Winston Churchill Memorial Trust
Fellowship Report
Designing digital interfaces to facilitate music workshops
www.generatormusic.co.uk/volt

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Abstract

In May 2011 I embarked on a research project funded by the Winston Churchill Memorial Trust. I had the following aims:

- To learn and understand new research taking place at *STEIM*, an independent specialist centre in Amsterdam for the design of electronic musical instruments.
- To use my current expertise in community music and digital composition to contribute to the development of simple, flexible and affordable musical interfaces for use in group music workshops.
- To return to the UK and disseminate the knowledge and practical applications developed in the form of my own music workshops, with an additional paper and web site to share with other workshop leaders.

This paper details the context in which I worked, aesthetic and technical reasons behind my experiments and descriptions of workshop compositions and interfaces that I returned with. It is accompanied by a website[1] with audio files, detailed compositions and downloadable software. I have also included descriptions of a group of workshops I have run since my return. This paper is intended to serve as a document of my research based at *STEIM* and provide documentation for workshop musicians and digital composers interested in exploring the field of accessible and economical workshop instruments.

[1] Please visit www.generatormusic.co.uk/volt.html

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Chapter 1

Context

1.1 Background knowledge

I run music workshops at *Generator Music*[1]. These are for groups of adults with moderate learning and physical disabilities. As a music workshop leader with a professional interest in digital technology I often incorporate electronics into my workshop compositions. The purpose of my project was to dedicate time to this practise by working in an environment among leading experts in the field. This was to absorb practical and aesthetic techniques and apply this knowledge to hands on design.

Digital technology can put the power of infinite musical landscapes into interfaces that are simple and effective for a user. Tools that facilitate and empower music making in individuals that may struggle with traditional instruments can greatly improve lives. This extends beyond the music making process by encouraging communication, co-ordination skills and neurological activity. My research is a combination of guided practical work, contextual research and field work that I have documented under the name *VOLT*.

1.2 Why Amsterdam?

My project was focussed through an understanding of Dutch social and creative initiatives. I chose The Netherlands as a research base because of its investment in culture and social care. There are many independent Research and Development houses for artists not affiliated academic institutions. This gives broad opportunity for innovative research and allows visitors like me to work on independent projects.

[1] Please visit www.generatormusic.co.uk

When working as a community musician an awareness of social policies within the United Kingdom is a necessity. The Netherlands has a very strong reputation for social enterprise, and during my residency at *STEIM* I visited and researched local social initiatives. This helped me to better understand what makes provision for music in the community a success, and extrapolate certain methods into my own practices. In addition to my research at *STEIM* I was able to meet local musicians, visit various community music initiatives and tour university departments. All of their approaches steered my work.

1.3 *STEIM*

STEIM is a centre for the research and development of instruments and tools for performers in the electronic performance arts. The centre offers residencies to artists wishing to design or compose with electronic musical media, offering artistic and technical support as well as a space and materials to work with. It also develops in-house hardware and software, offering a complete solution to the DIY hacker.

Founded by Michel Waisvisz, *STEIM* outputs bespoke hardware and software. Their instrumental development often features haptic feedback, indeed a growing interest at *STEIM* is the removal of computer music from the screen into a performer's hands. At *STEIM*, great aesthetic import is placed on understanding the translation of gesture to sound. This understanding then translated into the technology they develop. Hardware developed at *STEIM* include *The Hands*, one of the world's first gestural MIDI controllers, portable analogue synths named *Crackle Boxes* and more recently Laetitia Sonami's *Lady's Glove*. Their software releases have included the live sampling environment *LiSa* and video motion tracker *Big Eye*.

STEIM is a reflection of the amount of money that was, until recently, funnelled into the arts in the Netherlands. Amsterdam is striking for its sheer amount of creative and social initiatives that were until recently structurally supported by the government. This makes for an incredibly vibrant and switched on city. *STEIM* is a place to learn and reflect. During my visit it was constantly alive with international and local artists, reinforcing a strong network for the realisation of new ideas. Unfortunately, due to changes in the funding procedures within The Netherlands, *STEIM* - like all digital media research centres in the country - lost 100 percent of its structural funding. It is now undergoing radical changes to the model under which it operates. As such *STEIM* is seeking new ways in which to fund itself.

1.3.1 Visiting *STEIM*

A residency is often begun by an Orientation workshop[2] delivered by staff and visiting speakers. These introduce the aesthetics and technique underlying *STEIM*'s ethos as well as tutorials on their in-house technology[3]. Over the course of my residency I was given space and guidance for my project, allowing me to experiment and understand approaches to interface design first hand. This included lectures and meetings with *STEIM* staff that proved equally invaluable for the aesthetic and technical development of VOLT.

Figure 1.1: The Orientation Team

STEIM also provided me a forum to present my work, during the Open Studio evening[4]and later on in a *Max/MSP* user group meeting[5]. This provided good opportunity for discussion and feedback about the project during its formative stages. The space, equipment and expertise at *STEIM* gave me the opportunity to develop, build and test my ideas. Taking a residency at STEIM encouraged me interrogate all forms of gesture and equipped me with the facility to translate ideas into compositions .

[2]Now known as *Instrument Labs*. For more information click here

[3]LiSa is a program for live sampling and Junxion for the input and mapping to of physical controllers to sound sources

[4]For more information visit this page

[5]The Monthly *Max/MSP user group* at *STEIM* is organised by Danny De Graan. www.dannydegraan.nl

Chapter 2

Understanding Instruments

2.1 Technology in a Therapeutic environment

"Imagine, create, play , share and reflect on musical actions" (Luhtala et al., 2011)

It is important for music workshop leaders to diversify their sonic palettes, both for the sake of their participants and themselves. Musical diversity can lead to longevity in a workshop where the aim is relaxation rather than public performance. Resources for groups of participants of limited movement or learning capability can be scarce, as the extensive use of percussion instruments in group improvisation testifies. This lack of resources can lead to repeated material and restrict the musical satisfaction gained form such workshops. Growing economical accessibility means that digital technology is being increasingly used in the therapeutic environment. Many approaches exist for the therapeutic use of computers, and understanding these proved a good foundation for the development of my project.

Rod Patton's Life Music[1] is an example of a successful meditative improvisational framework for large groups. Guided improvisation gives participants the chance to explore their instruments whilst communicating with others. Most importantly the musical interest arises through the conductor's ability to shape musical ideas, giving the participants "an inclusive space where anyone and everyone can become creative musicians" (Patton, 2011). Technological extrapolations of this approach are increasingly prevelant. Samuel Benveniste and Pierre Jouvelot write on the use of *Wii* remotes (Benveniste and Jouvelot, 2011) in therapeutic improvisation, aligning it with the music therapy framework of Sonorous Communication. They examine free group improvisation as therapeutic meditation and qualitatively analyse the musical and therapeutic success of *Wii* remotes in this situation.

