Sonic Structures

For students on the UG and PG version

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Abstract

Comprehensive project brief and course guide for Sonic Structures discussing the context, submission requirements and proposed workflow.

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x.1 An image of the jawbone UP a wristband that tracks you and appears to know what your body is up to. Image from here. 5

About this project and the brief

This project is structured in two parts. The first is intended to propel you quickly into study of dynamic sound structures and the opportunities and challenges this presents by inviting you to synthesise sounds for a single button interface (musically or worldly relevant). This work will get you involved with coding simple sound structures and expects that you'll be able to invoke some form of modulation or change to the sounds each time they are experienced. However, it will also get you thinking about the *ways* sound can change to keep up with changing contexts, whatever they may be.

This project will send you searching far and wide, exploring synthesis techniques and ways to control parameters and shape good sounds with these. It will get you thinking about sound in the world. How it behaves inside, outside, day, night, who needs it and why. You'll receive feedback on your work and suggestions about how to get even more from your idea, perhaps feedback on how to implement some techniques you might have overlooked and we will engage carefully with the claims you make for your sounds and their place in the reality you define.

This part of the project should help you find the **essential intent** of your work so that you can focus the remaining learning time available to you. To do this, you need to consider the things you've enjoyed in the first submission, the gaps you may have, things you didn't like doing and to resolve what's most important to you in order to move forwards.

We have already argued the case that sound design needs to be dynamic (alive?), so how will you bring this into your development as a sound designer in order to complete part 2 of the brief? We're looking for you to set your goals and work strategically towards them, we'll assess you on how you may have reached the goals that you have set for yourself.

Context

An image of the jawbone UP a wristband that tracks you and appears to know what your body is up to. Image from here.

The art and craft of sound design, composition and screen composition is not limited to fixed media contexts (such as film or electroacoustic composition). Contemporary computer games offer a popular genre where the sound and music structures aspire to be dynamic, context sensitive, malleable and adaptable[1]. There are many other contexts where sound is (or could be) designed to adjust itself depending on when, where and how it is heard or needed. Live performance, electronic composition and free improvisation, multimedia situations, online, Human Computer Interfaces (HCI), sound art, museum exhibits, GPS-enabled podcasts, and a range of industrial audio; in car, alarms, mobile phones, sound masking, sound reinforcement, sound therapy, sonification and auditory interfaces of almost any kind constitute the short list.

Professional sound designers and composers can contribute significantly to these areas because such people are not only technically skilled in fundamentals of digital

[1]Some of us will look at this are in detail in semester 2 in the course Interactive Sound Environments | Game Design Studio http://digital.eca.ed.ac.uk/sdhandbook/category/interactive-sound-envrionments/

audio, but they also understand *how* sound can carry information to potential listeners. Importantly, they're also sensitive to *what* sounds good.

All of the above suggests that the sounds themselves are only *part* of the design process. The ***system*** that generates, manipulates, adjusts and presents these sounds is a significant concern too. Thanks to software tools like MaxMSP, Pure Data and Supercollider, and the increasing ubiquity of computing power, sonic artists can rapidly prototype and test the *behaviours and principles* of reactive and interactive audio **as well as** the sounds themselves. Audio Design is now about imagining *how* sound might adapt to unimagined contexts and conceiving the **shifting parameters** that control the sounding result.

Given this (extra?) responsibility for the *system* that generates and manipulates sound to fit its context, sonic artists must ask of their work, "what is the sound supposed to be doing now?", then evaluate "is it doing that?" and if not, persuade the system to change its parameters in a well-designed and carefully thought out way such that the sonic consequences of these changes are meaningful.

