

AHRC ICT Methods Network Conference Panel

ADVANCED TECHNOLOGIES FOR COLLABORATIVE PERFORMANCE

CAMBRIDGE UNIVERSITY AND ANGLIA RUSKIN UNIVERSITY, 20- 21 DECEMBER 2006

Report by Alan Blackwell, CRASSH, University of Cambridge

Overview

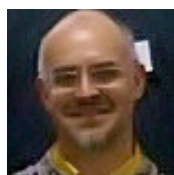
The aim of this workshop was to train practice-based researchers in the performing arts to make better use of ICT technologies that support live collaboration in performance situations. The workshop leaders were Julio D'Escrivan and Richard Hoadley of Anglia Ruskin University; Ian Cross of the Cambridge University Centre for Music and Science; and Alan Blackwell of the Crucible network for Research in Interdisciplinary Design.

The workshop was based in the recently-upgraded music technology teaching facility at Anglia Ruskin University, which contained two group studios each equipped with nine G5 dual-processor Macintoshes. Collaborative facilities included networked sound processing with studio monitors, local MIDI keyboards and audio processors on each workstation, shared headphones for pair work, and central video projection facilities.

The workshop was structured to include a range of participants including technical specialists in the use of SuperCollider and Max/MSP, professional exponents of mixed genre performance and a small selection of practitioners from other performance genres such as poetry, live video art and others. Participants were provided at the start of the day with a broad range of inexpensive sensors, and a short hands-on introduction to the process of interfacing these to performance software such as SuperCollider. The workshop was then be divided into mixed discipline teams for hands-on development and instruction, ensuring that programmers did not 'race ahead' of performing collaborators. In the course of the day, the whole group shared experiences during unstructured breaks, with a structured sharing of experiences in the final session. Throughout the day, work in progress was captured and shared by facilitators moving from team to team. The overall ambition was to emulate a 'collaboration masterclass' as the most appropriate model for practice-based research workshops applying technology in the performing arts.

People

There were a wide variety of backgrounds and roles for those attending the workshop, with candidates representing cultures and music across the globe. Everyone brought a fresh perspective on musical collaboration and technology and a wealth of experience in many composition and performance techniques and technologies...



Alan Blackwell ORGANIZER / OBSERVER

Crucible Centre for Research in Interdisciplinary Design / Computer Laboratory, University of Cambridge

Alan's long and distinguished career in academic and industrial research has taken in many seemingly diverse fields, including computer science, music, psychology, religion and medieval history. From his

current base in the Computer Laboratory at Cambridge, he has recently been attempting to bring them together, and encourage work in interdisciplinary subjects, through Crucible. He saw the workshop as an opportunity to explore practice-based research and bring both similar and differing minds together to collaborate on a meeting of music and technology. Alan, in his role as organizer, also looked forward to honing his skills as a facilitator.



Simon Blackmore PARTICIPANT

Exhibiting / Performing Artist

Simon has had several years experience integrating micro-controllers and other electronics into installations and musical performances, and has used SuperCollider on many occasions. He has worked with children in educational environments and is eager to adapt non-musical objects for use in video and music art. He would also like to see a move from the loop- and sample-based aesthetic of modern electronica to an approach more akin to re-orchestration. His goal at the workshop was to investigate what activities other people in the field were (and, critically, weren't) working on.



Nick Collins ORGANIZER / PARTICIPANT

Lecturer in Music Informatics, Department of Informatics, University of Sussex

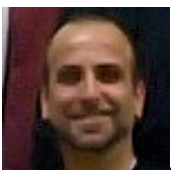
Having recently completed his PhD, Nick brings his considerable experience in live computer music to the workshop. His knowledge extends to both audio and video, specialising in SuperCollider, for which he has developed several machine listening plugins. He also has interests in algorithmic composition, psychoacoustics, beat tracking and is, himself, a live performer and SuperCollider plug-in coder.



Jason Dixon PARTICIPANT

Live Performer / Composer / PhD Student, University of East Anglia (UEA)

Jason is an Irish Composer, currently studying for a PhD in composition in Norwich, England. Previously at the Sonic Arts Research Centre (SARC) in Belfast, he has significant performance experience using electronics and music technology. His aim at the workshop was to define his artistic focus and also build a network of contacts to collaborate with on future works.



Julio d'Escrivan ORGANIZER / PARTICIPANT

Senior Lecturer in Music Technology, Department of Music, Anglia Ruskin University (ARU)

Originally from Venezuela and now a Pathway Leader at ARU, Julio has significant experience in music technology and is an expert in electro-acoustic composition. As such, he has a considerable knowledge of SuperCollider and Max/MSP. He has written for TV and games - in the latter, specialising in interactive music, or music 'with a goal'. In addition to his role as host and organizer of the event, he was very interested to learn and draw inspiration from what others are doing in the field.