Benveniste and Jouvelot's research uses gestural information captured from the *Wii* remote. It is incorporated as an *addition* to the instrumental palette of the class ather than a complete replacement. Workshop compositions demand simple instruments that contribute to a whole,

[1] Visit www.lifemusic.org

though complexity can be introduced under the same musical model. Developing technology around workshop ideas using simple *1 bit* actions can prove as useful as developing a highly complex digital interface (see section 4.1.2). Here the complexity of programming is in the software rather than the hardware; creating a successful musical environment with single actions from participants requires imagination.

Researching therapeutic approaches towards music workshops sculpted the development of my interfaces. Emphasis is largely placed on basic elemental components that give the participant a voice to explore and communicate with others. This is the central ideal around which I designed my workshop compositions.

2.2 Sounding Music

Understanding and using technology in workshop compositions necessitates separate consideration of each of the musical elements, which are then put back together. These can then be mapped to gestures, actions or temporally triggered. Here the designer needs to understand what they intend for each action's corresponding musical traits.

2.2.1 The shape of a Melody

The connection between movement and output requires thought to establish expression beyond frequency height and speed. I found it useful to extract parameters of musical shapes and associate these with gesture; A long smooth musical passage would instinctively correlate with long smooth arm gestures.These 3-5 second movements tend resonate with mental images of melody and pulse and can feel naturally responsive to a user, leading to the quicker action/consequence understanding.

Moving beyond these natural correlations requires imagination. The idea of 'sound sculpting' within compositions (Fels et al., 2003) is a useful method to link movement and melody beyond the immediate. The metaphor of smoothing statue for a slow section, or whipping an egg for the fast movements can create different types of movement to correspond to different musical attributes. These metaphors are often more easy to communicate verbally. Metaphors can also aide conduction through graphical scores, and this can assist with structuring the narrative of music. An interesting way to harvest ideas for sound mapping is to have a workshop in which the participants perceive the sound and draw it with gestures. This can then be extrapolated into simple instruments by perceiving an action and guessing how this action is made.

A workshop in which participants map their own designs leads to a greater investment into an instrument. In this way the process of democratically yet individually creating the instrument are all components of a complete composition[2]. Allowing the participants to personalise the musical identity of their instrument gives creative investment into an instrument, this ownership ultimately enhances the player's engagement; The composition of the instrument defines the shape of the melody.

[2]see *Kinect* composition, Section 5.2

Using Fels et al's methods of metaphor from mapping through to composition of a workshop helps to stabilise an idea and understand the potential of each particular controller. Encouraging participants to create their own ideas also helps participant engagement; Amusing outcomes also contribute to the wellbeing of the class as a whole.

2.2.2 Layering

Knowing which part of the frequency spectrum that you want each instrument to occupy helps musical cohesion. Each *layer* has the potential to be afforded variations, but needs to maintain its own musical *area* whether this be in frequency or timbre. This does not mean that each composition must comprise greatly differing musical components, more that the qualities of musical contribution by each element must be understandable. Once these layers have been extracted and assigned, the workshop leader is able to bring them back together with signals, signs or conduction so each player contributes to a united composition[3].

Layering prompts the arrangement of music in simple parts; as in an orchestra all parts are important to the composition and rotation between different parts of different complexity will allow longer repetition to assist long term learning. The *Jostiband* orchestra exemplifies this with the extended use of many percussion instruments as well as simple note changes using its colour code system[4], as discussed below.

2.2.3 Musical grammars

Individual elements require that musical grammars are built into the sound engine, which defines the phenomenology of the composition. Musical grammars represent the way the blend of elements that music comprises are organised. This can relate to harmony structure, amplitude control or the larger formal structure that you may choose to overarch your workshop composition. The acoustic identity of the instrument can be flexible or fixed, but each instrument's relationship to the other's defines the musical grammar.

Understanding the grammatical organisation of each composition is arguably key to the success of a workshop. This is practically demonstrated using a variety of different interfaces in the same composition. Whether the workshop leader chooses to have all the instruments tuned into the same key[5] or having them in a similar genre the computer can place the acoustics of the interfaces in the same musical language. A sweep of the *Wii* remote can speak the same language as an arm gesture in the *Kinect*. Establishing a musical grammar establishes each instruments rules, which can be explored and exploited.

Considering musical grammars lead me to design software patches to democratise the semantics of each controller. The data attained through an arm movement with the *Kinect* is quite different to that of a joystick yet flexibility demands that it is important for my purposes that they are able to play the same range of the same key on the same synthesiser. These necessities directed me

[3] see 360 Controller Composition, Section 5.1
[4] see *Jostiband*, Section 6.1
[5] See ModeChanger

research in this area towards certain repeatable modules that could translate different modules in the same way.

2.2.4 Representing Grammars: *Colour Notation*

Notation is far from fixed in digital composition or music workshops. The communication of a conductor with the group is particularly important for the structural content of the music and each workshop leader often develops their own personal language.

When visiting *Jostiband* I was struck by just how successful the large scale musical organisation was, communicated by their own *Colour Notation System*[6]. This was something that leader Lyan Verburg and her then colleague Wim Brussen had researched and documented throughout their time as leaders of the *Jostiband*. Verburg and Brussen have documented their colour notation system in a booklet entitled *The Sound of Colour* (Brussen and Verburg, 2001). In this booklet they elucidate how and why their colour notation system works.

The musical material played by *Jostiband* is tonal. This is reflected in the direction of their colour notation system, with colours corresponding to different musical keys and notes within them. Their choice of colour is influenced by the text *Kleurenleer*. Here they consider the chromatics of colour, and how when one colour is used it affects the way colours next to it are perceived. As such they have replaced orange with brown in their seven colour spectrum as it is recognised more easily from afar. Additionally, in the diatonic scale light and dark colours alternate, aiding perception. *The Sound of Colour* contains a well formed musical grammar that has been transcribed and used for *Jostiband*'s repertoire. These are available for download.

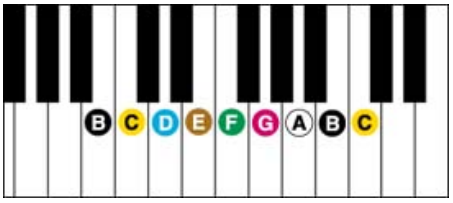

Figure 2.1: The Colour Scale

The use of colour notation in music workshops is a way to circumvent traditional notation whilst still communicating complex ideas. It can be extrapolated and augmented to suit your group's needs and instrument's capabilities. It can also be used in parallel with graphic notation to represent timbre and musical fragments as well as individual notes.

Using gaming controllers was naturally compatible with this method, as they too utilise a colour coded system. When established alongside the gestural metaphors approach colour notation can represent many different timbres and actions in simple and coherent ways.

