

Design and implementation of multimedia video fusion system

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Abstract. With the rapid development of computer network application technology, various video products and video systems are changing with each passing day. The daily internal communication, training and exchange activities mainly use video conference, paperless conference, projection display, large screen splicing display and other video systems for interaction. These systems are developed and run independently and lack system linkage. In addition, due to the disunity of platforms, the system is prone to multiple devices, complex operation and low resource utilization, which increases the operation and maintenance cost. To solve the above problems, a set of multimedia video fusion system is designed to integrate various video systems to achieve unified control of video conference, paperless conference, projection display, large screen display and other systems, effectively support the use of various business scenarios, and achieve the purpose of improving efficiency and reducing costs.

Keywords: Video system, Multimedia video fusion, Unified control.

1 Introduction

With the progress of The Times, computer and network application technology has been developed rapidly, a variety of video products and video systems are changing with each passing day, applicable to a variety of scenarios, widely used in government agencies, public security, transportation, financial and other industries. Take the enterprise as an example, there are various types of communication, training, exchange and review activities in the enterprise. The communication methods are mainly video conference, paperless conference, projection display, large screen display and other video systems for interaction. These systems are developed and run independently and lack system linkage. In addition, due to the disunity of platforms, the system is prone to multiple devices, complex operation and low resource utilization, which increases the operation and maintenance cost. In view of the above problems, a set of multimedia video fusion system is constructed to integrate various video systems to achieve unified management, unified operation and maintenance, effectively support the use of various business scenarios, and achieve the purpose of improving efficiency.

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2 Problem analysis

For some important industry units, the daily management and scientific research work mode involves multi-place and multi-department collaborative work, which requires various discussion, communication, consultation and major presentation scenes. Video conference, paperless conference, audio and video interaction, large screen display and other video means are mainly used in these scenes. At present, most of these video systems operate independently with poor linkage between them, which brings great difficulties to the working mode. The main problems are reflected in the following aspects:

2.1 Complex system interface

The construction time and construction types of various video systems are different, and the system signal types are complicated, including analog signal, digital signal and HD signal. Signals of different types are interconnected through signal converters, resulting in large loss of signal quality and ineffective guarantee of audio and video effects.

2.2 Security risks

Traditional video systems can only meet the functions of meeting holding and meeting management, but lack in the scope of information knowledge, information security protection and data security. There may be security risks that information is out of control or the scope of information is expanded because the data is not cleared in time.

2.3 Decentralized system management

The audio-video conference system, paperless conference system and large-screen splicing display system are all developed and operated independently. Due to the disunity of platforms, the system has many equipment, complex operation and low resource utilization. Therefore, it is necessary to deploy multiple technical personnel to guarantee the stable operation of multiple independent systems, which brings great difficulty to guarantee the operation of conferences and increases a lot of operating costs.

3 Platform architecture design

Aiming at the above problems, this paper designs a set of multimedia video fusion system, which can access and be compatible with various video signals. The system security and confidentiality has been moderately reformed to meet the requirements of system information security protection and data security. The platform provides unified access and control to multiple independent audio and video systems, realizing unified command and scheduling, signal switching control and large-screen display control.

3.1 System framework design

The design of multimedia video fusion system is divided into two parts: business architecture and functional architecture design. The business architecture effectively integrates video conference, paperless conference, audio and video interaction, large screen display and central control system, realizing the management and control of multi-system services on a single platform and meeting the unified control, unified scheduling and unified management functions. The functional architecture consists of six modules, which

are demand management, plan management, process management, post-management, system management and information security modules. Each module has different business requirements based on the roles of the participants.

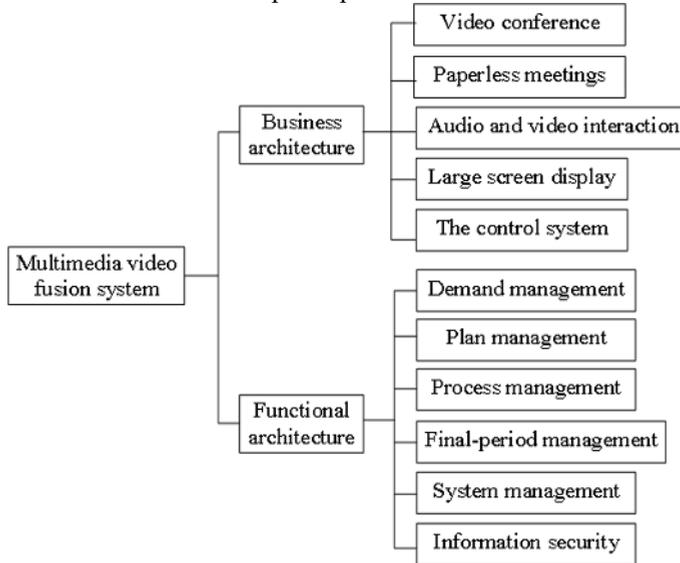


Fig. 1. The platform diagram.

3.2 Function module composition

The demand management module defines the interaction types, which can carry out audio and video interaction types such as video conference, paperless conference and large screen display, and support some internal and external visit and exchange, test joint adjustment and other services. The system supports meeting application and meeting approval functions. The user can specify the name, secret level, convenor, moderator, participants, start time, and duration of a meeting.

The plan management module can make the exhibition and discussion plan and script in advance, complete the boot of audio and video related equipment and system inspection with one click, add the theme of the meeting before the meeting, upload files and materials, and drill the plan before the show and discussion. The function module composition is shown in the figure below:



Fig. 2. The function module composition diagram.