Jamie Forth PARTICIPANT

PhD Student in Composition, Royal College of Music (RCM)

Representing the Royal College of Music, Jamie's studies in composition take him beyond the normal role of practising composer and have involved him in informatics and the development of music systems, for performance, improvisation and live coding. Admitting that he has not yet delved deeply into live performance himself, he is eager to move into this area and explore what technology has to offer in this regard. He has much experience in SuperCollider and is looking for to extending and sharing this at the workshop. He was also interested to find out what strategies and paradigms are in use for musical instrument and interface design.



Iris Garrelfs PARTICIPANT

Exhibiting / Performing Artist

Iris is a popular, prolific and celebrated professional performing artist and composer on the London electro-acoustic scene, who has collaborated with many other artists throughout the world. Her aesthetic draws from not only more-earnest (or ernste) electro-acoustic styles, but also more popular modern music. She has much experience in using technology in performance and installation work, including realtime sound processing with Max/MSP, but limited experience with SuperCollider and interactive computer music methods such as live coding. At this workshop, she is interested to explore how her interaction with the computer might be improved in live performance.



Owen Green PARTICIPANT

PhD Student in Music, City University (London)

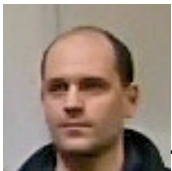
Owen's current studies in composition centre around dynamic, long-term collaborative endeavours. A specific focus of his is to expand the scope for improvisation in established popular music fields, such as hip-hop. He is hopeful that the answer lies in technology, with technologies such as Max/MSP, which he has been exploring for several years now. At the workshop, he was looking for further collaborations and hoped to expand his experience of SuperCollider and the use of micro-controllers.



Neil Grindley ORGANIZER / OBSERVER

AHRC ICT Methods Network

Neil represented the AHRC ICT Methods Network, with whose invaluable assistance the workshop was made possible. He has significant experience of organising, pioneering and supporting similar projects for the Arts and Humanities Research Council (AHRC), designed to foster creativity and originality between disciplines. Although he has past experience with musical collaborations, the format for this workshop is something new. Neil was very interested to see how people get along and how the endeavour might become a model for future events.



Tom Hall PARTICIPANT / SUPPORT

Senior Lecturer in Music Technology, Department of Music, Anglia Ruskin University (ARU)

As well as lecturing at ARU, who hosted the event, Tom is an active composer and performer of electro-acoustic music, and researcher in the fields of algorithmic composition, sonification and multimedia work. He brings his musical and technological experience to the workshop, and also his invaluable inside knowledge of the equipment and facilities at ARU.



Alex Harker PARTICIPANT

PhD Student in Composition, Department of Music, University of York

Currently based in York, Alex's composition studies take in elements of both the acoustic and electro-acoustic. His aesthetic centres around contemporary classical, and he is eager to exploit the possibilities that electronics afford in this genre, especially in the case of live performance and improvisation. With a deep knowledge of Max/MSP, he has on occasion delved into C programming, but is interested to extend his experience of working with electronics, sensors and micro-controllers. In addition, he saw the workshop as an opportunity to see how people combine different technologies, such as Max/MSP, SuperCollider and hardware.

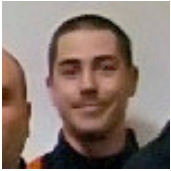


Richard Hoadley ORGANISER / PARTICIPANT

Senior Lecturer in Music Technology, Department of Music, Anglia Ruskin University (ARU)

A lecturer and researcher at ARU, Richard's interests lie equally in performance, composition and the supporting technologies. He is especially interested in fostering technologies and interfaces that allow for spontaneity and originality in musical practices, and ensure that the influx of technology use does not negatively impact how enjoyable music is. Helping to organise and host the event, Richard was keen to

see where the field is at in terms of technology and musical aesthetic, and see how people use the tools available.



Paul Jones PARTICIPANT

Student in Audio and Creative Music Technology, Department of Music, Anglia Ruskin University (ARU)

Formerly a DJ, Paul has been using technology in musical performance for a number of years. He has a working knowledge of both audio and video processing in Max/MSP, Jitter and SuperCollider, often using the tools in combination. His current interest is in the use of electronics and technology to improve musical interfaces for performance. At the workshop, he looked forward to extending his knowledge of music software (notably SuperCollider) and hardware, and developing skills that would allow him to collaborate on future projects.