Aims of the project

- The project expects that you'll develop work that sounds good, in combination with viable proposals for how your sound can and should adjust itself to the changing contexts in which it is being used.
- This project will help its participants to develop skill in devising and implementing sound design appropriate for context-sensitive situations.
- It aims to provide opportunities to think about ways of manipulating sound in (close-to) real-time in a performance or other live-sound scenario.
- Participants will develop designs that demonstrate the principles of a real-time sound manipulation ideas designed by them. This will be done with a high-level graphical programming language such as MaxMSP[2].
- The project will expect its participants to keep a record of their processes (research, code annotation and instruction manuals) in order that they, or others might be able to recreate or continue similar work in the future.
- Participants in this project should feel pushed to develop their creative and expressive voice and challenged to apply imaginative and conceptual ideas introduced in lecture and tutorial sessions in order to prototype works of sound design that may end up in their professional portfolio. It also expects its participants to push themselves technically, to attempt to **grasp the concepts** behind real-time audio manipulation and articulate good ideas for using this technology, even if their skill with this technology is at a basic level.
- Participants will be exposed to reasonably complex collaborative processes similar to those experienced in professional circumstances, but the success of collaborative elements will not form a significant part of the assessment procedure.
- Finally, the project aims to provide a firm and well-defined project brief (this document) that participants are expected to respond to in imaginative ways.

[2] note we'll certainly focus the teaching on MaxMSP but can also help with the development of PD or Supercollider patches if you choose to work in that domain instead.

Submission 1 - a single-press event as input 30%

Introduction

For those identifying as sound designers

An industrial audio design company **Flexi-digit** has approached you to pitch sounds and modulation ideas for a button. Irritatingly, the agency have only given a partial brief. They know they need their button to make sound and that the sound the button makes is supposed to shift and adjust itself to context, but they've not told you what the button is attached to, what contexts it will be operated in, nor what information the sound is supposed to be communicating. Rather, they're looking for ideas about what the **"communication potential"** of a sounding-button could be.

The button makes something happen in the world and there is a sonic counterpart that explains to the listener/user what it has just done. They want to hear sounds of course, but they also want a carefully thought through mechanism that sculpts changes to the sound in order that the single button communicates precise information as contexts change.

Your job then is to conceive a context/scenario in which your button is to be used and to design convincing sounds that communicate information as the context in which the button is used changes.

For those identifying as musicians rather than sound designers

Point and shoot is a music software development company. The group is commissioning composers and performers to develop new sound tools for their DAW-embeddable synths and samplers. The whole point of these tools is that they are able to be controlled by a single finger. However, the intention is not to make simple single shot sample playback, but to render complex and exciting sound events or compositional *suggestions* from the press of a single button. They want you to think instrumentally here. Much like an acoustic instrument, it should be very difficult to get exactly the same sound every time the button is pressed.

Your job is to invent a musical event creation tool that is triggered by a single button. The musical style is completely up to you, but consider that any sounding event doesn't need to be too long and that it's important that it is different upon each encounter/use.

Remember, music is in flow and the context where the button might be pressed will change all the time. The sounds the button makes may need to fit into particular spectral areas, to respond to rhythmic or other challenges.

a suggested workflow for sound design projects

listen to the sound that buttons and switches make in different scenarios (in the bag, pocket, hand, on street, at home) what qualities do they share, how do they sound in different places/ranges/situations?

think about how the button's audio feedback might morph and evolve - what scenarios can you imagine single-button audio feedback might be useful in?

research how sound is said to work in auditory interfaces, who has done similar things, what challenges have they come up against?

research audio environments, gather SPL readings, make recordings and perform frequency analysis of the spaces where you think your button will be used. What frequencies and loudnesses will your button need in order to be heard?

research the psychology of your potential user. How do you think they'll respond to the sounds you are making, will they turn them off, how quickly will they learn what they mean? What character and style of person do you want your sounds to appeal to? Who are you designing for?

sketch some sound designs and try them out (use a DAW if you like) - how do they sound?

consider how these basic sketches might morph over time and use, how they might develop as the context for your button changes, how will the sounds age?

design some processing and / or synthesis parameters that might change over time.

plan a workflow for the software you're going to build, write out the components you'll need in order of importance, plot these in schematic form so that you have a very clear of idea of what to programme and when.

