Research Direction

From Performance Techniques to Electroacoustic Expression: The Design and Exploration of a Real-Time Interactive Performance System for the Zhongruan

1. Background and Research Focus

The zhongruan is a traditional Chinese plucked string instrument with a circular resonating body and four strings. It is characterised by a mellow timbre (Wang Bei, 2022). The zhongruan has long occupied a relatively marginal position in public awareness. In recent years, it has gained wider public visibility (Center for Chinese Music and Culture, n.d.).

Existing research on the zhongruan has largely focused on established performance techniques and the analysis of musical works (Feng Zining, 2026). Systematic academic investigation into the zhongruan's integration with electronic music remains relatively limited (Wang Bei, 2022). Moreover, most previous works combining the instrument with electronic music technologies have used general-purpose electronic tools for sound processing and performance (Wang Bei, 2022). However, the interaction methods provided by these tools may not fully accommodate the zhongruan's performance characteristics (Wang Bei, 2022). Developing real-time interaction mechanisms compatible with established ways of playing the zhongruan therefore deserves further exploration.

As a sound producer with ten years of zhongruan performance experience, five years of part-time work as a backstage sound technician, and one year of research experience at NOVARS, the University of Manchester, I bring practical knowledge of both instrumental performance and sound production. Building on this background, the research proposes to design, develop and evaluate a real-time interactive electroacoustic performance system customised for the zhongruan.

2. Research Questions and Corresponding Methods

The research will address three core questions: (1) Which sound and movement features associated with established zhongruan performance techniques can be used for real-time interaction? (2) How can established zhongruan performance techniques and body movements be translated into real-time sound processing and spatialisation control? (3) Can the system support performers in shaping electronic sound and its spatial expression naturally, without a noticeable increase in operational burden during performance?

To address these questions, the research will combine performance literature, performer interviews, my own performance practice and reflective documentation with sound and movement recordings to identify features suitable for real-time control. Iterative prototyping and creative musical practice will explore and refine mappings to sound processing and spatialisation. Technical testing and evaluation based primarily on performer feedback will assess real-time responsiveness, expressive potential and operational burden.

3. Expected Contributions

The expected research outcomes will include an evaluated prototype of a real-time interactive electroacoustic performance system for the zhongruan, a set of interactive electroacoustic performance works, and a written research report documenting the development, creative and evaluation processes. Through system design and musical practice, the research will explore mappings from zhongruan performance techniques and bodily movements to electronic sound processing and spatialisation. It will analyse how different mappings support musical expression and how real-time interaction affects performers' operational burden and their experience of controlling sound.

Building on this work, the study aims to formulate interaction design principles suited to the zhongruan's performance characteristics and clarify the potential and limitations of sound and movement features for real-time control, offering methodological guidance for combining traditional plucked string instruments with electronic music technologies. The works will also form part of the research, demonstrating how these interactive relationships contribute to the formation of musical structure in specific musical contexts and extending the zhongruan's boundaries within contemporary electroacoustic performance.

Key References

Center for Chinese Music and Culture, Middle Tennessee State University. (n.d.). Instrument gallery ("Ruan" section). (Accessed 13 October 2026).

Feng, Zining. (2026). Artistic characteristics and performance interpretation of the ruan solo "Under the Grape Trellis". Home Drama, (16), 124–127.

Wang, Bei. (2022). Exploration and practice of combining electronic music with the zhongruan: A case study of the work "Ruan Xian" [Master's thesis, Central Conservatory of Music].