Jin Hyun Kim PARTICIPANT

Researcher, Department of Systematic Musicology, University of Cologne (Köln)

Arriving from Cologne, Kim's interests give her a different perspective on the field. Her research focuses on interaction in music, specifically the gestural aspects of coupling sound and movement, but she states that her approach has been more theoretical than practical to date, only touching on technologies like Max/MSP and SuperCollider. As such, she saw the workshop as an opportunity to experience musical interactions first hand, and also exchange views on artistic, technological scientific, psychological and philosophical aspects of physical interaction in music.



Andrew Lovett PARTICIPANT / PERFORMER

Pianist / Composer

As a composer, Andrew has been studying and practising for years, oscillating between Cambridge and London. From his background as a pianist, he grew an increasing interest in all forms of music technology, recently culminating in his first major opera, *Abraham On Trial*, in 2005, which used both audio and video technologies and included well over 1000 different sounds in the score. In addition to his considerable compositional experience, Andrew was able to bring a performers perspective to the workshop. For him, the event provided insights into alternative ways of working with electronics in music.



Anton Lukoszevieze PARTICIPANT / PERFORMER

Cellist / Composer / Photographer

A popular and renowned performer, Anton's main focus is the cello, but his passions extend further. He is a celebrated video and sound artist, talented photographer, and the subject of Jayne Parkers 2005 film, FoxFire Eins. His aesthetic tends toward acoustic and analogue methods, but not necessarily using conventional methods. The workshop, for him, was an opportunity to see how people used technology in artistic endeavours and work with artists of differing, yet complimentary aesthetics.



Chris Nash RECORDER / OBSERVER / SUPPORT

PhD Student in Music HCI, Computer Laboratory and Faculty of Music, University of Cambridge

Chris's background began in computers, but an enduring passion for music lead to the combination of music and technology in both his professional and academic pursuits. Through his own efforts in computer music and his experience of writing software for others, he has developed a specific interest in the interfaces of music software, and is currently researching ways to improve the spontaneity and dynamism of computer-based composition tools. To this end, one of his goals at the workshop was to see how musicians and people from different backgrounds used existing software and, specifically, how expertise in such software develops.



Rui Penha PARTICIPANT

PhD Student in Music, Department of Communication and Art, University of Aveiro (Portugal)

Rui's studies in composition focus on the electro-acoustic, going slightly beyond the remit of his more traditionally-oriented institute. As such, his considerable experience with music technology (including Max/MSP) is self-taught. He is eager to unite all creative minds in collaborative exercises - acoustic, electro-acoustic, electronic, young, old, etc. - and sees technology as the key to this goal. His objective at the workshop was to become more familiar with technologies that afforded collaboration, such as SuperCollider, and share knowledge with others.



Dan Tidhar PARTICIPANT

Harpsichordist / Post-doctoral Researcher in Computational Linguistics, University of Cambridge

With an extensive and varied background in music and technology, Dan's current focus is information retrieval in music systems, with a view to using the computer as performer. A harpsichordist himself, Dan is keen to integrate art and technology, often combining his passions for baroque music and computing. To this end, he has experience of numerous technologies, including Max/MSP and Jitter, but is looking forward to learning more about the role of SuperCollider in performance, and its use in combination with other technologies.

Projects

On the first day, participants met to get to know each other, talk about their expertise and backgrounds and establish directions and goals to pursue on the coming workshop day. Several participants had worked with each other before; some tended towards artistic perspective, others towards the more technical; and each candidate had experience and knowledge of different technologies to varying degrees. As such, participants were broken into three groups with which to collaborate with respect to their background and interest. Efforts were made so that each group had similar goals, but varied experience and perspectives.

Technologies and equipment were available from several sources. In addition to the facilities available at ARU, many participants brought their own software and hardware. A large variety of sensors, micro-controllers and interface circuitry boards were available to be used with each participant's own Apple Macintosh laptop. These were at times linked with other more traditional acoustic instrument, belonging to the department and musicians, including a cello, harpsichord and (most of) a piano. Combining so many diverse technologies, some technical problems had to be expected, but aside from occasional computer glitches, difficulties were minimal and participants were quick to adapt.

The workshop day was divided into several sessions and each group proceeded with a similar methodology, for each session: set-up hardware, experiment with different combinations of hardware and software, establish a goal and realise it. The objective of the day wasn't to produce a polished concert or market-ready interaction tool, but to explore the possibilities of collaboration. As such, the fruits of the participants' labours came in the form of small presentations during the scheduled breaks, where a group would demonstrate and explain their ideas.