set limits and agree with yourself the designed/sounding limits of the processes you're going to develop.

listen back to your sketches, how do your programmed sounds sound in relation to your initial ideas? - **now loop back to *plan* and revise accordingly**

complete your software in good time so that you're able to put your submission package together, including screen-grab of the software in use and annotation of the code

pitch and present your work to colleagues for last minute feedback

submit your work to the submissions system by the deadline specified in the calendar

a suggested workflow for the more musically inclined

listen to the musical contexts you'd like your software to operate in.

think about how the button's sonic gestures might evolve - what musical situations can you imagine single-button music maker would be useful in?

research how are real-time sound manipulation processes done such that there is variation and interest at different levels of the structure, from micro-sound up?

research musical contexts such as timing (how quickly can a human play (should you system be able to play faster?)for example?

research the psychology of your potential user - is it you, the composer, or will others use this button, perhaps those in assistive music contexts? How do you think they'll respond to the sounds you are making, will they turn them off, how quickly will they learn what they mean? What character and style of music/performer/-composer do you want your sounds to appeal to?

sketch some sound results and try them out (use a DAW if you like) - how do they sound?

consider how these basic sketches might morph over time and use, how they might develop as the context for your button changes, how will the sounds age?

design some processing and / or synthesis parameters that might change over time

plan a workflow for the software you're going to build, write out the components you'll need in order of importance, plot these in schematic form so that you have a very clear of idea of what to programme and when.

set limits and agree with yourself the sounding limits of the processes you're going to develop.

listen back to your sketches, how do your real-time sounds work in relation to your initial ideas? - **now loop back to *plan* and revise accordingly**.

complete your software in good time so that you're able to put your submission package together, including screen-grab of the software in use and annotation of the code.

present your work to colleagues for last minute feedback

submit your work to the submissions system by the deadline specified in the calendar

submission 1 components - what you need to submit

the software this is the code that makes your button's sound elements work, this should be fully commented code with credits for any abstractions or 3rd-party externals used. All 3rd party software should also be included in the package so that we can run the software ourselves.

a video screen grab of you using the software and demonstrating how the sound design is supposed to work (use quicktime on the lab machines if you don't have a screen grabbing system on your own computer). See the section Submitting software projects for examination on formats below

a 600-word (maximum) project report that explains your design for manipulating sound in context - include any diagrams of the structure of the software prototype - this saves words and makes the explanation clearer. Include your research that explains why things sound the way they do in the context that you've chosen. You can include links to the sound sketches you made and any documentation of you trying these things out in situ.

any sound-file examples especially if you were unable to make them sound the way you wanted with the software we're teaching.

The submission will be uploaded to our online submissions by the date set in the course calendar. We may invite you to present/show your work before this submission in a 4 minute demonstration. The presentation **is not** assessed, however, it is a good way to make sure you've finished coding and got some feedback from your colleagues and teachers before the actual submission.

You might find it useful to share technology such as sub-patches/abstractions and other elements between your colleagues. This process should be noted clearly on your submissions and code properly credited.

Submission 1 THE DETAILS

The project report document

You will submit a 600-word description of your sound design as a **PDF** file. The description will explain the following;

- how you intended your sound to change over time (or in a changing context)
- any diagrams of your software design / or work flow / schematic
- explain any relevant research you did whilst designing and implementing your work, this might be research on perception, earcons / auditory icons, or other study that led you to determine why things sound the way they do
- provide any software credits such as 3rd party externals or tools developed by others in the class
- a bibliography containing full reference points for all things cited in the text

The software prototype

It is understood that the majority of you are at a beginner level with these softwares but this should not prevent you from finding ways to excel if you concentrate on the logic of sound manipulation, rather than trying to get too fancy with user interfaces etc. We recommend that you generate a schematic of how the sound should work, then attempt to develop it in software. If the schematic is good, then even if you don't complete the software as you want it to, the principles of this should be in place. A well researched schematic / sound plan may help to make up for a less skilled implementation.