[6]For more information please see the *Jostiband* website

Chapter 3

Gesture and Mapping

3.1 Understanding Gesture, Understanding Sound

Gesture is defined as "a movement usually of the body or limbs that expresses or emphasizes an idea, sentiment, or attitude" (Webster). Describing musical shape inevitably results in discussions regarding physical gesture. The two are difficult to separate, even semantically. Is gesture a physical gesture physically resulting in a sound? Is it be the musical gesture that occurs as the physical movement? Or the gesture of communication, to convey one's feelings?

Alexander Jensenius clarifies potential confusing by replacing the word altogether with descriptions of natural "action-sound couplings" and artificial "action-sound relationships" (Jensenius, 2007). He explains that couplings are inevitable to multimodal perception, citing the image of a dropped vessel inevitably matched with the sound of a broken glass. Jensenius posits that artificial relationships built into interfaces will be inherently weaker; even with care given to naturally mapping artificial relationships, instability in a system can still lead to an unexpected outcome or lack of sound that diminishes the user's trust. It is highly important to establish trust in a workshop instrument with stable and convincing action-sound relationships.

The problems instrument designers encounter with mapping often force them to repeatedly address the same issues. How can the semantics of the hardware relate with my desired sound world? Will these inevitable impact the sound world? Can my interface cope with a number of different music scenarios?

Attempting to model digital interfaces on action-sound couplings suggests relationships physical and musical gestures. This has impact on each overall composition. *MIDI pads* suggest a percussive sound[1], and their use will primarily imply a pulse led workshop. In the case of touch-less interfaces such as the *Kinect* there is no natural nudge towards any particular type

[1] See drum pad composition 5.3

of movement. In this case sound-sculpting as describe earlier is crucial for mapping in order to provide a "mental model" of the gesture space.

3.2 Mapping

> "The ease of understanding the mapping is crucial to the success of the instrument" (Fels et al., 2003)

How does a physical gesture relate to the sound an instrument creates? If this cannot be immediately felt, or repeatedly established through practise the instrument fails to engage the player. The influence of the sonic material on the mapping will be relevant; using a slowly evolving sample or synthesis engine will require actions triggering subtle parameter changes rather than explicit pitch or panning alterations.

Figure 3.1: Mapping Workshop

At *STEIM* I took part in a workshop that elucidated the idea of mapping using simple tasks and games. This gave us the chance to step away from the computer and consider the implications of mapping on an instrument[2].

Many instruments are designed for repeated use and practise by an individual user. In this case it becomes highly personal, and the instrumentalist can develop skill with the performance of this instrument. Music workshop leaders will rarely have concentrated time with an individual to facilitate diligent practise to lead to the understanding of a complex instrument. Therefore it is beneficial to create quickly accessible action-sound relationships. These can be as simple as one to one mappings where a hit results in a velocity controlled sample.This relates back to the discussion on melodic shape. In the workshop environment the importance of coherent mapping becomes clear in practice.

My instrument designs reflect research that indicates sources of success for digital compositions. The most complex aspect of my project lies in the interpretation and reconfiguration of

[2]Run by *STEIM* staff Jon Reus and Georgios Papadakis. See www.FetaPapa.com/FetaPapa/Mapping for more information

data. To address this I have documented modules specific to each controller and a set of modules specific to particular musical outcomes, such as sample triggering, MIDI configuration or parameter changes. This flexible software is easily configured, making data information necessarily digestible for ad hoc remapping. These modules were the basic workshop elements that introduced during *Electronic Music Month*.

Chapter 4

Input/Output

This chapter presents a survey of options for simple modular interfaces. I have placed an emphasis on robust and widely tested controllers to maintain workshop stability.

4.1 Input

Controller inputs naturally define the shape, mapping and ultimately can dictate the sound of a workshop. The following section describes the inputs that I have explored, with the data and sound that they work best with alongside modular *Max/MSP* patches.

4.1.1 Footpedals/Keyboards/Knobs and Sliders

Figure 4.1: Korg NanoKontrol

These traditional music controllers can provide useful movement information, generally giving out manageable MIDI data from 0 - 127, alongside data from keyboards that will be instantly translatable to a sampler or synth. Though traditional these should not be overlooked as they can be modified in software for ease of group playing, using knobs for filtering or using a footpedal

as a simple musical trigger.These controllers tend to require dexterity, which can be inappropriate in some cases.

During *Electronic Music Month* a foot MIDI pedal mapped as a solo instrument became a popular and easy controller. It was successful because it was easy to learn but had more than one bit mapping so more could be achieved from the sound than a percussive sample.

4.1.2 MIDI pads

One bit are the most simple controllers for music workshop. I was first introduced to MIDI drum pads by my lecturer Graham Dowdall[1], who has been running workshops creatively with these for years. These are examples of *one to one* mappings; once hit a single sound is produced by the sound module in the computer. Programming can be made flexible so you can load these on the fly with synth notes, pre recorded sound or live sampling.

These are satisfying to play as the sound-action relationship is strong; it is clear when one has been hit, and the expectation is that the sound can change. In a workshop environment these are good for multiple rhythmic games, which can then be layered up to be triggered in a composition by other controllers in a later part of the lesson. Each drum pad can therefore be an individual element, or just part of a basic structural element.

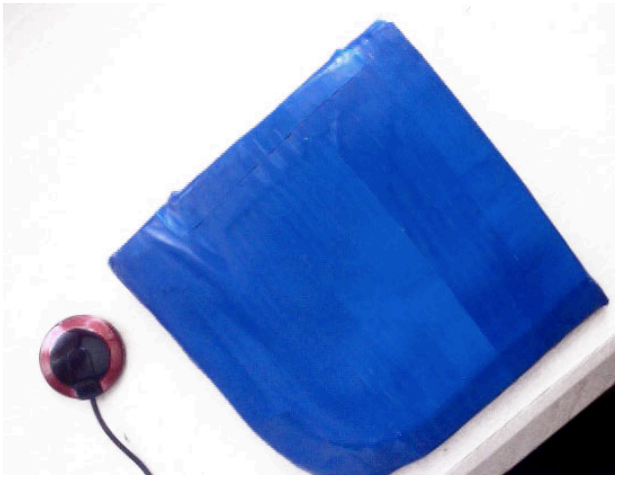

Figure 4.2: DIY drum pad

MIDI pads can be bought and then wired into a MIDI trigger rack, which can then be connected to a sound module. If you have a multi audio input interface you can make your own for about £2 using a piezo electric microphone and audio detection in *Max/MSP* (ensure to create shells to protect the microphones).

[1]Please visit www.gagarin.org.uk

4.1.3 Game Controllers

Human Interaction Devices[2] (HIDs) are also becoming part of the traditional canon of musical interfaces. This is because they are easily hacked and have a wide user and testing base. There are many drivers and translational software that can convert data from most HIDs to your choice of digital synth or sampler. The flexibility of the information allows the workshop leader to change the mapping between sessions, or even build personalised instruments as workshop sessions. Problems with game controllers can be a lack of stability, particularly with bluetooth based interfaces such as the *Wii* remote.

