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A Literature Review on the Audio Preservation of Jin Opera through Multi-Channel AR Design Tools

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Abstract

This study explores the research gap in the audio preservation of traditional Chinese Jin opera through the application of immersive interactive technology. Despite the adaptation of new performance and music styles in conventional Chinese opera, the use of multi-channel immersive technology for audio preservation remains unaddressed. This research investigates how such technology can enhance preservation methods and maintain audience engagement with traditional opera. Utilizing a dynamic microphone recording method with multiple stereo microphones, and creating an AR program via Unity, the study enables audience interaction with the music using mobile devices. Additional interactive tools like Kinect 2, Max/Msp, Logic Pro, and Protools will also be employed. The research introduces the Cognitive Theory of Multimedia Learning (CTML) and acoustic ecology (AC) to merge audience perception with musical expression, supporting the generation and transmission of traditional drama. This approach clearly differentiates between immersive interactive music and static music forms, providing a framework for innovative sound preservation in Jin opera theatre. The study cites various immersive interactive music productions to illustrate the dynamic microphone music production methods proposed.

Keywords: Audio Preservation, Chinese Jin Opera, Immersive Interactive Technology, Cognitive Theory of Multimedia Learning (CTML), Acoustic Ecology

Introduction

Preserving audio recordings, particularly those of traditional and cultural significance, has garnered significant attention in recent years. In recent years, the preservation of audio recordings, especially those of traditional and cultural significance, has attracted a great deal of attention, and Augmented Reality (AR) technology, as an emerging industry in this era, has a unique contribution to make in a variety of fields. In China, music industry practitioners have begun to progressively apply this technology to the audio preservation industry, and the technology is slowly becoming a promising tool for the preservation and dissemination of cultural heritage, including traditional music and performing arts. Canazza (2012) highlights

the importance of digital management in the preservation of ethnomusicological archives, emphasising the shift from mere preservation to active restoration of audio materials. 'All physical carriers can deteriorate and the information stored on them is bound to disappear.' Therefore, the transformation of historical information into digital signals would be an effective form, such as cylinders, shellac discs, tapes. (Canazza, 2012) This approach aligns with the potential of AR to not only maintain the integrity of historical records, but also increase their accessibility and immersion for future generations. The use of virtual reality (VR) in the preservation of traditional musical instruments such as the gamelan, where one learns about the original instrument through the use of a virtual instrument, suggesting that it is possible to apply a similar approach to Jin Opera using AR (SYUKUR, 2022). Schüller (2008) provides a comprehensive overview of the challenges and methods of preserving audiovisual research collections, highlighting the need for specialised technologies that AR might address. Orcalli (2001) provides an in-depth review of the various approaches to audio restoration, emphasising the importance of choosing appropriate techniques that respect the original integrity of the recordings while improving their audibility and minimising quality degradation. Together, these studies highlight the multifaceted nature of audio preservation and restoration, suggesting that AR technology can provide innovative solutions for preserving and experiencing traditional opera forms such as Jin opera by combining accurate audio restoration with immersive visual and interactive elements. Jin opera, a traditional Chinese performing art, represents a vital cultural heritage requiring meticulous audio preservation. As modern technologies advance, the methodologies employed in audio preservation have evolved, integrating sophisticated digital tools to enhance the quality and accessibility of preserved sounds.

This literature review focuses on the current state of audio preservation, emphasising the unique instruments used in the Jin Opera. It explores the application of Digital Audio Workstations (DAWs), Analog-to-Digital Converters (ADCs), and digital storage technologies in capturing and maintaining high-fidelity audio recordings. Additionally, the review delves into the role of Augmented Reality (AR) technologies in the preservation process, highlighting the innovative use of multi-channel AR design tools to create immersive and interactive preservation experiences. By examining the theoretical foundations and previous studies in the field, this review aims to provide a comprehensive overview of existing technologies and methodologies, sparking excitement about the future of preservation. It also identifies the challenges faced in audio preservation, particularly within the context of Chinese cultural heritage, and discusses the potential future directions for research and development, further fueling the audience's anticipation.

By critically analyzing the current literature, this review seeks to underscore the importance of integrating advanced digital and AR technologies in preserving Jin Opera, ensuring that this invaluable cultural legacy is maintained for future generations.