The process management module can be one-click plan execution, realize the display function, make the laboratory resources distributed in audio signal by the switching, control, will upload the file to preview and distribute, superposing domestic splicing display, combination, and roaming, and other functions, can be achieved via KVM manipulation of input terminal.

The final-period management module can delete the materials with one click after the end of the meeting, and users can evaluate the effect of the meeting. It provides users with some common statistical analysis functions, and provides users with the frequency and duration of the use of each meeting in an intuitive and visual way. In addition, the platform provides users with statistical analysis and download functions of reports. Users can collect the statistical data of a specified venue within a certain period of time according to the time and venue conditions for users to analyze and make decisions. The function module composition is shown in the figure below:

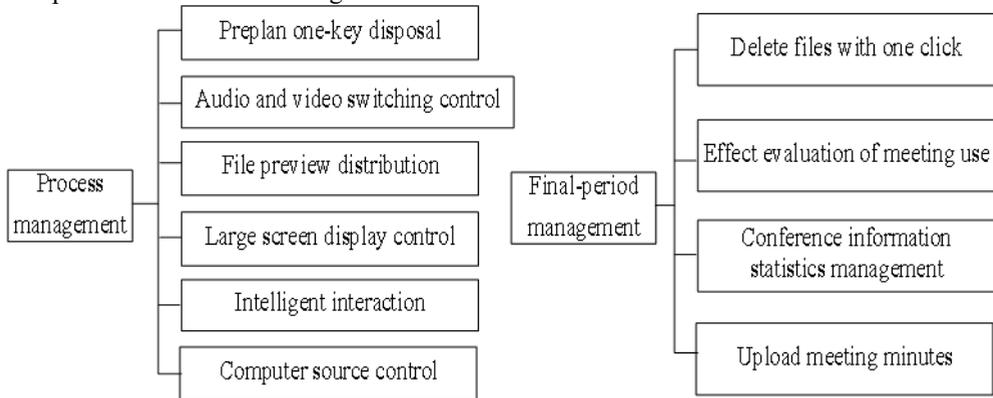


Fig. 3. The function module composition diagram.

The system management module can be configured with personnel/organization management functions and supports log management functions, including running logs, operation logs and alarm information logs, as well as log search and view. Supports unified management of audio and video resource pools, video storage and playback, centralized display of system topology, and alarm notification. The system supports permission management to define user operation permissions, data access permissions, and usage permissions on the device. Allocate the access and operation rights to the device based on users' functions, and assign different priority rights to users who access the same device.

The information security management module has various encryption mechanisms to ensure security, including identity authentication, device authentication, storage encryption, software authorization and other security defense policies. Module can realize system three roles, with system administrator is responsible for the daily maintenance work to the system, the security officer is responsible for the daily security management system, safety auditors are responsible for the audit tracking, analysis, and the supervision and inspection, timely find violations, and regularly report back to the system security management institutions. The function module composition is shown in the figure below:

4 Platform features and application scenarios

Multimedia video fusion system can cover the whole process of video management, including pre-meeting planning and meeting convening, in-meeting control, and business closed loop after the meeting. The system adopts the modular design concept, each function is designed into a module, separate open application permission. The system supports

screen management, audio management, central control management, environmental monitoring, operation and maintenance management, statistics management, information release and other functions. The system supports standardized interface encapsulation and can be compatible with multiple video surveillance system access, realizing integrated control of audio, video, conference and environmental systems. System design, architecture and development are implemented in accordance with security and confidentiality requirements. The integration system can improve the efficiency and reduce the cost, and effectively solve the problem of human, financial and time cost caused by the traditional conference organization.

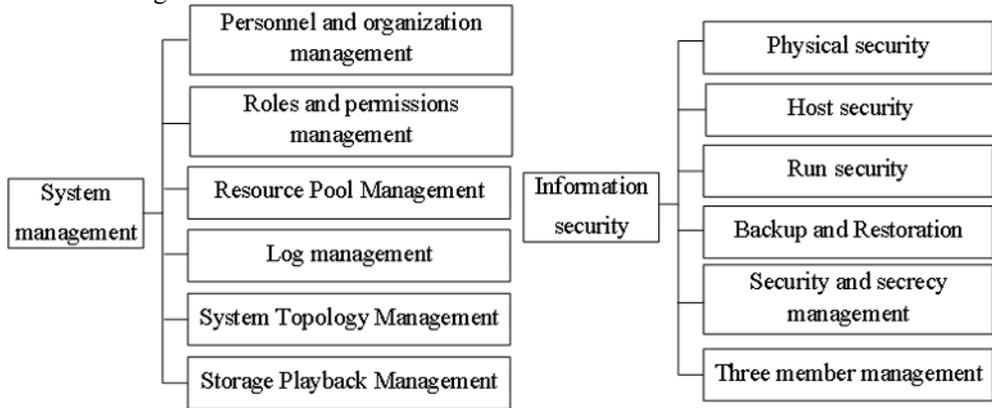


Fig. 4. The function module composition diagram.

The platform has been used and promoted in government, government agencies, military, exhibition centers and other institutions, effectively supporting the application mode of multi-location, multi-specialty, multi-scene collaborative office and collaborative RESEARCH and development of various units, and ensuring efficient, safe, economic and sustainable operation of management and scientific research business under the multi-location operation mode.

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