

PhoeniX - Mixed Reality Performance for Dance and Viola

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ABSTRACT

The *PhoeniX* project adopts interactive audio-visual system with mixed reality, motion tracking, music information retrieval and soundscape composition to create collaborative interactive art making immersive experience for enhancing human connection and avoid isolation. The work took reference from two artists, Robert Wechsler and Kay He.

Robert Wechsler developed camera-based motion tracking systems[1][2][3][4][5] for people with cerebral palsy, motor disabilities and/or autism to create real-time music from motions and gestures. His works are opened to a wide range of performers/users to freely experience therapeutic art making process, and this research has more scientific implications. (Yuan Yuan) Kay He is a well-established composer and multimedia artist who created mesmerizing interactive audio-visual works with motion tracking for artistic purpose¹². One of her works, *Breath of the Soul* creates motion-tracking immersive experience with huge screen projections at the back. Although both of their works have different implications, these examples offer opportunities for human connecting to themselves and their environment.

The theme of NIME2023 is Frugal Music Innovation and I use a low-cost and transportation-friendly Artificial Intelligence (AI) motion tracking system to create extended reality performance. The system is open-sourced and can be applied to different computer system. The work, *PhoeniX*, encourages everyone who is undergoing hardship in life and metaphorically transcend to becoming Phoenix, who is gifted new life and meaning by reincarnating from the ashes and flame. The mixed reality performance showcases the artistic performance of both dancer and violist in front of an interactive visual system.

The extended reality project portrays the reincarnation process of the Phoenix that addresses destruction, recreation, and the ambivalent nature of good and evil. The dancer acting as the Phoenix undergoes an everlasting cycle of birth, death, and rebirth. The dancer herself, as the an-

tagonist and protagonist of the story, expresses the pulling and pushing forces of the dilemma.

Guided improvisation of live viola music and dance performance combines with the exploration of virtual worlds within background narratives, where music and movement interact in real-time with digital and sonic environments. The story of the Phoenix is illustrated by the collaboration between a violist and dancer who navigate the exploration and interaction in a virtual world through timepoint events alongside with tailor-made soundscapes that accentuate the moods and themes. Their collaboration is the catalyst for controlling the story and its characters, actions, and environments.

The portrayal of the story starts in a dark void, rain and chaotic lightning. Upon the start of the dance and music, it triggers the creation of particles, objects, and humanoid creatures in different worlds, which include hell (fire, lava, and damned souls) and heaven (peacefulness, meadow with creek and flowers, heavenly creatures) environments. They visit and alternate between different environments, in each one of them they face some challenges related to sound and movement, amongst the eternal fight of good versus evil.

The system is audio-visual interactive. It sends live music and camera data to Unreal Engine, and converts them to diversified visual effects. A contact microphone on the viola captured the audio signal and run through a Music Information Retrieval system in Max, sending the analyzed data to Unreal Engine to control the movements, direction, speed and density of the background lava and flower pedal particle effects. The dance performance was captured by an AI motion tracking system through a phone camera. The datapoints were used to control the characters in Unreal Engine and perform gesture recognition. Different gestures trigger different visual effects, such as change of particle colors and movement of particles around the characters.

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¹<https://youtu.be/WePrrJIh0GA>

²<https://youtu.be/tx5kvPIL1h4>



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such as change of particle colors and movement of particles around the characters.

The following picture shows the staging of the project:



Figure 1: Rehearsal and staging of *Phoenix*

Author Keywords

Mixed Reality, motion tracking, artificial intelligence, interactive arts, electronic music, soundscape

CCS Concepts

•Human-centered computing → Artificial Intelligence (AI) motion tracking; •Applied computing → Sound and music computing; Performing arts;

1. MEDIA LINKS

The first video is the proposed Phoenix project, while the second video uses the same performance system with different groups of dancers.

- Video: <https://youtu.be/1t2Fwtw9ICk>
 - Video: <https://youtu.be/KDwly9Zt0F0>
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2. ETHICAL STANDARDS

The principles of ethical and professional conduct have been followed in the research project. The research does not involve sources of funding, human participants and animals.

3. REFERENCES

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