In Benveiste's and Jouvelot's research, the use of game controllers is socially positive because the children understand and like *Wii* remotes. This may not always be the case and the successful use of game controllers can vary from workshop to workshop. The positive effects of *Wii* remotes witnessed in therapeutic meditation can equally be negative depending on the group. These negative associations can be navigated by disguising the external appearance of the controller, or perhaps with their use at the end of the workshop in an explicitly gaming environment.

Gamepads/Joysticks

Game pads and joy sticks can provide useful one bit rhythmic information, as well as panning information. Their design is quite ergonomic and they are also stable to use. I have chosen to use the *XBox 360 wireless* controllers. USB wired joysticks such as the *Logitech Attack 3* also have a natural affinity with panning and spatialisation. I found the mental model that was naturally associated with lent itself to continuous sound production requiring constant movement of the joystick.

Figure 4.3: *Logitech Attack 3*

To connect with the computer the *Attack 3* doesn't need drivers, it is automatically able to communicate with the *Max/MSP* HI object. For rhythmic workshops I colour labelled the buttons in the same way as the *XBOX* controllers for a variety of one bit sample triggers . For more melodic solos I connected the moving joystick to the ModeChanger object to create musical lines.

Data Gathered	**range**
n * 1 bit trigger buttons	0 or 1
n * x/y joystick information	0 - 255

When running the EMM workshops it became clear that moving the joystick means that the top buttons are generally pressed without thought. During solo sections I learnt not to place too much musical or structural importance on the buttons, as they are often accidentally depressed.

[2]Please see www.generatormusic.co.uk/Joysticks.html

Wii Remote

Once the pinnacle of Wireless gaming technology, as a musical interface the *Wii* remote still remains unreliable in my opinion. The accelerometer provides good motion data, and this is naturally useful for explicit gestures but the useful information is dwarfed by the growing unreliability of bluetooth, particularly with mobile technology interfering more and more. The biggest problem with the *Wii* remote in *Max/MSP* is the connection stage. This often requires several restarts of *Max/MSP* and the computer, and leads to a lack of confidence in the controller. This leads to weak action-sound relationships.There are alternative game controllers that provide similar data that can be wirelessly connected.

Figure 4.4: *Wii* remote

Connecting the *Wii* remote with *Max/MSP* requires an object designed by Masayuki Akamatsu, which can be downloaded here. This allows Max to talk to the Bluetooth modules within the computer. The 3 way accelerometer information is the most desirable, and if smoothed correctly can turn the *Wii* remote into a very responsive controller.

Data Gathered	**Range**
n * 1 bit trigger buttons	0 or 1
1 * x/y/z acceleration information	0. - circa 1.5
1 * 3 way tilt switch	0 - 3
1 * IR Sensor	-

Guitar Hero

The *Guitar Hero* controller runs over a wireless remote system rather than Bluetooth. Wireless systems are infinitely more reliable and therefore more desirable in a workshop situation. The drawbacks are the lack of accelerometer information limiting the expressiveness of the instrument somewhat (though it is equipped with a tilt sensor).

Figure 4.5: *Guitar Hero* Controller

Data Gathered	Range
n * 1 bit trigger buttons	0 or 1
1 * tilt sensor	-32000 - 32000
1 * Wah Wah trigger	-32000 - 32000

The cultural understanding of the shape as similar to a guitar goes some way to the interface's instant acceptance as an instrument and the colour coding innate in the design is excellent for colour coded scores and conduction.

Connecting the *Guitar Hero* controller to a computer requires a PC microsoft wireless receiver. If connecting to a Mac computer additional drivers will be needed, which can be downloaded from *Tattiebogle.net* here. Once installed the driver should appear in the devices part of your System preferences, and when the controllers are connected to the receiver they should directly appear in the HI Max object. Up to four wireless *Guitar Hero* devices can be connected at one time.

The *Kinect*

The *Kinect*[3] was introduced as a 'controller free gaming experience', with high quality motion tracking taking place within the device.

> Based around a webcam-style add-on peripheral for the Xbox 360 console, it enables users to control and interact with the Xbox 360 without the need to touch a game controller, through a natural user interface using gestures and spoken commands. (Anon)

The *Kinect* is effective as a theramin-style controller, detecting movements, density of bodies in room and even providing accurate skeletal data. Planning workshops with more than one user with the *Kinect* has proved tricky, though used as a solo instrument or a workshop for personalised instrument design the *Kinect* works as a fun and engaging interface.The instrument is slightly unstable in that it can lose skeletal data and require the user to adopt the calibration pose. Perhaps the instability of the instrument could be worked into the resulting music with a flatline of information triggering the calibration pose[4].

There are multiple ways to gather information from the Kinect into *Max/MSP*, including the object jit.freenect.grab. I have chosen to communicate the skeleton information through open NI and the OSC protocol designed by CNMAT. The information received is detailed joint information (x, y and z planes) of the calibrated user, that can then be traced and transformed musical information. I decided to collect information from the left and the right hands and send it to my javascript object (detailed below). Installing the drivers for the Kinect can be irritating, and information can be found on my website.

The x and y information is from 0. - 1., so I scaled this and turned y information into frequency and x information into panning. Z information can optionally be used for velocity. This creates a dual instrument with movement. To replace the trigger button on the *Wii* and ensure that the instrument won't sound all the time, I created a motion sensor (again in Javascript) that ensures the MIDI data is only sent through when a certain threshold of motion is passed. Further

[3]Please see www.generatormusic.co.uk/Kinect
[4]Please see *Kinect* Composition, Section 5.2

Figure 4.6: Kinect Skeleton Tracking

functionality could be added either through voice recognition for mode and key changing, or more refined motion recognition (so far I can recognise up, down, left and right).

The *Kinect* allows extremely accurate and responsive skeletal data to be sent to flexible software, and the potential of this is just beginning to be recognised in various artistic and workshop disciplines. The biggest draw backs of the *Kinect* compared to standard video tracking that I have discovered through research is latency. The box only retrieved 30 frames per second, and combined with the USB protocol that is notoriously slow, there are perceptible issues regarding the use of the *Kinect* as a musical instrument. An interesting use of the *Kinect* could be in the form or research data, as the skeletal tracking is very accurate.

4.1.4 Sound as controller, sound as interface

***Acoustic Music Balls* (Jensenius, 2007)**

Acoustic Music Balls create sound when squeezed. Alexander Jensenius describes how commercial dogballs can be filled with a sounding material with a microphone amplifying the sound within. These tangible balls are direct in the way that sound is produced, and in workshops the tactility of the balls can be exploited alongside exploration of musical timbres. In this way the feel of the balls and how they are explored is what drives the sound itself. Please see www.generatormusic.co.uk/musicballs for a video demonstration.

