Multi-track Recording and Mixing for Surround

Module Code: MU70012E
MA Audio Technology: AUDTEC001E

Lecturer: Richard Curwood
Student: Josh Fairhead (21057665)

Table Of Contents

Introduction

Two pieces of work are being created for this project, one a recently written but unrecorded track called 'Primates' and a piece to accompany the video to NASAs 'Strange Enough'. The track 'Primates' is intended as the first stage of a concept album on the evolution of music which primarily deals with the origins of music and as such is suited to focusing on the use of space rather than programming - which will be abundant in the video piece.

Research

In terms of recording, primary research has been conducted throughout lectures where various surround microphone techniques were auditioned. Along with this the author has also been aiding a peer in the recording of two concerts of a big band and Gamelan where in the first instance a spaced array (Decca tree) was used. In the paper "Stereo Microphone Techniques; Are the Purists Wrong?" the author - Lipshitz (1985) - discusses the advantages of coincident techniques over spaced techniques; although no coincident surround technique was used at the time, a Zoom H4 was also placed by the conductor which - in the authors opinion - sounded better than the Decca when replayed in stereo. Partly due to this the second recording was created in double mid-side for comparative reasons; however the opportunity to audition the recordings in a surround environment has been limited due to being performed only of recent and so comparative judgement of each technique is reserved. However it should be noted that spaced techniques were generally of personal preference when auditioning the surround capture listening tests from the ORF surround seminar (Hauptmikrofon 2011).

In terms of writing and mixing for 5.1 commercial demonstrations were also auditioned and analyzed.[1] Most interesting of these from a rock perspective was Pink Floyd's *Darkside of the Moon* where Parsons and the band tracked for quadrophonic playback; here effects such as delay repeats were panned to different speakers while parts were written to fill the listening space (Parsons 1975). Although Parsons only produced the album in quadrophonic and not in surround, though similar techniques were utilised and are still of relevance in modern 5.1 mixes. From a newer perspective the album *Surrounded* by Tipper was an interesting example, where the artist makes use of the multiple speakers to create moving musical patterns to hold audience attention and immerse the listener. Finally stereo to surround up-mixes were auditioned and provide a perspective into how much less effective the surround experience is when the format is not considered.

Consideration has been given to the video output format from the start; the final format will have to be authored with with DVD Studio Pro and only accepts certain video codecs for transcoding into MPEG-2. Standard definition DVD has a 16:9 display ratio with an image resolution of 720x576 (Apple 2009) so video assets were firstly transcoded into this format to be used upon completion as a master image output. DV is also an intraframe format which requires less processing power to decode than the interframe H.264 original which is essentially a predictive codec. DV unfortunately results in a larger file size and limits the available transfer bandwidth to a drive and so to avoid this the master DV file was transcoded into a photo JPEG for sync reference in Pro Tools.

---

[1] See discography

Attention was also paid to the frame rate of each conversion to ensure the avoidance of possible sync issues at a later stage in the project and thought has also been given to the Grammy suggested guidelines for mixing surround such as monitor calibration (Ainley et. al 2004).

Pre Production - Primates
After some success in creating a custom click track for Advanced Non-Linear Recording it was decided that the feel of 'Primates' could also benefit from a non-continuous tempo map; a workflow the author is currently focusing on. This is an attempt to recreate the feel of natural tempo shifts that occur when playing 'free', while clocking the various sections of a song at the same pace (e.g. The verse will have a variable tempo but the second verse is identical in speed/length). To do this a live run through of the track was performed with a piezo pickup taped to the underside of the drummers hi-hats, these were then played in a predominant fashion providing clean transients for beat detection.

With a take approximate to the expected outcome the author went through the session using the add bar/beat command at every bar to create a tempo map of the performance. The guide tracks (one pickup, one drum microphone and a guitar DI) were then separated on a semi-quaver grid after which their time base was changed to ticks. This allowed the tempo changes to be altered while still keeping the guide tracks in time for audition purposes, while fine tuning was then made by playing to the click track and adjusting it while playing. Unfortunately however retracking guide guitars in time to this click was found to be extremely difficult and is thought to be due to some of the more extreme tempo jumps; as such the author intends to make another attempt at mapping it.

Pre Production - Music to the video 'Strange Enough' by NASA
After choosing a suitable video and downloading it as a high definition H.264 encoded video, the author transcoded the source into a both DV to create a standard definition master file and a Photo JPEG for the purpose of quick playback/less use of CPU recourses. This is because H.264 is an interframe (predictive) codec and requires processing power to compute the differences between frames than the more efficient MJPEG codec (One Stop Digital 2010).