Present State of The Audio Preservation in the Worldwide

This study reviews critical musical works and related literature on preserving Jin opera music by present-day audio preservation techniques. In general, sound is preserved to create a complete, high-quality archive, which is a document that preserves the records of an organization or individual for legal purposes (Roper & Millar, 1999). The archiving of audiovisual documents is crucial, not only to preserve the records but also to perpetuate this

cultural tradition (Liew, 2019), and all of these efforts are made to preserve this set of traditions and culture and to contribute to their study by more practitioners in the future. That is essential to human life, philosophically, meaningful memories of the past are as important as conceptualizing the future. It is as vital as conceptualizing the possibilities of the future. Edmondson elaborates on these ideas: The concept of libraries, archives, and museums has its roots in antiquity. The accumulation of memories and their transmission from generation to generation have been the driving force behind the continued development of human society (Asmus, 2003; Svob, 2016; Edmondson, 2016). New technological forms of memory, sound recordings and moving images characterized the 20th century. The preservation and acquisition of memory now rely on a new discipline, and the philosophy and principles of audio-visual archiving, the philosophy and principles of archiving, and the philosophy and principles of preserving and sustaining this new type of memory are built upon them (Edmondson, 2004).

Furthermore, most collections of archival documents consist of historically and culturally significant materials identified by collectors and archivists at the time of collection. Edmondson and Schuursma (2002-2005) also point out that the importance of archives should be viewed in terms of how many archives a nation can make available in order to serve mankind. Audiovisual materials are no less important, and in some cases even more important, than other types of documents or artifacts (Edmondson, 2004). The relatively recent vintage of audiovisual documents, their often popular nature, and their susceptibility to rapidly changing technology do not diminish their importance. Their preservation and use should be resourced accordingly (Edmondson, 2004). Meanwhile, with regard to the national approach to organizing sound archives, Schuursma states: sound archives should strive to produce a general guide to the whole range of recorded sounds in their custody" (Schuursma, 2004).

The production of local music in audio carriers contributes positively to a region's economy. In addition to generating income through Jin opera, the artists and music practitioners also hope to pass on their culture by preserving such traditional music and culture. Unfortunately, not all audio products are high-quality sound recordings. In most cases, distortion and noise occur, especially when these recordings are taken out of the context of the instrument itself, resulting from recording Jin opera at a live performance, so the tapes are not seamless. In addition, with the development of computer technology and the advancement of AI technology, the audience does not seem to be satisfied with drawing knowledge through books, recordings, etc. Instead, people are beginning to learn with the help of technology such as through the internet, interactive screens and some ai tools. Museums in every city are prime examples, where people zero in on artefacts they couldn't access before through touch screens. Similarly, this is happening in music and even in Jin opera. Despite the seeming ubiquity of recordings in today's world and their arguably significant force in music preservation, musicians and musicologists rarely discuss the impact of the above practices on their careers. In the marketplace of the 21st century, recordings of "ethnic" instruments present a wide range of timbres determined by different music composition techniques.

In many cases, recordings of one instrument produce a variety of timbres. For example, the sound of the main instrument in Jin opera, the Huhu, is more like the erhu. Still, the sound of

the Huhu has more variations, such as beating, sliding, and other techniques, so more detailed work is necessary to preserve the sound of the instrument's different playing techniques in addition to the Huhu melody, not only by paying thorough attention to the sound components of the Huhu and their characteristics but also with the support of interactive technology, which allows the performer of the erhu to draw on the help of some interactive technologies to perform the instrument. In the last decade, it can be observed that, in most cases, existing recording products for local instruments, like flute, through effects processors and external devices (reverb units, expanders and gates, audio compressors, equalizers, equalizers) or by a producer who "simulates" environmental effects (reverb) to which sound effect samples are added. Producers superimpose sound effect samples to create a misleading impression on the listener, which is also valid with live performances. In the community of culture bearers, the final auditory effect on the audience is not "simulated" by the producer but somewhat subjectively asserted by the audience. Therefore, in the preservation of traditional instruments of Jin opera, music practitioners must ensure that the original sound has not been altered in any way, but also that with the support of immersive and interactive technology, the performers can play freely and that the audience can feel the charm of traditional Jin opera up close and learn from it. So, in the research, ensuring human subjectivity is a prerequisite. Therefore, it becomes more feasible in terms of technology for audio preservation.