Microphone Detection

Placing a microphone in the middle of the room is also an effective way to detect the general activity of a room. Using sound as interface is not as direct as a tangible controller but can be very effective method to gauge the overall density of sound, frequency of sound and amplitude occurring around it. This form of reaction can unite a workshop with its electronic counterpart[5]

4.2 Output

The output of the instrument includes the hardware required and the sonic material that has been chosen. The controller input and sonic output are mutually dependent; The choice of instrument can reflect the desired musical outcome. This section details choices related to the hardware setup of the digital instruments and the musical decisions that a composer makes when designing a workshop composition.

4.2.1 Speaker setup

Each composition can have a variable speaker setup, though I maintain the same setup throughout each individual workshop. Multiple speakers can be used both for meditative purposes (in an array surrounding the participants) and for individuality within the instruments (a speaker per person). Conversely, to unite the group in a single sound world diffusion over a stereo channel at the head of the circle could suffice. More gestural instruments, such as samples triggered by the upwards movement of the *Wii* remote benefit from individual speakers.

4.2.2 Sonic Character

The sound palette of the computer is vast. It is necessary to make choices between sonic characteristics to blend and unite the instrumental group. Live sampling and playback of the voice is an effective way to personalise an instrument quickly, whilst granulation and fm synthesis offer established and varied palettes. Using *Max/MSP* to translate information from different interfaces to a vst synthesiser is a way to create melodies and timbral textures.

During my research I designed sound production modules to be combined with controller input translators. These elements can be recombined to explore the musical choices that determine a successful workshop. Defining the genre of the piece often narrows down the instruments that chosen. When creating a backing track for a song it was natural that the loops would be mapped to *Guitar Hero* controllers, whilst a percussive workshop with a solo instrument could be any

[5] see Rainfall Composition, Section 5.4

combination of MIDI pad or one bit instruments with a solo line from the *Kinect* or *Wii*. Most important is the unity of the sonic character within each composition.

Chapter 5

Practical workshops

Having established modules for the input and output of the instruments I designed practical workshops to test the effectiveness of the mapping that linked the modules. These would later be used in *Electronic Music Month*. The design of each workshop necessitated a clear idea of the composition's intended genre, number of participants and length of piece. Most important was the contribution of each element to the musical whole. Some compositions highlight a solo instrument and some would to a more democratic approach.

Each practical example requires a slightly different setup, which depends on the group, size and available equipment. At the core of the setup will be the computer, leading to a sound interface and amplification. On either side of the setup, however, the variations will lie from controller/microphone to speaker choice and positioning.

5.1 *XBox 360* controller loops

Required

- 2 or 3 *Guitar Hero* Controllers
- XBox 360 Wireless Receiver
- If using OSX you'll need XBox drivers.
  Download these from tattiebogle.net

In this piece 4 different generic loops to create a complete track. Loops can be dragged into sample boxes for different sections and different instruments. Here we use colour coding to associate 4 different colours with different sections of our track. For our bicycle song this is verse, prechorus, chorus and bridge. The participants are shown to touch particular colours in rhythm

and to enter in and out of the composition.

This is extremely similar to the modes of the *Guitar Hero* game. Once the backing track has been established compose a melody to go over the top of the loops to also be sung by the group. The Waa Waa lever on the guitar can optionally be used as a solo section using the ModeChanger object with a software synth linked to Max MSP. This type of composition does not necessarily need to prescribe loop based pop music, and each controller can be loaded with a number of different musical fragments, which can then be conducted in and out using coloured card.

5.2 The *Kinect* as a Solo Instrument

This workshop is designed for a small number of participants, with each watching and contributing to the evolution of each other's instrument.

Initially begin with a musical loop on simple instruments, for example moving from one chord to another and back. Ensure that there is one less contribution than the number of participants. Rehearse this a couple of times. Play. Move to the *Kinect*. Ask for a volunteer to go first in designing the instrument. Ensure that you have designed a Max patch that gives flexibility regarding palette of sound. The instrument in this instance is to be a solo instrument, so have this reflected in your chosen sounds.

Play the selection of sounds, and ask each player to pick one. Load this in using the sample loader patch. Ask them to then take the reset position, and inform them that their left hand will either make the pitch of the sound go up or down by moving either up and down or left and right and allow them to decide. The other hand will pan the sound. Again give them the same decision. Have an option for fast and slow moving notes again asking if they want a lot of motion to be fast or slow moving. Finally ask them to choose an associated key. Conduct the others playing the basic loop, indicate the points in which the *Kinect* player enters for a solo. Rotate the group for each to have their own instrument design.

Ask for any ideas on gesture or musical palette extension. Discuss how the music made the participants feel and what the sounds reminded them of.

5.3 Simple Drum Pads

Required

- N* MIDI 1 bit input pads.

This is the most simple of composition ideas, that I was taught by Graham Dowdall. Each MIDI trigger has one basic unit of sound that unites with the group to make a complete composition. The choice of sound can be synthesised or sampled live. These beats can be recorded directly as audio, or as MIDI notes which can then be quantised and layered.

5.4 Sound as Interface: Rainfall

Required

- Multi speaker array.
- Microphone.
- Optional joystick.

This workshop can incorporate any number of participants. Here, sound is the interface. A microphone is placed in the middle, with each participant in front of a drum around the room. The story revolves around the arrival of a storm and involves conga drums triggering the remainder of a jungle storm through changing soundfiles. Thunder and lightening are represented by percussion instruments and also within the soundfiles. These can optionally be rotated around the array using the joystick. When the storm has been going at maximum for a certain amount of time it is triggered to leave again.

5.5 Guided Storytelling

Required

- Combination of simple 1 bit triggers, joystick, Wii remote, Kinect.
- XBox 360 Wireless Receiver
- If using OSX you'll need XBox drivers.
  Download these from tattiebogle.net

In this piece the participants may have a variety of devices ranging from gamepads to MIDI triggers to the *Kinect*. This is at the workshop leader's discretion and can be varied with each idea for a story. The genre for the story should be chosen in advance, and the devices should also be pre mapped. For instance, if doing a halloween story, *Wii* remote could represent the witches wand, the joystick can represent stirring of the cauldron and so on. Corresponding colour codes should also be planned in advance and created for cue cards.

The participants are played each of the sound files and told the genre. At this point they are invited to take part in the creative process- the premise of the story is fleshed out and the narrative and sound design are weaved together. This is done democratically as a group. At this point Cue cards are associated with different parts of the story and participants are invited to practise playing on cue. Cue cards could use colour notation or names depending on the number of cues each person has.The story is then read by a 'storyteller', with cue cards being held at correct moments to guide the participants through various sound actions.

5.6 Colour Music Balls

Required

- Combination of 4 *Acoustic Music Balls*[1]
- Individually mapped monitors.