Edited video often contains scene changes which necessitate the accompanying music to conform with it such as a key shot that seems as if it should fall on a down-beat, although it may not naturally fit to the tracks tempo. A workflow suggested by Christopher Brooks (2010) is to note the timecode where the first downbeat should occur, place a bar/beat marker at said point and then decide on a tempo slope between start an end points - done through the tempo operations window in Pro Tools. After this the process can be repeated as the music is written until a satisfactory map is created to fit all the necessary cut points.

Plan of action
Drums for 'Primates' will be recorded in surround, ideally in a large room with an Optimised Cardioid Triangle/Hamasaki Square combination. This was picked out in the authors notes as sounding 'enveloping and clear with a good sense of space and above average instrument separation' and seems ideal for envisioned drum sound. Attempts to secure vestry hall for recording this project have been made and if they are confirmed then the Soundfield will also be tracked for comparative purposes as it would be interesting to audition the difference between a coincident and a spaced technique when recording transient material.

Instruments such as guitar will be overdubbed and the surround space will be made use of with effects, automation and additional layering. In the authors opinion an old stereo trick of panning the instrument and its reverb to separate speakers can be made use of in the surround environment to a much greater effect. This does not need to be drastic and could possibly come in the form of placing close microphones into speakers differing from the ambience microphones.

The video is relativity abstract in nature and so an electronic stye of composition seems like the best option. The track will primarily be created using samplers and soft synths while the tempo map is created in reference to the picture. Although no surround recording technique will be utilised, attention will be given to conforming the composition to a visual element and will make heavier use of the surround environment as a creative tool. An example of this could be the use of rhythmic and melodic counterpoints played across the listening space; allowing interdependent musical ideas to be heard over opposing channels, a technique employed to some extent by Tipper (2003). In the visuals there are also several cues which can be tempo synced to sound effects such as the falling clouds and blooming flowers, which in turn can be sent to different positions in the surround space.

Conclusion
Although foundation work and research has been carried out to a large extent the author will need to make a good deal of audible progress in the near future and logistics will play a large factor in completion. As mentioned action has been taken towards securing a recording date for 'Primates' though the availability of other sessions are seemingly in short supply over the coming month. To deal with the workload the author intends to do much of the video composition over this time on a home setup and writing with 5.1 in mind; after which it will be adapted in the studio and then mixed in surround. Lastly the video will be authored using DVD studio pro with the AC3 audio codec at a depth of 16bit and a sample rate of 48kHz.

Word Count: 1523

References

Ainlay et. al (2004) - Recommendations for Surround Sound Production - The Recording Academy's Producers & Engineers Wing, online [available: http://www2.grammy.com/PDFs/Recording_Academy/Producers_And_Engineers/5_1_Rec.pdf]

Alan Parsons (1975) - Four Sides of The Moon - Studio Sound Magazine [On-line reissue: http://www.stereosociety.com/FourSides.shtml]

Apple (2009) - DVD Studio Pro 4 User Manual - p56, Apple, US, Online [available: http://documentation.apple.com/en/dvdstudiopro/usermanual/DVD%20Studio%20Pro%204%20User%20Manual%20(en).pdf]

Christopher Brooks (2010) - Tempo mapping to picture: Pro Tools 8: Film Scoring from lynda.com - Online [available: http://www.youtube.com/watch?v=IFG2AYdER58]

Hauptmikrofon (2011) - ORF Surround techniques - Hauptmikrofon, Online [Paper: http://www.hauptmikrofon.de/index.php?option=com_content&view=article&id=68&Itemid=58] [DVD: http://www.hauptmikrofon.de/index.php?option=com_content&view=article&id=62&Itemid=71]

One Stop Digital (2010) What is the Best Quicktime Codec for Working with Pro Tools - Online [available: http://www.osd-uk.com/2010/03/what-is-the-best-quicktime-codecfor-working-with-pro-tools/]

Stanley Lipshitz (1985) - Stereo Microphone Techniques; Are the Purists Wrong? - Audio Engineering Society, Paper 2261, US.

Tipper (2003) - Surrounded - Screw loose; Myutopia Recordings; 5.1 label group

Discography

Holophone (Unknown), Surround Sound Microphone Systems; DVD Demo: Rising Sun Productions, Canada.

King Crimson (1974) Red; Discipline Global Music.

Nordheim (unknown) Cikada Duo; The Nordic Sound, 2L.

Miles Davis (1959) Kind of Blue; Columbia.

Pink Floyd (1975, 2003 rerelease) Dark Side of the Moon; EMI.

Porcupine Tree (2003) In Absentia; Lava records

Surrounded By Drums (2001); SPL Electronics gmbh, Germany.

Tipper (2003) - Surrounded; Myutopia Recordings, 5.1 Label Group.