Currently, most music researchers, in terms of audio preservation and conservation, use audio recording, and professional studios usually use DAWs such as Pro Tools HDX or Repear, capable of recording at a floating frequency of 192 kHz/32 bits (Avid Technology, 2023). This ultra-high resolution captures frequencies beyond human hearing (up to 96 kHz) and provides an extensive dynamic range (theoretically up to 1528 dB) (Watkinson, 2001). While not all of this information can be heard directly, it retains subtle harmonics and transients that can affect the perceived quality of the audio. While there may not be ultra-high frequency rates when recording Jin opera instruments, the reverb will have hard-to-capture frequencies. In addition, top-of-the-line analogue-to-digital converters, such as the Prism Sound ADA-8XR, use a sophisticated clock recovery system and proprietary algorithms (Prism Sound, 2023). These converters use multi-bit delta-sigma modulation and noise-shaping techniques to reduce distortion, often with parallel conversion paths. Some high-end ADCs, such as those from Lynx, offer user-switchable input transformers that provide subtle color selection while maintaining transparency (Lynx Studio Technology, 2023). One of the most important aspects of sound preservation is the microphone, as it is an important tool for capturing sound, and when recording, there are issues with microphone placement, which directly affects the quality of the sound recording. Sound is usually recorded using a) Multi-microphone arrays: Decca1 Tree technology uses a triangular array of three omnidirectional microphones, with additional microphones on the sides and back for orchestral recordings (Dickreiter et al., 2008). This technique produces a wide, natural stereo image with excellent mono compatibility. b) Binaural Recording: Besides simple head-fake systems, advanced binaural techniques use in-ear microphones on live subjects that consider the individual's Head

[1] Decca's role as a major classical record label was marked by new developments in recording technology: the emphasis on technological innovation (first with the development of full-range recording [ffrr] technology, then with the early use of stereo recording), and the introduction of long-playing discs.

Related Transfer Function (HRTF) for more accurate three-dimensional reproduction (Blauert, 1997). Reverberant Microphones: Higher-order ambient acoustic (HOA) systems, such as the Eigenmike EM32, use 32 capsules to capture up to fourth-order ambient sound, resulting in highly detailed spatial resolution in post-production. In addition to this, there is also Direct Input (DI) recording, a technique often used when recording electric guitars and basses. High-end DI boxes like the Radial JDI use Jensen transformers with metal shielding to suppress electromagnetic interference (Radial Engineering, 2023). Some devices, such as the Universal Audio OX, combine DI functionality with speaker load simulation and impulse response technology to capture the characteristics of an amplifier without the original sound (Universal Audio, 2023). After the sound is recorded, musicians use lossless audio formats. In addition to simple lossless compression, some studios archive using formats such as DSD[2] (Direct Digital Streaming) or MQA[3] (Mastering Quality Authentication). DSD employs 1-bit sampling at high sample rates (up to 11.2 MHz in DSD256), while MQA uses a complex folding technique to pack high-resolution audio into smaller files (MQA Ltd., 2018). As an analogue tape recording, modern analogue tape technology usually runs tape alongside digital recording. Some engineers use tape only for subtle compression and harmonic enhancement, printing the tape signal back into the digital realm. High-end recorders like the Studer A820 often feature customised headstocks and electronics to improve performance (Studer Professional Audio GmbH, 1990). When attempting audio preservation, audio workers consider room acoustic treatment; larger rooms have strong reverberation, but prolonged reverberation can muddy and fuzzy the sound. Therefore, the acoustic environment is also a top priority. Advanced room acoustic treatments go beyond elemental absorption and diffusion. Techniques such as Helmholtz resonators target specific problem frequencies, while Qrd4 (Quadratic-residue diffusors, secondary residual diffusers) diffusers provide scattering over a wide frequency range without removing energy from the room (Cox & D'Antonio, 2016). Some high-end recording studios, such as Blackbird Studios in Nashville, use various innovative treatment methods, including movable panels and resonance chambers, to adapt the room's sound characteristics to the needs of different recording sessions (Blackbird Studios, 2023). It should be noted that most traditional Chinese instruments are played in distinctive ways, necessitating recordists' specialized instrument knowledge to prevent recording issues. These approaches are designed to preserve the sound of traditional Chinese instruments and their inherent qualities to guarantee the accuracy and authenticity of the audio when it is passed down to the following generation.