Music balls containing a variety of materials should be laid on the floor in front of the participants. The participants are invited one at a time to choose a music ball and explore its sound and tactility in front of the others. They are then invited to explain how this makes them feel and what colour they would associate with it. These colours correspond to cue cards the can be held up inviting the participant to play or not play. They will are pale and darker colour to correspond to quietly and vigorously. The group rotates between conducting people in and out of the composition using the cue cards. This will encourage continuous playing which is always difficult in a group environment.

[1] www.generatormusic.co.uk/musicballs

Chapter 6

Additional Encounters

6.1 *Jostiband*

Jostiband[1] is the largest group music group for adults with learning disabilities in the world, orchestrating over 200 participants on a weekly basis. The *Jostiband* is a fantastically organised and resourced project, providing weekly orchestral rehearsals alongside individual lessons to allow people to learn their instruments. A contributor to the success of this project is the 50 percent residency rate of the participants, enhancing Zwammerdam's active musical community. On my visit to the *Jostiband* I learnt more about methods from conductor Lyan Verburg, the co-creator of a highly effective colour notation system.

Lyan is a very competent conductor, and a charismatic leader. In conversation with Lyan after the rehearsal we discussed the colour notation method and its formal organisation.This included how colours can relate to a number of different musical variations and how signals can mean different instructions to different members of the orchestra depending on ability. The colour notation method exemplifies the success of musical modularisation[2]. Lyan emphasised how important it was to engage every member of the orchestra in some way, ensuring that each person contributed no matter how simple; the Jostiband involved harder to reach members through the use of simple percussion instruments enhancing the texture of the music.

Visiting the Jostiband and witnessing its success as a social enterprise lead me to parallel some methods. In particular, the colour notation became very useful when using graphical scores to conduct compositional structure. The use of colour has the added benefit of existing in many of the gaming controllers that I feature in my composition, and though beyond the scope of this report this perhaps indicates prior colour research in gaming as well as music. The colour notation is a well considered and fully formed musical grammar, and something that I have extrapolated to electronics based workshop compositions.

[1] Visit www.jostiband.nl
[2] See Colour notation

Figure 6.1: Jostiband

6.2 Technische Universiteit Eindhoven

During my research phase I visited Hans Leeuw for his advice on interface design, meeting at Design Students exhibition of Industrial Design the technology university in Eindhoven[3]. Here I got a chance to see the work of his students who were also designing prototype models for musical interfaces, one using 3d motion game controllers attached to elastic to control live sampling and granulation, another being an electroacoustic music ball (as later described). In contrast to the practical grammars that I absorbed through visiting the *Jostiband*, my meeting with Hans lead me to consider the musical and tactile aesthetics of the instruments proving valuable in the compositional process.

During our meeting Hans expressed the importance of limiting the scope of each instrument within the compositions, about what motion means and where this can be extrapolated onto sound. The gestural importance lies in the semantics of the interface and the movement that each encourages should be sonically exploited. We also discussed feedback given by the instrument. In addition to sound as the primary source of feedback there is the option of both visual and vibro tactile feedback. Hans informed me that research pointed to vibro tactile feedback as the most appropriate form of instrumental feedback; indeed haptics are a huge area of research in the field of instrument design. This consolidates *STEIM*'s ethos of removing the music from the screen, which is perceived as an extra layer of distraction between the interface and the music. This is something that I touch upon in section 4.

[3]Please visit www.tue.nl

6.3 Work with Marij Van Gorkom

During my first week at *STEIM* I met fellow orientation attendee Marij Van Gorkom[4]. Marij is based in The Hague and performs contemporary classical works on the bass clarinet. She was interested in working closer with composers of electronic music so we decided to take advantage of my presence in Amsterdam to form a collaboration.

Figure 6.2: composer David Dramm, me and Marij

Since then we have been working together on a number of projects. This includes a joint commission for a bass clarinet work and electronics as well as programming a forthcoming concert series for bass clarinet and electronics taking place in New Zealand. In August I returned to *STEIM* to work on this project further, and Marij is travelling to Edinburgh in December to record our work.

[4]See www.marijvangorkom.nl

Chapter 7

Reflection and the future

The Winston Churchill Memorial Trust have given me the opportunity to develop skills that wouldn't have been possible in another circumstance. Being in an environment where I was surrounded by so many different ideas and approaches allowed me to absorb and reflect on a multitude of practices and ideas. This has provided me with a core palette of instruments and compositions to use in a variety of workshop situations. The chance to share and extend my musical network in the Netherlands has provided me with links and contacts who I will be able to communicate with in the future. I intend to consolidate the friendships that I forged during my fellowship for years to come.

The Netherlands has until recently funded the arts and social sectors generously, allowing them to carry out large scale social and technological projects that are not supported elsewhere. There is much to learn from these projects, and arts leaders are more often than not glad to share what they have learnt. What was most valuable to me was to consider methods from a cross section of project leaders, so my work was informed as a workshop musician as well as a technologist. As a result of this I was able to draw from a number of different resource bases to inform my own research. By carrying out this research I hope to point others towards ongoing initiatives and studies in The Netherlands, as well as bringing back tangible objects for practical use.

The Winston Churchill Memorial Trust fellowship has enabled me to build a strong platform of resources and documentation that I am now able to easily add to and share. Having run *Electronic Music Month* my research has become consolidated, and this information has given me a clear idea of potential areas to further pursue. I will continue running my workshops, and have begun sharing ideas among my peers both through computer networks and personally. I am very grateful to both the trust and *STEIM* for hosting me and giving me the time, space and environment to pursue an idea that I have been contemplating throughout my career.

Appendix A

Digital Workshops In Practice

Across the four weeks of October, alongside my colleage Nicola Sheeran I introduced the interfaces that I designed at STEIM into music workshops at *Generator Music*[1]. We created extra classes for the addition of *Electronic Music Month*, and their success will result in the new digital interfaces as a permenant fixture. Each week I used slightly different controllers, mapping and output to examine how well they worked within an established workshop environment. In this chapter I have documented my approaches, software and evaluation of the interfaces and compositions. These are presented in further detail with musical examples on our website.

A.1 Week One: Kite Heroes

During week one I introduced a variety of the game controllers[2]. I used a combination of Sound as Interface, *Guitar Hero* controllers, *Xbox* Gamepads and a *Logitech Attack 3* Controller to show the participants to as many instruments as possible at the beginning of the month. I used the same translation input patches throughout the workshop and merely changed the mappings to a variety of output modules between patches.

A.1.1 Rainfall

Using the practical example described in section 5.4 we used drums to call and experience a sample storm. This is similar to an acoustic workshop that I run, with the addition of a quadraphonic array of speakers around the participants.

[1] Please visit *www.generatormusic.co.uk*
[2] Visit www.generatormusic.co.ui/EMM

Figure A.1: *Electronic Music Month*, Week One

Evaluation

This is a tried and tested warm up to encourage the exploration of the feel and dynamic range of the drum. The addition of the soundfiles to make the experience richer built up excitement and participation within the class.