Some projects built on the previous work of candidates, utilizing software plug-ins or hardware of their own design. In several cases, it is expected that the collaborations and working relationships here will, in turn, fuel future projects...

Project 1 : "A Little Light Music"

Simon Blackmore, Jason Dixon, Richard Hoadley, Paul Jones, Anton Ludoszevieze

Lit by computer screens, ARU's darkened computer room was the venue for the workshop's son et lumière. The project, building on Paul's previous experience with video tracking, placed Anton centre-stage with his cello. In his hand, he clasped both the bow (a custom design, crafted for greater friction and thicker sonic textures) and a glow ball. A few feet away, a computer recorded and processed both the sound and the image. A firewire camera tracked the different coloured light of the balls and used it to control different elements of the sound processing, with, for example, the ball's vertical height affecting the volume, pitch, etc. of the recorded acoustic sound. Similarly, experiments were made using the sound to drive its own manipulation - such as detecting the recorded pitch and using it to re-synthesize the recording at an inversely proportional frequency, and then layering it with the original sound. To achieve this, the group used a combination of software technologies, including Max/MSP, Jitter and SuperCollider.

Thanks to the expertise and experience of the participants, the project progressed quickly and the group was able to demonstrate their ideas during the morning break. After the presentation, they were able to spend time widening their exploration, experimenting with different synthesis models. Different input and control devices were also looked at, including a multiple-axis game controller and pressure-sensitive glove, the latter of allowed some of the group to shift their focus from software and consumer hardware to lower level electronics.

Equipment: 3 Apple Mac Powerbooks (running SuperCollider, Max/MSP and Jitter), cello (with custom bow), light/glow balls, Shure SM57 microphone, Arduino USB interface board, game controller, pressure-sensitive glove.



(Images © 2006 Cambridge Performance Technology Workshop)

Project II : "DVI VIXI TACVI MORTVA DULCE CANO"

Nick Collins, Julio d'Escrivan, Jamie Forth, Dan Tidhar (and Iris Garrelfs)

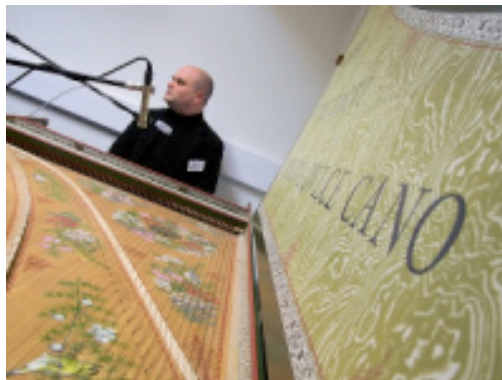
This project takes its title from the Latin inscription written on the department's harpsichord, which translates as "In life, I was silent; in death, I sweetly sing", originally an epitaph for the wood used in its construction. Adding a further lease of life to the instrument, and perhaps to compensate for its lack of tuning, the group combined the harpsichord with sound and video computer processing.

The earlier sessions had been spent testing how various sensors and micro-controllers interacted with each other and with software such as SuperCollider and Max/MSP. Each member demonstrated and explained technologies (for some, their own) to the others, and the group explored the potential of uniting them. This exchange continued throughout the day, and in the later sessions culminated with Nick and Dan leading an effort to exploit the potential of the disused harpsichord lying nearby, using ideas.

With Dan at the keyboard, a firewire camera was used to monitor the movement of his hands over the keys, achieved by tracking the white light reflected by his fingers using a computer running Max/MSP. Simultaneously, a microphone was positioned under the instrument's sounding board to record the acoustic output, which was fed into a second computer running SuperCollider, where it fed a software (re)synthesizer. Then, using Open Sound Control (OSC), the data from the first computer (the video

tracker) was fed into the second to manipulate the synthesizer process, allowing the keyboardist to not only manipulate the sound directly, using the harpsichords hammers and strings, but also indirectly, through his fingers and the computer.

Equipment: 4 Apple Mac Powerbooks (networked, running SuperCollider, Max/MSP, Jitter and OSC), harpsichord, microphone, Unibrain Fire-I webcam, Edirol FA101 audio interface, Korg Kaoss control pad, Logitech Wingman gamepad, custom sensor breakout box (wrapped into SuperCollider), USB interface board and various sensors and micro-controllers (including sliders, benders, rotary knobs, gyroscope, accelerometers).



(Images © 2006 Cambridge Performance Technology Workshop)

Project III : "The Prosthetic Piano Party"

Owen Green, Tom Hall, Alex Harker, Jin Hyun Kim, Andrew Lovett, Rui Penha (and Iris Garrelfs)

This project was inspired by the hulk of an old upright piano that was sitting neglected in ARU's corridor. Mute, due to the removal of its hammers, the piano was otherwise in good condition and the team set about restoring its musical status, attempting to retain its input control (the keyboard) and resonant chamber (strings, chassis), but replace the driver (hammers) with computers and electronics.

