



**Binaural Spatialised Music in Computer-Generated
Imagery (CGI) and non-CGI Media :**
*Spatial Electroacoustic composition as part of
fully immersive and interactive environments as
Virtual Reality (VR) and other 360° Media.*

Master Thesis

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Course: MA Scoring for Visual Media and Film

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Abstract

Abstract to be written...

Signed Declaration

I declare that this thesis has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where stated otherwise by reference or acknowledgment, the work presented is entirely my own.

Date and Signature

Dedication

This thesis is dedicated to... I dint know yet :D, Well, actually I do, but I'm too lazy to write it out now. I will do it at the end.

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List of Acronym

- AR** Augmented Reality
- MR** Mixed Reality
- VR** Virtual Reality
- XR** Extended Reality
- FPV** First-Persons-View
- DoF** Degrees of Freedom
- CGI** Computer-Generated Imagery
- CG** Computer-Generated
- VFX** Visual Effects

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Chapter 1

Introduction

1.1 Introduction

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1.2 Project Description

intro-projdesc has to be written...

1.2.1 Technology

intro-projdesc-tech has to be written...

1.2.2 Composition

intro-projdesc-comp has to be written...

1.2.3 VR Experience

intro-projdesc-VRExp has to be written...

1.3 Genre

genre has to be written...

1.3.1 Interactive Media

intro-genre-iMedia has to be written...

1.3.2 XR

intro-genre-XR has to be written...

1.4 Goals and Motivation

intro-motivation has to be written...

1.5 Key Contributions

intro-contribution has to be written...

1.6 Thesis Outline

intro-outline has to be written...

1.7 Conclusion

This chapter covered a few of the numerous preambles fueling the concerns we have to bear in mind in order to understand the areas we will have to cover. We took an overall look at the technological aspects which are involved in the work, the compositional background and the interactive field we will have to deal with.

The next chapters will cover the Background of the research, followed by the Review and Methodology. Thereafter, we will explain and have an in-depth look at the compositional work related to the research.

Chapter 2

Background

2.1 Introduction

In this chapter, we will discuss several points which are directly related to the perception of the music and how we can maintain the attention of the listener at each place of the orchestra. These elements will form the biggest part of the background we will build our research on.

2.2 Spatial Music

2.2.1 Enda Bates

back-spatialM-eBates has to be written...

2.2.2 Varese

back-spatialM-Varese has to be written...

2.3 Musical Style

2.3.1 Spatial Music

back-style-spatial has to be written...

2.3.2 Music storytelling: Opera

back-style-spatial has to be written...

2.3.3 Ligeti

back-style-ligeti has to be written...

2.3.4 Bjork

back-style-Bjork has to be written...

2.3.5 Electro-acoustic or Tape music

back-style-electro has to be written...

2.4 Immersive Audio Technologies

back-IAT has to be written...

2.4.1 Immersive Media

back-IAT-iMedia has to be written...

2.4.2 Higher Order Ambisonics

back-IAT-HOA has to be written...

2.5 Conclusion

This chapter covered the background needed in order to achieve properly the research that has to be made. We discussed several points which are directly related to the perception of the music and how we can maintain the attention of the listener at each place of the orchestra.

The next chapters will cover the Review of works and literature already existing in the domain which has to be studied.

Chapter 3

Review

3.1 Introduction

In this chapter we will be reviewing some important works or literature written in relation to the background knowledge we have to build in order to achieve a proper understanding of the research.

3.2 Spatial Music

3.2.1 Enda Bates

rev-spatialM-eBates has to be written...

3.2.2 Varese

rev-spatialM-Varese has to be written...

3.3 Musical Style

3.3.1 Spatial Music

rev-style-spatialM has to be written...

3.3.2 Music storytelling: Opera

rev-style-spatial has to be written...

3.3.3 Ligeti

rev-style-ligeti has to be written...

3.3.4 Bjork

rev-style-Bjork has to be written...

3.3.5 Electro-acoustic or Tape music

rev-style-electro has to be written...

3.4 Immersive Audio Technologies

rev-IAT has to be written...

3.4.1 Immersive Media

rev-IAT-iMedia has to be written...

3.4.2 Higher Order Ambisonics

rev-IAT-HOA has to be written...