A.1.2 Synthesiser Improvisation

Using 2 x *Guitar Hero* controllers, 1 x *Logitech Attack 3* Joystick and 1 x *Xbox 360* Gamepad. Each instrument was mapped to their own discrete sound, with 1 bit buttons relating to single notes and joysticks and waa levers associated with solo melodic phrases. These were all tuned into the same key using the javascript object. Participants are then invited to explore each of the instrument's capabilities before being guided through different style of workshop improvisations. Colours were used to direct improvisations as well, although this adds a layer of thought between instruction and playing that is removed by using names for direction.

Evaluation

- The *Guitar Hero* Controllers were the most enjoyed. This was for their shape and connotations with real guitars and combination of one bit buttons and waa waa lever for more expression. These were very stable and withstood a lot of movement away from the computer.
- The joystick was appreciated but exposed some flaws in my programming. Evolutionary mapping that I had programmed in to change during the course of the composition was not understood and the buttons were more difficult to press. Interesting melodic melodies

did begin to be brought out of it by some participants. This was also very stable.

- The Gamepads were the least popular of the three. Their lack of association with any instrument and the fact they are less tactile than the joystick made them less satisfying to play. The colours were useful, and I would make the joysticks more integral to the composition as they lead to the most concentration.
- The group all loved the synthesiser sounds, and the fact all the instruments were mapped to the same key lead to good musical cohesion.
- One of the participants refused to play any of the instruments. This will be encountered during workshops incorporating new technology, and in this situation an acoustic alternative can be offered to blend into the workshops.

A.1.3 Kites

The group were working on an acoustic version of *Kites* by Simon Dupree. We quickly programmed in wind to the joystick - when it moves the sample plays. We added organ and guitar synths in a particular key to the other instruments to play over the group's work.

Evaluation

The combination of acoustic and electronic worked well. At times the levels were not balanced between the sample and synthesiser so a method of normalisation and compression should be programmed into the modules.

A.2 Week Two: Bikes and Mics

Figure A.2: *Electronic Music Month*, Week Two

At STEIM I took part in a performance that took place on a fleet of bicycles around the city[3]. This was at the time when I was designing my workshops for *Electronic Music Month* and lead to the theme and consequent instrument design of my workshops during week two[4].

A.2.1 Bicycle Soundscape

We began with a bicycle soundscape to be performed and recorded on our selection of *Guitar Hero*, Joystick and Gamepad instruments. To this we added a Wii remote and Live Sampling.

To prepare the soundscape I downloaded, edited and processed some well recognised bicycle samples from freesound.org. These samples were linked to the individual parts of each instrument using *(the sound loading module)*. Additionally to this, each instrument had its own live-sampling functionality. This was programmed into the most expressive aspect of each instrument: the two joysticks for the 360 controllers and Attack Three and the wah wah lever on the *Guitar Hero* controller. Each participant recorded a word that they associated with a bicyle and was then responsible for its diffusion and granulation in the composition using their joysticks/levers.

The participants were firstly invited to explore and 'guess the sounds' loaded into their instrument. They were the asked if they would like to speak and record a word into one of their instruments, and explore how they could granulate or diffuse this. They were then conducted using a combination of colour coding and live conduction to create an ambient soundtrack to accompany their art installation.

Evaluation

[3]See here for more information
[4]Visit www.generatormusic.co.ui/EMM2

- Guessing the sounds of the bicyle was well received, and sound design in general is always engaging within the workshops. However, it became instantly clear that the loud and punchy samples were the favourites to trigger, and samples could not be longer than about three seconds This makes sense according to Jensenius' evaluation of gestures lasting as long as the mind's working memory (Jensenius, 2007).
- I was surprised at the lack of enthusiasm that voice diffusion was greeted with. I imagined that this would be greeted with fascination and excitement, but in fact it was treated just as any other sample loaded into the instruments. In fact the bicycle horn was much better received. I will, however, continue to work with voice as I think it is one of the most powerful tools for instrument personalisation.
- The Wii remote was hugely difficult to connect, and I came close to abandoning it. I would be very hesitant to use this again. Having unstable technology in the workshop leads to a loss of attention very quickly, and can lead to stressful situations for a workshop leader. This is a shame because the gestures and movements we decided on were very fun.
- The composition sounded quite balanced and well structured. The problem was a lack of investment into the sounds by the participants.This could be solved by bringing a bicycle into the workshops and recording our own bicycle samples for the instruments.

A.2.2 Bicycle Song

For this I used the *Xbox 360* controller loops composition[5]. I loaded up a set of samples for a song to be changed by colour codes on the instruments. We played through these samples, and brainstormed some lyrics for a bicycle song. With then sang through a melody over an acoustic realisation of the song structure with these lyrics. After the participants were familiar with the song we introduced the 'backing band', and began to learn how to play through the piece using the colour. Though the loops are only triggered through 1 bit actions the participants quickly learnt that there was a right and wrong way to play through the piece, and concentrating on the colour structure was engaging. This worked well combined with singing the song and the participants learnt quickly when to change timings.

Evaluation

- This was the most successful composition in the first two weeks. The participants really enjoyed the fixed musical structure that they understood, and were invested in the lyric writing as well as the musical backing.
- The software worked very well, and none of the interfaces were unstable. The colour conduction was very effective, though the timing of the conducting needed to be very precise to compromise the individual versus group speed.
- The layers were in danger of becoming muddy. Again this called for more live compression and mixing to be built into the modules to control the sound. This can be done with a vst compressor and EQ.
- This can be extrapolated to any number of loops, which do not need to be rhythmic.

[5] see Section 5.1

A.3 Week Three: Rhythmics

Figure A.3: *Electronic Music Month*, Week Three

During week three[6] of *Electronic Music Month* I decided to concentrate on direct action-sound relationships, using MIDI pads and workshop methods designed by Graham Dowdall.

A.3.1 Drum patterns

We first experimented with the MIDI drum pads using live sampling. Each participant was shown a selection of sound objects and invited to experiment with them. They were then prompted to choose one, or a word if they wished that would be loaded into their drum pad. We then played call and response improvisation games with the drum pads to help the participants associate their sound with the sound-action.

Evaluation

- The MIDI drum pads had a very strong action-sound relationship and this was reflected with the general enthusiasm for the workshop.
- The resulting composition was simple and the basic premise of the instruments was reflected in the sound world.