However, given that a large proportion of the teaching and learning is based around the use of coding software, you are expected to submit some coding work and the completeness (or incompleteness) should be explained clearly in the submission.

Video documentation of the software in action

See section Submitting software projects for examination below. A video screen grab is an essential component of this submission. It shows you using the working software system on your own machine and shows it working at its best. This helps mitigate against forgetting to upload a crucial piece of the software, and gives you a chance to show the examiners the best side of the software and what your intentions were.

Any other resources

If your project has met with total disaster (very unlikely), it's a good idea to include the sketches, particularly sonic ones of how you would have liked things to sound had the work not fallen over. This way, you can get credit for your sonic ideas and proposals, even if the code is still to be perfected.

Submission 1 checklist

Place all of your resources and sub-folders inside a single top-level folder and create a .zip of the package and upload to the VLE.

component	completed
text document and schematic as pdf	
video document as mp4 or .mov	
sound software will all components required to make it work	
any sketches, sonic or otherwise that help explain what's here or what you wish was here	

Submission 2 - ensemble as context 70%

You have been given or will find an experimental film. It needs sound. Because the film is "experimental" it requires that you experiment with its soundtrack, its narrative has not been set in advance, there are no preconceptions regarding what the film is *about* and its your job to sort this out.

In groups of three or four, devise a performable soundtrack for the film. Each person in the group will be responsible for a specific element of the film's sound track. You should decide who will work on what and develop your layers and elements accordingly. Your system will need settings that can be stored and recalled and you'll need to be able to rehearse and perform with your software. You might think of designing elements around concepts of live Foley, sound synthesis, synchronisation, semi-sync, or an-empathetic sound, or you may choose to divide the work between the group across the frequency spectrum, over time (four solos) or to group sound design elements by sound type.

Despite performing as a group of four or five, this submission is an **individual** submission and will be examined as such. It will consist of;

- Documented software for your element of the soundtrack (this means a video screen grab and well commented code).
- A written document that explains how your sound design was supposed to work and any research you made whilst developing the project (1000 words maximum)
- Documentation of a live performance of the whole sound track, or a studio version of the piece as a finished video. (This will be made by the group).
- Any other resources you think are relevant.

The submission will be uploaded to our online submissions folder by the date set in the course calendar.

Submission 2 - THE DETAILS

The project report document

You will submit a 1000-word(max.) description of your sound design as a PDF file. The description will explain the following;

- how you intended your sound to change over time
- how you experimented with interpreting the image - what was your concept?
- any diagrams of your software design / or work flow / schematic
- explain any research you did whilst designing and implementing your work, this might be research on perception, performance, controllers, experimental performance, live sound design
- provide any software credits such as 3rd party externals or tools developed by others in the class

- a clear explanation of what everyone did in your ensemble to make the soundtrack come together and any particular details of your role, how you designed your voice to fit with the other voices for example.

The software performance

It is understood that the majority of you are at a beginner level with these kinds of programming languages and that some of you aren't experienced performers. But this should not prevent you from finding ways to excel by concentrating on imaginative methods of sound manipulation and a vivid audio-visual response that can be realised in real-time. We want you to experiment with what this new situation for designing sound offers you and we appreciate that this involves some risk on your part.

It is likely you'll need some real-time controllers such as midi interfaces, joysticks, keyboards, we have patches that can help with this so don't spend too long on the input-control elements of the performance, think more about the sound and how you're going to manipulate and change it over time to work with the film and make a convincing performance/realisation of the soundtrack.

Given that a large proportion of the teaching and learning is based around the use of Max or PD, you are expected to submit some working code and the completeness (or incompleteness) should be explained clearly in the submission.

If you use externals, then this code should be credited properly in your documentation and **in the code**. The externals should be included in the same folder as your own PD patches, again, so that these files can open and work on any machine. It's good to test the portability of your code before submission by moving around a few machines.

We recommend that you generate a plan of how the sound should work with the film and then attempt to develop it in software. If the schematic is good, then even if you don't complete the software as you want it to, the principles of this should be in place. A well explained schematic / sound plan may help to make up for less actual skilled implementation.

