

Analysis of Digital Audio Technology in Broadcasting and Television Engineering (Postprint)

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Abstract

Digital audio technology is a representative technical approach developed based on digital audio signals, capable of analyzing and organizing modular information types and processing them through digital means. It finds extensive application in the post-production of television broadcasting, ensuring program quality and thereby satisfying people's actual needs. To this end, this article examines the application of digital audio technology in broadcasting to comprehend its specific advantageous and functional characteristics.

Full Text

Analysis of Digital Audio Technology in Radio and Television Engineering

Abstract: Digital audio technology represents a prominent technological approach based on digital audio signals, capable of analyzing and organizing modular information types through digital processing methods. Widely applied in the post-production of television broadcasting, it ensures program quality and meets audience demands. This paper examines the application of digital audio technology in radio and television, exploring its specific advantages and functional characteristics.

Keywords: digital audio technology; radio and television engineering; application

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1.1 Digital Audio Technology

Digital audio technology is a technical approach for recording, storing, editing, compressing, and playing sound through digital means. It represents a novel sound processing technology that has emerged alongside the continuous development of digital signal processing, computer technology, and multimedia technology. The primary functions of digital audio lie in post-production and recording applications. Computer data storage utilizes a binary format of 0s and 1s, and digital audio converts audio files into binary data for preservation. During playback, this data is transformed into analog electrical signals and broadcast through speakers. Digital sound differs from traditional media sound storage methods, offering greater convenience, lower cost, and no distortion during information storage and transmission.

Digital audio technology is a new numerical technology grounded in internet communication and computer technology. It features multimedia capabilities, interactivity, and timeliness, representing a new form of media communication characterized by efficiency, speed, and broad reach. Its transmission is faster, its scope wider, and its interactivity stronger. With the development of digital information technology, digital audio technology has become increasingly widespread and ubiquitous in daily life. As network television, mobile network television, and optical fiber technologies advance, digital audio technology—marked by extensive information volume, wide coverage, and rapid application—has grown increasingly prevalent. In television engineering, digital audio technology can enhance audio recording efficiency, improve editing efficiency and quality, and thereby elevate television program quality. In future development, digital audio technology will inevitably integrate with new media technologies, perfecting the engineering technology model of radio and television in the internet information age and forming an entirely new paradigm.

1.2 Basic Principles of Digital Audio Technology

1.2.1 Sampling In digital audio technology, the primary application method involves analog information processing to improve information transmission effectiveness. During signal transmission, waveform changes can only be detected through specific commands—this constitutes sampling. In practice, when time intervals are uniform, one can understand and capture waveform change characteristics in a timely manner for information collection.

1.2.2 Quantization Signal conversion through quantization is crucial in audio transmission. Strengthening control processing can prevent signal loss. While signal digitization has effectively improved and optimized video clarity and noise, interference problems still occur to varying degrees when signals emerge. Therefore, quantization processing is necessary.

1.2.3 Encoding Encoding is a key component of digital audio technology. Its main function is to decompose and convert transmission signals. During the

encoding process, parameter calculations must be performed to ensure signal transmission accuracy, thereby improving encoding quality and effectiveness.

2.1 Application Characteristics of Digital Audio Technology in Radio and Television Engineering

2.1.1 Extension of Audio Tracks With the vigorous development of computer technology, digital audio technology has continuously improved and gradually been applied in radio and television engineering, primarily in television audio recording, program management, and digital audio broadcasting. Digital audio technology expands existing radio and television audio tracks, fundamentally improving music program quality. When applied to language-based programs, it enhances production efficiency and quality. If deviations occur during program recording, they can be repaired through overdubbing and other methods, which undoubtedly expands audio track operations and improves television sound and picture quality, delivering high-quality visual and auditory experiences.

2.1.2 Precise Audio Editing Using digital audio technology for radio and television program management can enhance audio editing functions and precision. It enables systematic editing on high-resolution computer screens. By applying waveform technology, sounds in files can be repaired and displayed on the computer screen, allowing editors to utilize this technology for editing, thereby improving editing efficiency and quality and enhancing users' audio experience.

2.1.3 Information Storage The application of digital audio technology in radio and television engineering can address the shortcomings of traditional technical methods. It features high-efficiency information storage functions that can be processed through network technology and computer technology. It has the characteristics of convenience, centralization, and interactivity, enabling resource information sharing. The information storage resources in digital audio technology are consistent with computer data storage resources, providing users with high-quality audio information storage. During audio data retrieval, target data can be accurately located. This method is more convenient and effective, fundamentally promoting the sustainable development of radio and television engineering.

2.1.4 Broadcasting System Digital audio technology has wireless transmission and compression encoding functions. Through wireless transmission technology, information data can be effectively transmitted and controlled. Using compression decoding technology, audio data can be encoded after the human ear receives and discriminates sound signals, thereby improving the effectiveness and quality of radio and television technology transmission and enhancing user satisfaction.

2.2 Key Application Technologies

2.2.1 Digital Mixing Console The digital mixing console is a key component of radio and television engineering. Its main purpose is to reduce television noise and present high-quality audio, thereby improving television program broadcast quality. The application of digital audio technology can handle problems such as noise, interference, and crosstalk in audio. Through its own repair techniques and methods, the digital mixing console can improve the quality and efficiency of radio and television broadcasting. The application of digital audio technology can achieve channel switching effects and purposes, thereby meeting different user needs.

2.2.2 Audio Embedding Technology Audio embedding technology is commonly applied in radio and television engineering. In practice, it can be used to supervise programs and identify existing problems, thereby improving program audio-visual effects. Audio embedding technology is mainly applied in the pre-production and post-production processing of television programs, enabling refined division of labor and solving various problems in radio and television programs, thereby improving production efficiency and quality.

2.2.3 Cloud Broadcasting Technology Traditional radio and television programs could not be saved, and users would forget some content during listening, exhibiting fragmented characteristics. With the improvement of digital media technology, network technologies such as cloud storage and cloud computing are developing rapidly. Applying cloud storage functions in digital audio can transform traditional radio and television listening modes. By storing audio information in the cloud and saving it in the network database of radio and television broadcasting, users can connect to the cloud platform through terminal devices when online, listening to cloud broadcasting anytime and anywhere, thereby providing customers with diversified, precise, and personalized services. Currently, cross-regional, cross-platform, and cross-terminal broadcasting program listening modes are mature. With internet support, traditional broadcasting models are gradually being eliminated, forming a broadcast platform that can be freely shared and has popular characteristics.

2.2.4 Social Broadcasting Technology In modern social development, social activities constitute the main content of people's lives. The development of social networking software has promoted the active dissemination of media with social attributes. Users in the internet era are more willing to participate in digital audio technology with social features. This model effectively transforms the traditional one-way communication mode, achieving diversified communication through a radiating approach, effectively enriching traditional radio and television communication channels. Throughout the communication process, it has the characteristics of richness, interactivity, and social functionality. In internet-era radio and television media, it effectively brings users closer together.

Conclusion

The application of digital audio technologies such as digital mixing consoles, audio embedding technology, cloud broadcasting technology, and social broadcasting technology in radio and television engineering can improve production quality, enhance work efficiency, provide users with high-quality experiences, and improve program broadcast effectiveness and quality, truly promoting the modernization and digitalization of China's television engineering. This has a positive driving effect on the sustainable development of China's social economy.

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Note: Figure translations are in progress. See original paper for figures.

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