[6] Visit www.generatormusic.co.ui/EMM3

A.3.2 Rhythmic Looping

This workshop was then expanded into rhythmic looping[7]. Rather than live sampling each input MIDI pad was associated with a single MIDI note, which could then be quantized for looping and loaded into one of the other controllers for playback. We also incorporated the *Kinect* as a solo instrument to be played over the loops[8]. We experimented with a selection of different synths, and concentrated on exploring the type of sound and how it made people feel. We democratically decided on which sounds would be layered in next and how the solo instruments would compliment these layers. Each player was able to personalise their solo instrument by choosing from a selection of sample packs and synthesisers. The mappings related to note density, frequency and velocity and were also fairly immediate to understand.

Evaluation

- Exploring synth based sounds was very engaging for the participants, and communication between them was encouraged by call and response and repeating other player's rhythmic motifs.
- The loops later triggered by the instruments were not effective if they were too long. In retrospect this is obvious, and reinforces success of the short loops that comprise the bicycle song.
- The *Kinect* solo instrument was very popular. The process of building an instrument held participant's attention for long periods of time, and the mappings proved expressive. There were some problems that occasionally called for recalibration poses, which can lose player's trust of an instrument. These problems are easily fixed by the leader, and so are not as distracting as the loss of connection by a Wii remote. The *Kinect* is a strange instrument to incorporate into a workshop because it tends to monopolise attention due to the physical nature of the motion tracking. Additionally, there are issues of exclusion relating to this instrument. Although physical dexterity and movement will always vary in a workshop the *Kinect* really requires a player to be standing, and have good movement in their arms. Whilst every player has different instrumental needs and will not be able to use all the instruments, the nature of the *Kinect* in this composition was as a solo instrument and therefore instruments need to be offered to replace this mode of soloing.

[7] see Section 5.1
[8] see Section 5.2

A.4 Week Four: Halloween

Figure A.4: *Electronic Music Month*, Week Four

Week four[9] was the final week of *Electronic Music Month*. The participants enjoyed using the electronic instruments to a varying degree. Some insisted on staying and playing through lunch break while others refused to attend. This engagement or mistrust of technology is to be expected. This week we developed a theme of halloween and introduced some simple amplified *Music Balls* during the warm up.

A.4.1 Music Ball Warm Up

Four music balls were placed next to the participants with individual speakers. Each ball had different sounding materials within them, amplified by the inside of a karaoke microphone. They were then connected to processes specific to each particular ball, to heighten each instrument's individual quality. The participants were asked to each explore the balls, how loud or quiet they could be played and to describe the quality of each one. They were each asked to ascribe a colour that best suited their particular sound, which was then used to conduct a composition. The nature of the composition was textural, so the musical metaphors advised related to a slow massaging motion.

Evaluation

- The tactility of the instruments was very absorbing for the participants. The action-sound relationship contrasts with the direct nature of hitting a MIDI pad. The fact that the sounds stem from an amplified action-sound coupling means that the relationships built into the processing are likely to be inherently stronger.
- The Composition was well formed and enjoyable to play, though the sonic palette is less diverse than sounds completely mapped through data interpretation.

[9] Visit www.generatormusic.co.ui/EMM4

- The biggest criticism of the *Music Balls* that I have is that they are more flimsy than mass manufactured gaming controllers. This is an important factor in a workshop composition, because having to be careful of an instrument can feel restrictive when playing.

A.4.2 Guided Storytelling

We ended *Electronic Music Month* with a Halloween themed narrative. This is a multi layered composition featuring various techniques used throughout the month. We began by making several halloween backing tracks. These were created through a combination of MIDI pads and game controllers, each linked up to seperate synthesisers, quantized and recorded into loops. The loops were loaded into the *Guitar Hero* Remote only.

In preparation for the workshop I downloaded sounds associated with halloween. These were pre loaded into the remaining instruments, and colour coded. The participants were asked to press each of the buttons and together we wrote down the sounds that we heard. The joystick was programmed in so that ambient samples were played with a stirring movement, which was particularly appropriate to the witches' cauldron. This also meant that alongside longer loops triggered by the guitar, there were other longer layers to support the foreground sounds.

We then wrote a poem, which featured our preloaded sounds. This was recited over the sound triggering via the joystick and *Guitar Hero* ambient sounds, alongside triggering of various sound effects at appropriate points.

Evaluation

- This multi layered workshop was successful because it involved instruments that the participants were now familiar with. A coherent narrative held the group's focus and the composition of musical fragments and sound design created a well rounded composition.
- Additions to this could have been made. The Wii could have been used to represent a metaphorical wand, the *Kinect* as a spell being cast. The fact that I chose not to use these is unfortunately evidence against the two devices. Instability during previous workshops has lead to a lack of trust in the devices by both me and the group. I would like to research further to resolve these issues, and I have confidence that in the case of the *Kinect* the stability can and will be strengthened.

A.5 Reflecting on *EMM*

For me to properly understand the instruments that I had designed it was crucial for me to put them into practise in a workshop environment. During this time I identified things that I had overlooked during my research and development phase and had the chance to be more objective over which approaches were successful. Most importantly, during the month I identified areas and workshop directions that were the most stable, musically interesting and satisfying for the participants.

A composition's success often reflected the theoretical literature I had read, reinforcing the notion of theory alongside practice. The participants were most comfortable with instruments with

strong action-sound relationships that used up to 4 second gestures. Metaphors to communicate the musical architecture were the most successful methods for conduction. Colour notation made the musical elements easy to organise and play. However, to draw together these ideas it is necessary to take a compositional approach. This was most noticable when I had concentrated on programming instrumental complexity rather than musical results.

Input, gesture, mapping and output need to always be considered in equal measure. In my experience I do not yet have an instinct towards natural input mappings and output and so each element of the instrumental design needs to be thoroughly considered. When a composition failed it was largely due to poor programming leading to my distraction.

Overall the workshops were a success, and I am continuing to program in compositions further. We will continue running specialised classes alongside larger cross discipline projects.

Bibliography

Anon

. Kinect. Available at: http://en.wikipedia.org/wiki/Kinect.

Benveniste, S. and P. Jouvelot

2011. Designing wiimprovisation for meditation in group music therapy with children suffering from behavioural disorders. *NIME: New Interfaces for Musical Expression*.

Brussen, W. and L. Verburg

2001. The sound of colour. Self Published, 2470 AA Zwammerdam The Netherlands.

Fels, S., A. Gadd, and A. Mulder

2003. Mapping transparency through metaphor: Towards more expressive musical instruments. *Organised Sound*, 7:2002.

Jensenius, A. R.

2007. *ACTION – SOUND: Developing Methods and Tools to Study Music-Related Body Movement*. PhD thesis, Department of Musicology. University of Oslo.

Luhtala, M., T. Kymäläinen, and J. Plomp

2011. Designing a musical performance space for persons with intellectual learning disabilities. *NIME: New Interfaces for Musical Expression*.

Patton

2011. Life music. Available at: http://www.lifemusic.org/ (Accessed 04/11/2011).

Webster, M.

. Merriam webster online dictionary. Available at: http://www.merriam-webster.com/dictionary/gesture (Accessed 28/10/2011).