Even though we will have a public performance of your project on this course. You don't have to submit that performance for examination. In fact, it's very good if the group can get together after the performance to respond to the feedback and do a few more runs of the performance and submit that. We don't examine the whole group performance, but we examine your role in the group, how your voice moves and responds to the others, contributing to the whole.

Therefore, it's a good idea to submit the group's best take (or the one that you think is best) and also a solo version of your performance so we can hear just you playing.

Video documentation of the software in action

See section Submitting software projects for examination below.

The performance

We'll arrange a performance opportunity for you before submission. **This is not assessed**. You'll get some feedback on this in the session, this will generally attend to the sound qualities of the different elements of the ensemble. The performance itself will not feature particularly in assessment comments, rather, we'll feedback on the *performability* of the system you've devised and its ability to be reconfigured for the different contexts you find yourself in whilst you play to the film. We'll also comment on the overall audio-visual impact of the elements you've designed.

Submitting software projects for examination

Software submissions are often tricky. There is no guarantee that software you submit now will work on different people's systems, no matter what you do to protect yourself from that. So it is important to submit documentation of the software working "as you see it" at the time of submission. The best way to do this is to generate a video screen grab of you using the tool yourself. We have purchased a site license for iShowU which will allow you to make a video of your actions on screen. However, Apple's quicktime, universally available, is capable of making screen recordings and we recommend you use that as it's much easier to use, though less fancy.

- The video can be annotated with your voice, text, or just be a demo of you using your tool.
- Compress the video to .h264 in a .mov or .mp4 container and scale the dimensions to a reasonable size for playback across networks. Do NOT submit uncompressed HD footage of a screen grab - this is not necessary.
- Practice using your screen grabbing software before the deadline, this is complex stuff and sometimes people don't know that they're not recording the sound output of Max/PD, you may need to use soundflower or other sound-routing tool, or an external sound card and loop back into it… We can show you how to do this if nescessary.
- Where relevant (e.g if using MaxMSP), you can submit a standalone version of the software that compiles all elements needed for the software to work in one executable package.
- Where possible, submit all source code for examination and keep it in the same folder. Include a readme.txt file to explain which files to open and where they should be installed to make them work.
- Write yourself (and your examiner) a short manual
- Where possible ensure that the software will work on the lab machines in Alison House, providing alternative solutions if asked.

Criteria for Assessment

Work will be assessed in line with the University's common marking scheme[3] and on the basis of;

- Demonstrated competence with sound design, composition and Computer Music programming tools
- Skills in creatively deploying allocated resources, whatever their quality (such as dealing creatively with a complex film, working with a simple single button input to make exciting sounds)
- Precision and competence in presentation, including well-formatted documentation of the work
- Ability to meet the requirements of the project brief and deal creatively with its open-ended aspects
- Design quality of the work in terms of meeting functional requirements, legibility, usability, interactivity, and appropriate use of media
- High quality sound design whilst being faced with other creative challenges
- Account will be taken of the risks taken and degree to which the design deviates from standard solutions

Please note that assessment will take account of tradeoffs between the above criteria, particularly in light of the diverse backgrounds of students in the class. You are encouraged to seek feedback during the development of your work, but please note that adhering to feedback does not guarantee a high assessment of the completed work. Note also that the assessment of the work is not necessarily commensurate with the amount of time spent on the project work.

We will offer constructive feedback on the submissions but cannot give detailed feedback on every detail of the software submitted. Within four weeks of submission you will have received feedback on your work and a provisional mark, to be confirmed after the exam board in May/June of the year of study.

Tutors may refer to the risks taken in response to the brief, the sound quality, the approach you've taken with your system-based sound design, the clarity of the written components, the style and clarity of the programming and the conceptual approach taken - especially with regard to wider research that may have informed your design.

[3] http://digital.eca.ed.ac.uk/sdhandbook/marking-scheme/