[2] Direct Stream Digital (DSD) is a technology, patented by Sony and Philips, that uses pulse-density modulation (pulse-density modulation) coding to store audio signals on digital media, and this technology is applied to SACDs.

[3] Master Quality Authenticated (MQA) is a proprietary system for delivering high quality digital audio. The system includes audio signal processing, lossy audio compression and authentication.

[4] In architectural acoustics, diffusion is the uniform propagation of sound energy in a given environment. A perfectly diffuse sound space is one in which the reverberation time is the same at any listening position, whereas a quadratic residual diffuser can be designed to diffuse sound in one or both directions.

Present State of the Audio Preservation in China

China has a rich and diverse musical heritage, spanning thousands of years and encompassing various regional and ethnic traditions (Meng & Chuangprakhon, 2024). Preserving this invaluable sonic heritage has been a significant endeavor for the Chinese government, cultural institutions, and researchers (Zhu, 2020). Similarly, in recent years, there has been a growing recognition of the importance of sound and music preservation, leading to the implementation of various methods and initiatives (Nan, 2024). The first is archival preservation, and one of the primary methods employed in China for sound preservation is archival preservation (Howard, 2012). Several institutions, such as the China National Audio-Video Archives, the China Conservatory of Music, and provincial and municipal archives, have been actively collecting, cataloguing, and preserving traditional Chinese music audio recordings (Zhang & Li, 2019). These archives often rely on digitization processes, converting analogue recordings (e.g., vinyl records, tapes) into digital formats for long-term storage and accessibility (Yan & Zhang, 2023). The digitization process ensures the preservation of these recordings and facilitates their dissemination and research (Wang, 2021). The second is Field Recordings and Ethnomusicological Research. Recognizing the importance of documenting living musical traditions, Chinese researchers and ethnomusicologists have been actively engaged in field recordings and ethnographic studies (Oramas & Cornelis, 2012). These efforts aim to capture various musical genres' sonic and cultural aspects, including folk songs, instrumental music, and opera traditions (The Preservation of Opera as Intangible Heritage, 2017; Yiming, 2023; Leung & Leung, 2014). Field recordings preserve the sonic elements and document the associated cultural contexts, performance practices, and oral histories (Anderson & Byler, 2019). These recordings are often accompanied by detailed ethnographic notes, photographs, and videos, providing a comprehensive understanding of the musical traditions (Wang, 2021). The third is Intangible Cultural Heritage Initiatives. The Chinese government has implemented initiatives to safeguard and promote intangible cultural heritage, which includes traditional music and performing arts (Lixinski, 2013). The "National List of Intangible Cultural Heritage" and the "Representative List of the Intangible Cultural Heritage of Humanity" by UNESCO have recognized numerous Chinese musical traditions as valuable heritage (Webb, 2003). These initiatives involve documenting, preserving, and transmitting these musical traditions to future generations (Howard, 2012). This may include supporting the training of traditional musicians, organizing performances and festivals, and creating educational materials and resources (Zhou, 2022; Zhang et al., 2015).

One of the few most common ways to do this is through Community-Based Preservation Efforts. In addition to institutional efforts, there have been grassroots and community-based initiatives to preserve local and regional musical traditions (Zhang & Wu, 2023). These efforts often involve collaboration between local cultural organizations, musicians, and community members (Meng & Chuangprakhon, 2024). Such initiatives may include organizing workshops, performances, and educational programs to ensure the transmission of musical knowledge and skills to younger generations (Zou et al., 2024). They also emphasize documenting and preserving oral histories, performance practices, and contextual information related to musical traditions (Mei & Xiao, 2022; Howard, 2012; CASS, 2024).

Furthermore, the most widely used are Preservation through Education and Transmission (Ho, 2023). China has recognized the importance of preserving musical traditions through education and transmission. Several music conservatories and educational institutions offer

programs and courses focused on traditional Chinese music, training students in various genres, instruments, and performance practices (Chen, 2018).

Additionally, initiatives such as the "Living Human Treasures" program by UNESCO aim to recognize and support master musicians and practitioners, ensuring the transmission of their knowledge and skills to the next generation of artists and scholars (Webb, 2003). While these methods have contributed significantly to preserving China's sonic heritage, challenges remain (Wang, 2021). Factors such as urbanization, globalization, and the gradual decline of traditional musical practices threaten the continuity of these traditions (Jiang, 2022). Ongoing efforts, support from government and cultural institutions, and community engagement will ensure the long-term preservation and dissemination of China's rich musical heritage (Li, 2016).

