Novel Human Computer Interaction Development

Dr Bruce Wiggins, Michael Brown, Kristian Lane, Alex Gibbins
School of Technology

email: b.j.wiggins@derby.ac.uk
telephone: 01332 593157

UNIVERSITY of DERBY

LEARNING TEACHING & ASSESSMENT CONFERENCE

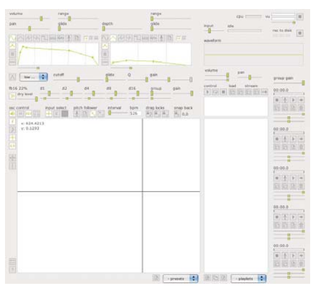
Project Outline

Following the recent success of the Multi-media Applications project 'Wii are the Music makers' (http://www.derby.ac.uk/press-office/news-archive/wii-are-the-music-makers) which resulted in local news and radio coverage along with a stand prepared for the 'NanoWhat' event (http://www.nanowhat.co.uk/), this TIR projects aim is to both develop novel human computer interfaces and embed this work both into performance (the use of) and technical modules (the development of) using cheap, readily available materials which will allow more intuitive control of audio and lighting/show control software (such as Wii controllers, mobile phones and web cams, for example).

This work ties in to the three previous TIR bids entitled 'SPARG True Multi-Channel Mixing' as the plug-ins developed for this project will be among the software tools that can be controlled using this hardware, and the project will be documented on the pre-existing Wiki site (http://uod-true-multi-channel-mixing.wikispaces.com/) by traditional write-up and screencasting and streaming video/audio.

The learning material is case study based, with each team member carrying out a project to develop and document an application of Human Computer Interface technology. For this poster, two of these case studies will be detailed.

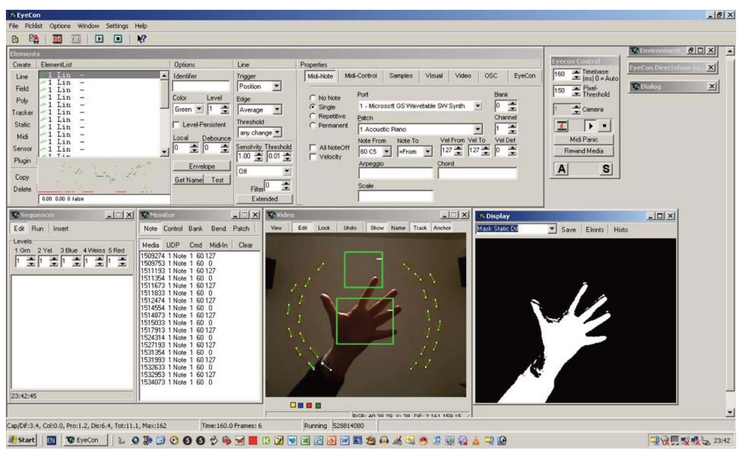
II - Michael Brown
Gestural Control of Musical Parameters using a Webcam and Gaming Controllers



In this case study, Michael Brown created a multi-channel composition using a webcam to capture movement and trigger audio clips/samples, along with a drawing tablet and a 3D Connexion Space Navigator. This case study has also been presented at Forum for Innovation in Music Production and Composition (FIMPaC) at Leeds College of Music, February, 2009:

"…I was drawn to collecting images as well as sound because of my early interest in Art, in particular three-dimensional Art and I wanted to create a time-based environment in which the images would form a collaborative narrative structure. I imagined the eventual product to be an interactive installation that incorporated motion capture technology using the programs EyeCon (http://eyecon.palindrome.de/) and Isadora (http://troikatronix.com/isadora.html) to trigger and manipulate audio visual material (related samples that could be sequenced to make meaningful gestures) over distributed speakers and multiple visual projectors.

Samples are prepared and associated with locations within the performance/display space. A static image of the performance space, or an area of the performance space, is captured and regions identified; some are specifically located to pick up precise movement in a 'line', others to pick up amount of movement in a localized 'field'. The result of this movement can trigger MIDI, samples, images or send OSC messages to trigger other events.



