The music researchers time travelling through sound

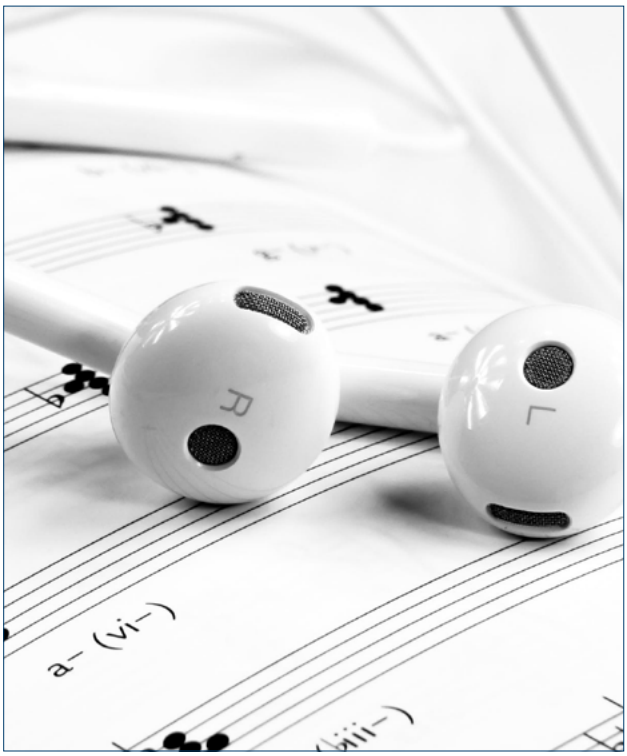
Dr James Cook and Dr Kenny McAlpine's collaboration with Historic Environment Scotland connects listeners with history and paves the way for virtual reality performance.

Imagine being in the crowd during Jimi Hendrix's legendary 1969 Woodstock set or watching a choir perform for Scotland's King James IV in the 16th-century. Time travelling through the history of music is now a real possibility, thanks to an innovative collaboration between The University of Edinburgh, The Melbourne Conservatorium of Music, Historic Environment Scotland and digital restoration experts Soluis Heritage.

Space, Place, Sound and Memory uses cutting-edge visual and acoustic modelling technology and new recordings to recreate performances of Medieval and Renaissance music in virtual reality (VR). Wearing VR headsets, visitors to Linlithgow Palace's Chapel Royal and Edinburgh's **St Cecilia's Hall** can experience concerts as they would have looked and sounded hundreds of years ago.

The project is the brainchild of Edinburgh Medieval and Renaissance music researcher, Dr James Cook and Melbourne-based composer and researcher, Dr Kenny McAlpine. James believes it offers a unique perspective on the past.

"Music is a vital part of being human. Live performance can connect us to our surroundings and each other in a way recordings can't. But people tend to forget that this kind



of experience existed in the past", he explains. "Contemporary concerts and recordings by groups such as **The Binchois Consort** expertly capture the sound of early music, but they cannot recreate the sense of presence audiences would have felt hearing them in their original setting. Using the latest VR technologies, we can give modern listeners a window into history."

Kenny says the idea for the collaboration began with a conversation at a conference. "We found it amusing were probably the only two people in the room who shared a passion for both video games and early music", he recalls. "We began talking about using similar digital technology to introduce people to repertoires they wouldn't otherwise hear."

When the **Arts & Humanities Research Council (AHRC)** issued a funding call for projects using technology to connect with new audiences, James and Kenny seized the opportunity and asked Historic Environment Scotland to collaborate.

They worked with the **Knowledge Exchange and Impact** team to secure external funding

and brought research associate Rod Selfridge on board. James believes the combination of skills was invaluable to balance the technical requirements and artistic ambitions of the complex undertaking. “Historic Environment Scotland saw the value of the concept from day one and brought an enormous amount of knowledge about how the landmarks looked in the past”, he says. “Its digital heritage team carried out the specialist LIDAR (Light Detection and Ranging) laser scanning to map Linlithgow Palace’s Chapel Royal. They were also constantly on hand to support Rod and complement his software engineering expertise to build digital models of the spaces.”

However, the project ran into early difficulties when the relationship with the first VR company appointed by the team broke down. “It became clear quite quickly there were some misaligned priorities, and they couldn’t deliver what we needed”, notes James. “It was touch and go after we parted ways. However, as soon as we found **Soluis,** things moved on at a pace.”

The Glasgow-based digital heritage developers used Rod’s 3D models to build interactive, immersive reproductions of the Chapel Royal and St Cecilia’s Hall. James and the team measured both venues’ current acoustic qualities and combined these with estimates of their original dimensions to develop historically accurate simulations of their acoustics, and the sonic properties of the materials that once occupied the spaces.

The most significant challenge proved to be physical rather than technical: “The only way to overlay music on to a simulated acoustic is to record it in an environment with no sound of its own. We used an anechoic chamber, a specially designed room which produces no echo”, explains James. “But it was tough. You could hear the blood in your ears, and it was difficult to tune. The chamber could also feel very cramped and claustrophobic.”

Not only do the tracks they recorded fit seamlessly with the two virtual recreations of the venues, but the pioneering approach has also paved the way for the first classical music record produced entirely in virtual reality. The Binchois Consort’s new album will include an app that allows users to experience the music as if it were performed live in immersive recreations of iconic venues such as the Royal Albert Hall. Kenny is excited about the potential to use the technology in other ways in the future. “Imagine playing with the Beatles at a life-like simulation of the Cavern Club or performing at a virtual Sydney Opera House”, he enthuses. “As well as opening up a whole new world of music gaming, it could also allow professional musicians to road test spaces before they play, or even help them deal with performance anxiety.”

The project has also unearthed new evidence which could radically change the perception of Scottish Renaissance music, and James has already published a paper and written a book chapter. To colleagues considering similar collaborations, he has just one piece of advice. “Get some funding, find some kindred spirits and test new things. Even a failed attempt can create new knowledge and have a huge impact on your development personally and professionally.”

Developed in collaboration by:

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