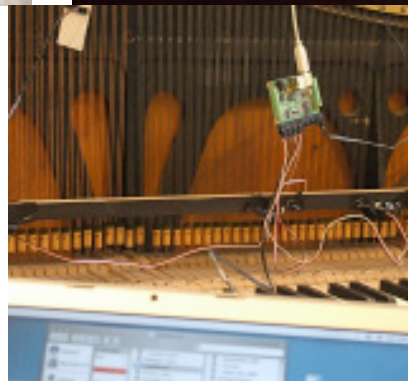
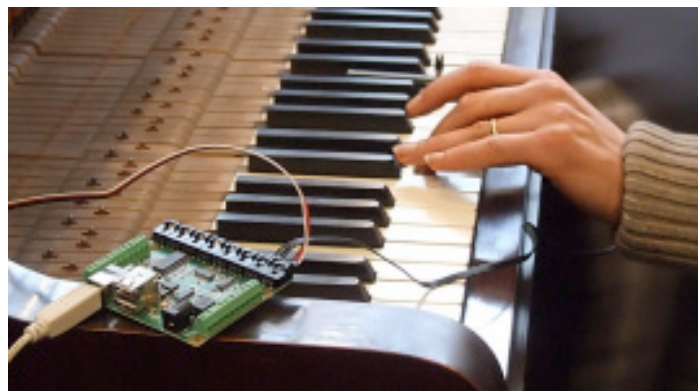
The group took a methodical approach, taking time to discuss and plan their attack in the morning session. The group then broke into pairs and threes to tackle the problems of interface design, electronics and computer processing.

A number of electronic sensors and micro-controllers, such as sliders and force sensors, were integrated into the keyboard and pedals of the instrument, feeding a Phidgets USB interface board before entering a computer running Max/MSP. The computer would use the input device data to control low-frequency noise-based sound generators, which were then outputted to loudspeakers. The speakers, however, did not

address the audience, but were placed against the piano's soundboard, so as to induce vibrations in the piano chassis and strings. Because of the chassis's construction, a direct coupling was difficult to achieve and vibrations, though present, were not of the volume required for performance. Undeterred, the group placed a contact microphone against the strings of the instrument and piped the recorded sound back to the speakers to set up a feedback loop that not only amplified the sound, but also produced a new sonic texture that was at the same time original and yet not entirely divorced from the familiar piano timbre.

Andrew, as an experienced pianist and composer of contemporary music, was able to exploit the piano's new character in the group's presentation. In addition to using the electronic control methods, he would also rap on the piano's chassis and pluck the strings directly to further excite the sound caught in the feedback loop. Following the presentation, the group experimented with variations on the system, including different synthesis and re-synthesis techniques, using Max/MSP and SuperCollider. Although a full concert was not possible, the overwhelming opinion in the group was that there was a lot of potential for future collaboration in the project and group.

Equipment: 2 Apple Mac Powerbooks (running Max/MSP), 1 Apple Macbook Pro (running SuperCollider), Mobile I/O audio interface, Edirol UA25 audio interface, piano chassis, Phidget USB interface board, contact microphone, Impact game controller, Marshall Guitar Amp (mini), Genelec monitors, speakers and various sensors and micro-controllers (including force sensors, sliders, Apple HDD tilt sensor).



(Images © 2006 Cambridge Performance Technology Workshop)

Feedback and Conclusions

At the end of the day, all participants met one last time over coffee to talk about the workshop: what they had achieved, whether it met their expectations and whether it was a good model for future events.

The response was overwhelmingly positive - everyone had found the event both educational and enjoyable. Many had made contacts that they looked forward to working with in the future; others had got a taste of technologies that could take their work and art in new directions.

One criticism shared by nearly all the participants, however, was that the workshop was simply too short, and that one day was not enough. In addition to being a little rushed, the participants felt that the limited time led to a focus on developing and evaluating technologies, and didn't allow for much artistic exploration of how such technologies could be used. Many would have liked to have longer, so that they could refine their projects, perhaps with the aim of preparing polished performances or a concert. The general consensus was that the event should be between two days and one week long. Within these extra days, other participants said they would also welcome masterclass sessions, from experts in different fields on different subjects.

These factors aside, as an initial foray into the field, the event proved highly successful and demonstrated the value of practise-based research in live coding and performance, as well as music (and media) technology in general.