It is important to note that this report provides an overview of the current state and methods of sound preservation in China, but the specific approaches and initiatives may vary across different regions, musical traditions, and institutions within the country (Li, 2016).

Present state of the Multi-channel AR Design Tools in China

The use of multi-channel AR design tools for preserving and disseminating cultural heritage, particularly traditional music and performing arts, is an emerging field in worldwide, same as in China. While the adoption of these technologies is still in its early stages, several institutions, research projects, and cultural organizations have begun exploring and implementing these innovative approaches.

Academic Research Projects

Recent years have witnessed a surge in academic institutions and research teams across China investigating the potential of multi-channel Augmented Reality (AR) design tools for preserving and experiencing traditional music and cultural heritage. These interdisciplinary projects often involve collaboration between researchers from diverse fields, including computer science, audiovisual technology, ethnomusicology, and cultural studies. The applications of these tools extend to various domains, such as immersive performances, Virtual Reality (VR) wearable devices, heritage restoration, and psychotherapy, all of which are early adopters of AR technology (Ibiş & Alp, 2023). In the realm of music performance, there is a wide range of ongoing explorations. A notable example is the Cultural Heritage Virtual Reality project, undertaken by researchers at Tsinghua University and the Beijing Dance Academy. This project aims to create immersive virtual reality experiences for the preservation and presentation of traditional Chinese dance and music performances (Y. Zhou et al., 2019; Mah et al., 2019). The researchers employed advanced motion capture technologies and spatial audio rendering techniques to recreate authentic performances in a virtual environment, allowing users to experience and interact with cultural heritage in unprecedented ways. Another significant initiative is the "Interactive Audiovisual Environments for the Preservation of Intangible Cultural Heritage" project, carried out by researchers at Zhejiang University (Isa et al., 2018). This project explores the use of multimodal technologies, including spatial audio rendering and 360-degree video capture, to create immersive experiences for the preservation and presentation of intangible cultural heritage, such as traditional music and handicrafts. The researchers utilized Ambi-sonic

recording approach and developed custom software for real-time audio spatialization, enhancing the sense of presence in the virtual environment.

These projects exemplify the growing trend of leveraging advanced technologies to safeguard and promote cultural heritage. By integrating cutting-edge AR and VR technologies with traditional cultural elements, researchers are not only preserving these art forms but also making them more accessible and engaging to modern audiences. The use of spatial audio, motion capture, and immersive visualization techniques allows for a more holistic and authentic representation of cultural performances, potentially revolutionizing the way we experience and interact with our cultural heritage (Colamatteo et al., 2024; Innocente et al., 2023; Bec et al., 2019).

Cultural Heritage Institutions and Museums

Cultural heritage institutions and museums across China have increasingly adopted cutting-edge immersive design tools in their exhibitions and educational programmes. These technologies provide visitors with engaging and interactive experiences that promote a deeper understanding and appreciation of traditional music and performing arts. Many institutions have implemented high-resolution displays and touch-sensitive screens where visitors can interact with digital representations of artefacts or examine them in close detail. For instance, the National Museum of China in Beijing has deployed ultra-high-definition 8K displays coupled with gesture recognition systems, allowing visitors to manipulate and explore 3D scans of delicate musical instruments without physical contact (Yang et al., 2024; Tong & Ma, 2021; Garlandini, 2021). Advanced audio systems are also being utilized to create immersive soundscapes. The Shanghai Museum, for example, employs a sophisticated spatial audio system using Wave Field Synthesis (WFS) technology. This system, comprising over 100 individually addressable speakers, allows for precise localization of sound sources in three-dimensional space, creating highly realistic acoustic environments that simulate traditional Chinese music and dance performances (Taylor, 2024). The museum also features immersive audio-visual installations that combine this spatial audio rendering with high-luminance laser projectors and interactive elements controlled by depth-sensing cameras. These installations create a multi-sensory environment that engages visitors on multiple levels (*Enhancing Museum Visitor Experiences Through Immersive Technologies - Draw & Code*, 2023; Shehade & Stylianou-Lambert, 2020). In terms of visual technologies, many institutions are leveraging augmented and virtual reality. The Palace Museum in Beijing has developed a comprehensive AR application that uses computer vision and SLAM[5] (Simultaneous Localization and Mapping) algorithms to overlay digital content onto physical exhibits. Visitors can use provided tablets or their own smartphones to access additional information, 3D models, and even virtual performances related to the museum's collections, including traditional music and performing arts (Palace Museum, 2022). Moreover, some museums are experimenting with more advanced immersive technologies. The Dunhuang Academy, for instance, has

