Analysis of the Advantages and Applications of Digital Audio Technology in Television Engineering (Postprint)

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Date: 2023-10-08T00:00:00+00:00

Abstract

Currently, with the continuous development of Chinese society, broadcasting and television engineering has undergone innovative development, particularly benefiting from the ongoing application of information technology and digitalization. Since the advent of the 21st century, digital audio technology has found extensive application in broadcasting and television engineering, not only driving innovative development in the field but also enhancing the effectiveness of broadcast content transmission. This paper primarily analyzes the concept and advantages of digital audio technology and provides a concise overview of its applications in broadcasting and television engineering, aiming to facilitate innovative development in this domain.

Full Text

Advantages and Application Analysis of Digital Audio Technology in Television Engineering

Abstract

With China's societal development, broadcast television engineering has achieved innovative breakthroughs, particularly through the ongoing application of information technology and digitalization. Since entering the 21st century, digital audio technology has been widely applied in broadcast television engineering, driving innovation and enhancing content effectiveness. This paper analyzes the concept and advantages of digital audio technology and outlines its applications in broadcast television engineering, aiming to facilitate further innovation in the field.

Keywords: Broadcast Television Engineering; Digital Audio Technology; Advantages; Application

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With continuous societal advancement, broadcast television engineering has developed rapidly with remarkable achievements. Simultaneously, propelled by information technology, digital audio technology has laid a foundation for effective broadcast television operations. As an innovative processing technology, digital audio technology represents a product of its era and an audio processing methodology emerging from multimedia technology development [1]. Undoubtedly, future development will present greater challenges for China's broadcast television engineering. Only through genuine integration and targeted application of digital audio technology can comprehensive and effective development be achieved.

2. Advantages of Digital Audio Technology in Broadcast Television Engineering

2.1 Enhanced Multi-Track Recording Capabilities

Multi-track recording constitutes an indispensable component of broadcast television engineering. It utilizes multiple tracks to capture and record different sounds into a system for compilation into complete programs. Its primary advantage lies in facilitating sound acquisition and enabling operations such as overdubbing and track merging. Moreover, deviations during recording can be rectified in post-production, and additional recordings can be integrated through track fusion without necessitating complete re-recording [3]. The robust functionality of multi-track recording offers convenience and efficiency for television program production while reducing time and costs.

2.2 Improved Accuracy of Digital Audio Precision Editing

Digital audio technology primarily refers to a data sequence representing sound intensity, involving analog sampling and encoding to align with audio formats and technologies. In recent years, the application of digital audio technology in broadcast television engineering has transformed dramatically, shifting from traditional analog to digital processing. During China's rapid development of digital audio for broadcast television, the two main modes have been transistor and integrated circuit, both with inherent limitations. From another perspective, since the emergence of digital audio sources, equipment precision has improved, enhancing sound processing accuracy while reducing costs. Consequently, various countries have recognized the importance of digital audio technology, with scholars predicting rapid growth in the coming years as digital audio content permeates all industries and sectors [2]. Meanwhile, with widespread adoption of digital audio technology, broadcast stations have integrated digital audio processing equipment, which reduces signal attenuation during conversion and improves program quality. However, overall analysis indicates that China's digital audio technology remains in its early development stages, requiring further

analysis and research.

2.3 Enhanced Digital Signal Processing Effects

It is well established that the human ear can distinguish frequencies between 20Hz and 2000Hz. From a developmental perspective, modern broadcast television programs now employ digital audio processing during recording. This approach replaces traditional recording methods, offering greater convenience while enabling broadcast audio to achieve richness and harmony, thereby further enriching the audio signal spectrum.

2.4 Improved Humanization of Digital Audio Broadcasting Systems

Currently, digital audio broadcasting systems have been widely applied in public broadcasting and remote conferencing. Originally designed to accommodate human auditory characteristics, these systems enable flexible device configuration. Particularly in wireless audio data transmission, they can reduce audio bit rates, maximize signal strength, and even shield low-intensity weak signals. This approach achieves humanized broadcasting, rendering auditory perception more acute.

2.5 Enhanced Storage Capacity

Compared with other audio technologies, digital audio technology's primary characteristics and advantages lie in its digital nature. Only through digital technology can previously unresolved issues be addressed. Furthermore, like computer principles, digital audio technology requires resource storage and sharing. However, its primary object is audio resources, enabling users to quickly locate suitable materials and analyze numerous audio resources, thereby improving broadcast television management efficiency [5]. Thus, digital audio technology plays a crucial role in broadcast television management.

3. Applications of Digital Audio Technology

3.1 Application of Digital Mixing Consoles

Mixing consoles are common equipment in broadcast television engineering sound reinforcement and audio-video recording. With ongoing technological development, digital mixing consoles have become one of the most widely used devices in broadcast television units, occupying a critical position. Traditional mixing consoles primarily used multi-circuit inputs to receive and optimize different sounds, but this approach was complex and yielded unsatisfactory results. Digital mixing consoles have improved this situation through simple operation, clear interfaces, and strong intuitiveness that facilitates staff mastery. Additionally, digital mixing consoles can utilize comprehensive digital recording interfaces for sound processing, fulfilling the functions of large-scale consoles and meeting the diverse, multi-level demands of broadcast television engineering.

3.2 Application of Digital Audio Embedding Technology

From a theoretical perspective, digital audio embedding technology utilizes appropriate tools to place audio-related information into broadcast television productions for post-production processing. For instance, current film and television programs in major stations all rely on audio embedding technology, which enables synchronous operation and mitigates deviation impacts [6-7]. Furthermore, this technology transforms audio signals into smaller components, allowing video signal fusion through reduced matrix levels for synchronous processing. This enhances signal transmission strength while simultaneously embedding audio and video output, saving time and resources, reducing losses, meeting public diversification needs, and minimizing errors.

3.3 Digital Audio Broadcasting

Digital audio broadcasting represents another major application of digital audio technology. Proposed based on the Eureka-147 plan and later standardized by the European Telecommunications Standards Institute, its primary objective is to deliver high-quality digital audio radio services to audiences. The United Kingdom pioneered a global transmission network to promote radio broadcasting nationwide, demonstrating that digital technology application can truly drive innovative development in broadcast television engineering.

3.4 Future Development of Digital Audio Technology

With China's societal development and rapid innovation in broadcast television engineering, digital audio technology has played a significant role in sound recording and post-production, improving program quality, reducing costs, enhancing efficiency, and leveraging its characteristics. Meanwhile, from another perspective, numerous deficiencies remain in China's current broadcast television engineering, necessitating strengthened digital audio technology application. However, the technology itself also requires analysis, and only by truly improving its existing defects can program quality and audio-visual effects be enhanced.

4. Conclusion

In summary, with China's continuous socio-economic development and scientific-technological transformation, broadcast television programs face increasing challenges, and broadcast television engineering confronts severe development trends. For China's broadcast television engineering, digital audio technology is a product of its time, capable of improving transmission mode problems and driving innovative development. Additionally, its application enhances program audio quality, providing richer audio enjoyment for the public. With ongoing broadcast television engineering development and effective improvement of digital audio and multi-channel technologies, the field has undergone significant changes. Only through genuine digital audio technology

integration can richer audio experiences be provided and true innovation and sustainable development of China's broadcast television be achieved.

References

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