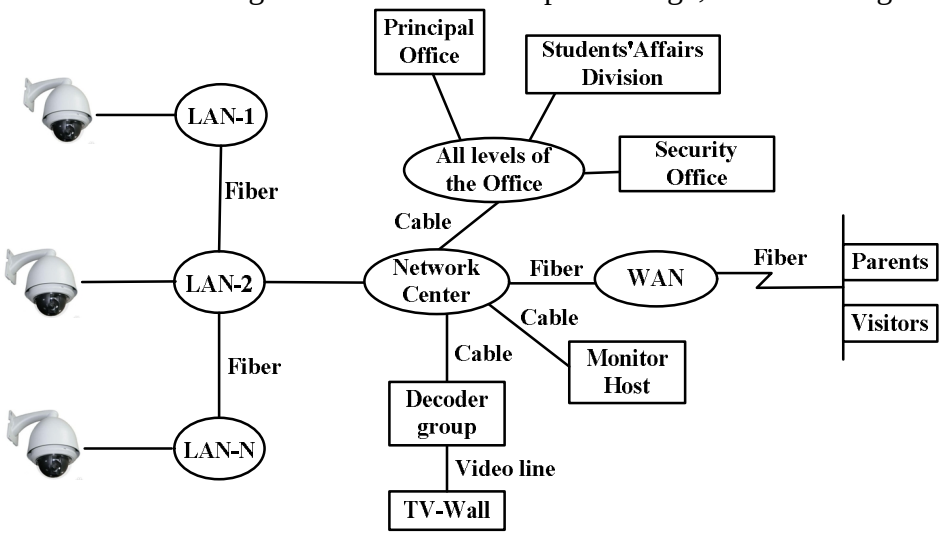

Fig 1 The Total Topology

The Design of the Main Control Room. The main control room design contains that the controlled of the surveillance point's camera and display image, the design of the storage system.

The camera and display image of the surveillance point control. The main control room is the signal control and information exchange center of the system. The surveillance system will install 13 host - digital hard disk video host IDRS-7016HE-D type in the main control room. The device is the core of the system. Its hardware and software will help manager to schedule, manage and control the system.

If the front-end camera is installed by PTZ\decoder, the control mainframe will communicate through the RS485 communication interface. PTZ control signal will be transmitted to the PTZ decoder, the decoder then cracked the control code to its only corresponding to a road camera, PTZ, while providing regulated power supply. In this way, the control of the host will be able to control the action of the camera head, flexible monitoring of the surveillance points.

If the front-end camera is installed in a fixed position, the camera will install in a specific position. The fixed focal length is adjusted; the rotation of the camera and the stretching function of the lens need not be realized by the control panel.

Control the host with a variety of screen display, just click the mouse to complete, simple and convenient. It has a single loop display, and four, nine, sixteen split display.

The design of the storage system. 13 digital hard disk video recorders in the main control room can convert the images and sound that is captured through the front-end camera to digital signals and compress into H.264 stream timely stored in the hard drive. Each channel image resolution is D1 or CIF, 25 frames per second, the total resources of 400 frames, and can guarantee real-time playback of a single audio and video, up to each way while the digital signal storage.

Digital hard disk video recorder with real-time monitoring, real-time video, real-time playback function, can adjust the hourly compressed storage capacity according to the image quality. When a large test hold, the digital video recorder with a large hard drive can guarantee the examination room during the continuous uninterrupted video recording, clearly record the examination room content. If the 3 days of continuous recording 5 hours per day, and 600M per hour per channel (D1 video quality) resource consumption calculation, 600M * 16 * 5 * 3 days = 1440G/station , then each 16 host Need to install a 2000G hard drive standard system hard drive. If 250M per hour per channel resource consumption calculation, 250M * 16 * 5 * 3 days = 600G/station, then each 16-way host needs to install a 1000G hard drive standard system hard disk.

It also can record the teaching situation of the excellent teachers in peacetime for teaching and research.

If needing to find the video data, the video retrieval function of the host is extremely convenient and quick. It can look up the information accurately according to a road camera or date or time, that is only a few seconds.

In addition, the digital hard disk video recorder also comes with a recording system, can record the audio and video files carved into a disc, permanent preservation.

The design of the sub - control room. The university has a principal room, the teacher's office and other sub-control points in the design. If the general office computer installed the sub-control system software and connected the campus network, it can control the sub-control points.

Main control center set the authorization management function to ensure that the monitoring system on the sub-control side of the strict management of the principal with the use of monitoring system, the highest priority, and to other sub-control point authorization. There is no authorized sub-control system can’t access the host camera and control functions.

Sub-control function not only supports local LAN access, but also supports INTERNET remote access and control of the Internet. Its highest authority and the same LAN, the function to meet the staff travel in remote access and control needs. Other universities can also be through the wide area network and sub-control software for on-site observation classes, in order to further improve the school teaching competition mechanism, promote the education and teaching level.

The design of the surveillance points. Because of the cost, the fixed installation method is adopted. Install a color dome camera in the corner of the classroom. Fixed installation is characterized by: the camera to monitor the distance and range will remain unchanged, not through the main control center for any control and regulation.

If using the PTZ control mode, you can use mini-intelligent high-speed dome camera. Its features: 1) multiple optical zoom and electronic zoom, auto iris. Auto iris adjustment function, according to the monitoring of the scene light and shade to automatically adjust the aperture, can clearly display the image details. 2) The pan / tilt can be rotated 360 degrees horizontally and vertically at 90 degrees. The camera can be flexibly installed in a fixed way. Monitor head with high sensitivity, high-fidelity high-quality pickup.

Equipment selection is fully guaranteed to achieve monitoring without blind area, the image is clear, clear voice.

The Design’s Features

The video surveillance system design based on industry standards, combined with the specific circumstances of the campus, with the best design to reflect the best price, the program is the basic starting point and the pursuit of goals.

University campus as a special environment, should have the ability of security, the system should not only have advanced technology, but also is reality. So the design contains the following characteristics.

The first, it is trying to use the most advanced and mature system. It can be low-cost hardware expansion and software upgrades to maximize the current user and the next few years to meet the functional requirements of the system.

The second, the most important thing is the reliability of the system, so the system must be reliable, continuous operation. This design under the conditions of cost acceptance, from the system structure, equipment selection and other aspects are strict requirements, so that the possibility of failure as much as possible to reduce.

The third, the surveillance system is a strict comprehensive system, and the design in the construction process requires reference to all aspects of the standards and rules, strictly abide by the technical specifications, good standardization of the system design and construction.

The fourth, it is taking full advantage of the existing network, the use of open architecture and standard network communication protocol (TCP / IP) design, through the local area network, Internet connection. It also can monitor the remote camera image at any time, to avoid duplication and save money.

The end, regulatory safety is the result of the close combination of physical defense and civil air defense. All technical means are implemented by supervisors. Therefore, the design, planning and equipment matching of the system also take into account the requirements of human functional science.

Conclusions

With the progress of technology, video surveillance gradually to the digital, network and system integration development and in the future will play a full role. In this paper, a complete campus monitoring system is designed. The core hardware used in the scheme has the characteristics of high performance, high reliability, low power consumption, maintenance-free, and embedded structure, high stability, small size and convenient installation. In addition, the system can be remotely set and managed through the network, including software design, without on-site manual operation and maintenance, which greatly facilitates the installation and maintenance of the system.

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