The environment was imagined to be perceived as sonically serene, church-like, when viewed from the outside with back-lighted projections through stained-glass like transparencies. There would also be an underlying ambient texture reflecting a personal statement of stasis that evolves in the absence of interactive interference; this also provides a foundation from which to measure the interactive additions. This is achieved through a loop-based tonally static (E minor) ambient structure, consisting primarily of multi-sampled single note electric guitar 'swells' distributed over the ambisonics array at fixed locations (N, NE, E, SE, S, SW, W, NW) forming an E minor chord through a series of progressive related gestures; a twelve-second loop evolves with the low note at the N position, progressively unfolding the higher notes through to the NW position. Motion interaction inside the performance space is intended to cause dissonant disturbances that bring home insights into the reality of the source environment which may not be known to the participants. This version of the presentation is a static mixdown (assembled in Apple Logic Studio but spatialised within Cockos Reaper), that includes the ambient background texture and the collected sound disturbances sequenced to create a three stage A-B-A experience with most of the dissonant disturbances at B…"

Remote Control of Audio Placement using a Mobile Phone – Dr Bruce Wiggins

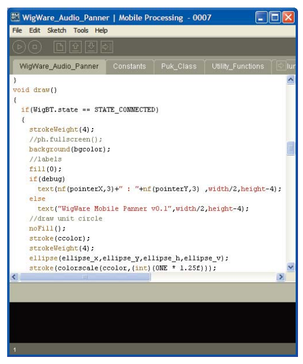
In this case study, a mobile phone was used to control the position and volume of audio sources within a musical piece. Some of this work was also presented at Forum for Innovation in Music Production and Composition (FIMPaC) at Leeds College of Music, February, 2009.

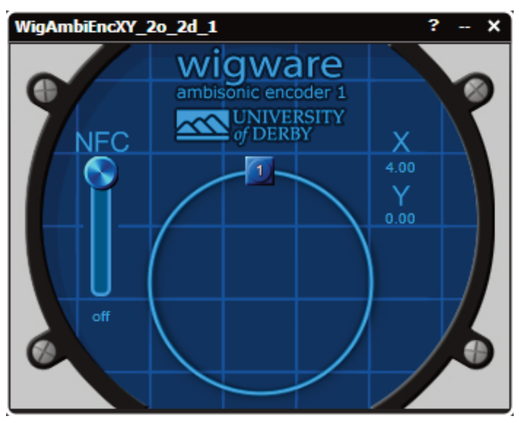
The application is made up of the following sections:

- Touch Screen aware mobile phone application written in Java (using Mobile Processing - http://mobile.processing.org/) showing graphical user interface of audio sources.
- This phone application communicates with a PC using Bluetooth, passing the positional and volume values wirelessly.

Bluetooth™

- The PC is also running a custom Java application (written using processing – http://processing.org) which passes that data, via Open Sound Control (http://opensoundcontrol.org/) to an audio application called Plogue Bidule (http://www.plogue.com/) which hosts the WigWare, University of Derby, Ambisonic plug-ins which actually affect the audio.





This system allows multiple users to interact with the audio performance/ installation in numerous ways using technology that they, invariably, already own. It could be used to allow the audience to control aspects of position and level of elements of a performance (as in this example) or allow them to steer the musical direction of a composition that they are listening to in some meaningful way, or other, as yet, untried applications, all using a human computer interface that they are already familiar with.

Outcomes of the Project

Four case studies have been realised, although the packaging of these for the students using screen casts and on-line resources is still in progress.

Benefits for Students

- Students get access to cutting edge learning resources showing how to use relatively cheap technology in a way that enables more intuitive control of various parameters.
- This work can be utilised by the performer, composer, technician or audience member depending on the parameters that are to be controlled, and is relevant across all of our sound and light biased degree courses.

Benefits for Staff

- Many new skills have been mastered through-out this TIR which, by its very nature, has created bespoke, and previously untried, systems for controlling the attributes of a performance.
- Staff get access to the same learning resources which can be utilised in their own projects.
- The flexible nature of the systems developed makes cross-school and faculty use extremely likely (for interactive art installations, for example).

Benefits for the University

- Some of the techniques pioneered for this project are likely to lead to greater short course provision, generating income for the University.
- Michael Brown and Dr Bruce Wiggins have already presented this work at Forum for Innovation in Music Production and Composition (FIMPaC) at Leeds College of Music, February, 2009 (http://www.lcm.ac.uk/research-conference/FIMPaC.htm), generating good exposure for the University and much interest externally. Both have been invited to contribute to the upcoming N Point 1 symposium on the strength of this work.
- Following on from the success of the 'Wii are the Music Makers' event, feeding this material down to students should generate more television, radio and newspaper exposure for the University.