3.5 Conclusion

In this chapter we will review all the background knowledge needed in order to build the understanding the research implies. We discussed several points which are directly related to the perception of the music and how we can maintain the attention of the listener at each place of the orchestra.

The next chapters will cover the Methodology that has to be followed in order to achieve the final result of the work.

Chapter 4

Methodology

4.1 Introduction

In this chapter we will explain how the work was done. All the thoughts and decisions undertaken during the elaboration will be listed in three major sections:

1. Implementation
2. Composition
3. Technical

4.2 Implementation

4.2.1 Musicians

methodo-implement-music has to be written...

4.2.2 Location

methodo-implement-location has to be written...

4.2.3 Recording Rigs

methodo-implement-rigs has to be written...

4.3 Post-Production

4.3.1 Editing

methodo-postprod-edit has to be written...

Audio

methodo-postprod-edit-audio has to be written...

Video

methodo-postprod-edit-video has to be written...

4.3.2 VFX

methodo-postprod-vfx has to be written...

4.4 Rendering

methodo-render has to be written...

4.5 Conclusion

We will face a couple of important choices during the recordings and the implementation. Several versions will be made and placed on private 360 Youtube videos in order to discuss the final results with musicians, non-musicians, and technicians before rendering the final application or video.

In the beginning we consider working with Google Resonance. Google Resonance will be used in a second stage. Google Resonance will be powerful and very effective when we will be in a full Computer-Generated (CG) environment. Each musician will be 3D scanned and placed in the VR environment. Each 3D musician will be live animated with Motion-Data sensors clipped on their desks and linked to the skeleton of the 3D mesh inside the Game-Engine. Google Resonance will be fed with all the microphone tracks and will render a binaural track in function of where the viewer will situate himself in space. At that level we will not have to struggle with that amount of cameras anymore. Because the environment will be entirely computer generated, the viewer will have entire freedom to move virtually on and around the stage and perceive the sound as if he would be there.

This technology is growing very fast, but as soon as we can get it on an orchestra or a television news presenter, it will be soon available for sport and other entertainment companies. Their spectators will wear their headset and they will be able to be transported to the stadium and evolve on the court as if they would walk around with the players. As we have seen in (Alvarez 2018), the digital human "Siren" at the GDC2018 the collaboration between Epic Games, Vicon, Cubic Motion, 3Lateral and Tencent. This amazing interaction between motion data, CGI and a game engine will bring us towards the future of broadcasting entertainment. We don't have to forget the power of sound and music, which makes 70% of the immersive reality. This is where we as technologists, composers and musicians have to jump into.

Chapter 5

The work

5.1 Introduction

Initially the work was intended to be made on a big ensemble, like a chambre orchestra. But we decided to think smaller in order to go in-depth with a string quartet. The understanding we will build with this small instrumentation will be helpful to develop it later for orchestral ensembles.

5.2 Musical Analysis

As soon as the score will be written, an in-depth analysis of the choice made and the musical gesture will be done and divided in these three categories :

1. Structure and form
2. Counterpoint and Melodic Material
3. Harmonic material

5.2.1 Structure and Form

work-analyse-struct has to be written...

5.2.2 Rhythmic Material

work-analyse-rythm has to be written...

5.2.3 Melodic Material

work-analyse-melo has to be written...

5.3 Immersive Behaviours

In this section we will analyse the relation between the visual and acoustic aspect of the work. How does the viewer perceive the music? At which point and how would we as composers, be able to enhance a reaction by the viewer? Which elements are maintaining the interest of the viewer in en VR environment? All these questions will have to be answered and analysed.

5.3.1 Psychological aspects

work-immersive-psycho has to be written...

5.4 Conclusion

work-conclusion has to be written...

Chapter 6

Discussion

6.1 Introduction

In this chapter we will discuss some elements which are essential in order to achieve the expected results.

6.2 Critique, Evaluation and Preparation

disc-crit has to be written...

Chapter 7

Conclusion

7.1 Introduction

concl-intro has to be written...

7.2 Summary of Thesis

concl-summary has to be written...

7.3 Major Findings and Answers

concl-answers has to be written...

7.4 Future Works

concl-future has to be written...

7.5 Conclusion to the Thesis

concl-finalconcl has to be written...

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