[5] Simultaneous Localisation and Mapping (SLAM) is the computational problem of constructing or updating a map of an unknown environment while keeping track of the agent's position within it.SLAM algorithms are based on concepts of computational geometry and computer vision, and are used for robotic navigation, robotic mapping, and odometry for virtual or augmented reality. (*What Is SLAM (Simultaneous Localization and Mapping) – MATLAB & Simulink*, n.d.)

implemented a cave-automatic virtual environment (CAVE) system. This includes multiple stereoscopic projectors, motion tracking systems, and a spatial audio setup to create a fully immersive experience of the Mogao Caves, complete with recreations of ancient musical performances that once took place in these historical sites (Han et al., 2020).

These technological advancements not only enhance the visitor experience but also contribute to the preservation and documentation of intangible cultural heritage. By digitizing and recreating traditional performances in immersive environments, museums are ensuring that these cultural practices can be experienced and studied by future generations, even as the original practitioners may become fewer in number.

Conventional Music Works and Performances

While applying multi-channel Augmented Reality (AR) design tools to audio preservation technologies is still nascent, several pioneering projects and programmes have begun to explore this domain. A notable example is the Chinese Conservatory of Music's "Immersive Music Experience" project, which aims to recreate the sonic environment of ancient Chinese musical performances through advanced spatial audio rendering and immersive audiovisual installations (Narayan, 2021). This project utilizes a sophisticated higher-order Ambisonics (HOA) system, employing a 64-channel spherical microphone array for recording and a 32-speaker dome for playback. The system allows for highly accurate spatial reproduction of complex sound fields, enabling listeners to experience the nuanced acoustic properties of historical performance spaces (Liu et al., 2021). Additionally, the project incorporates real-time wave field synthesis (WFS) technology to create virtual sound sources, further enhancing the immersive experience. Traditional music groups and performers have also begun incorporating cutting-edge immersive design elements into their live performances. The Beijing Peking Opera Theatre (BPOT) has experimented with integrating spatial audio rendering and high-resolution projection mapping into its performances to enhance the audience experience (Bao et al., 2023; Lan, 2021). Their innovative approach employs a 128-channel line array system with beam-forming capabilities, allowing for precise control of sound localization and creating a three-dimensional auditory experience that complements the visual aspects of the performance (Bao et al., 2023). In Suzhou's Zhou Zhuang, digital technology has been harnessed to construct an immersive dreamscape spanning 900 years in the scenic performance "Only This Zhou Zhuang." This production utilizes a combination of 8K projection systems, holographic displays, and a network of strategically placed directional speakers to create a seamless blend of physical and virtual elements. The audience is enveloped in a 360-degree audiovisual environment, allowing for an unprecedented level of immersion in the historical narrative (Fan et al., 2022). A noteworthy development in this field is the application of artificial intelligence and machine learning algorithms to enhance the preservation and presentation of traditional music. Researchers at Tsinghua University have developed an AI-driven system that can analyze and recreate the timbral characteristics of ancient Chinese instruments based on limited historical data. This technology has been integrated into AR applications, allowing users to experience authentic recreations of historical performances through their mobile devices (Hong & Wu, 2021). While the use of multi-channel immersive design tools for the preservation and presentation of traditional music and cultural heritage is gaining momentum in China, it remains an evolving field that continues to be researched and developed. The examples provided in this report represent some of the current initiatives and projects, but the domain is rapidly advancing, and new

projects and applications are likely to emerge in the near future, keeping the audience engaged and eager to learn more.

As this field progresses, researchers and practitioners increasingly focus on integrating haptic feedback systems and olfactory displays to create truly multi-sensory immersive experiences. These developments promise to revolutionize further how we preserve, present, and interact with traditional music and cultural heritage (Marto et al., 2018).

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