

Kirk Hogden

Supervisor: **Nuno Palmeiro Otero**

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Adaptive Soundtracks in Video Games

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BSc H GAMES DESIGN & DEVELOPMENT

ABSTRACT

Many game studios still use linear soundtracks despite other music composing methods being out there, resulting in methods such as generative music not having widespread attention around the game industry. This is a problem because linear soundtracks aren't as dynamic or efficient at transitioning compared to other methods, and listening to the same loop over time starts to become repetitive and less effective against the player's emotions.

To approach this problem, a video game with a beginning to end is to be designed and developed which supports multiple methods of composing soundtracks, one of those methods has to be linear and the other being an experimental choice of either adaptive or generative music. Using a between-groups method, participants will invited to play through the game after they have filled out a consent form which explains the tasks they'll be completing. One group will get to play the game as it plays linear soundtracks, while the other group will play it with the experimental method of playing music. Hardware will be used to discover each player's emotions, such as using a heartrate display, and each participant's session will be recorded with a webcam which helps to get results unobtainable by simply filling out a survey.

ACKNOWLEDGEMENTS

This project has received attention and much support from its supervisor Nuno Palmeiro Otero, who gave many ideas on how to get the best out of research in this project. Participants have also made this project possible and their participation in research is much appreciated.

Thank you to everyone who assisted in this project.

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1 INTRODUCTION

1.1 Background

Audio has been a fundamental element for video games since the first ever game titles. Tennis for Two used audio queues throughout gameplay in 1958. It often plays when interaction takes place, such as when the player presses a button, or their character collides into something. (Pute & Pasquier, 2020) Music is a form of audio, and the focused type in this report. It amplifies the viewer's emotional responses when consuming media, whether that is movies or in this project's focus: video games. (Pute & Pasquier, 2019)

There are three types of soundtracks that video games may include. The most recognisable is linear, which simply plays a piece of music from beginning to end before looping. With nothing more, linear is a simple form of music. It lacks the additional features to make the soundtrack interesting but possesses less risk of sounding unpleasing which makes it the most popular method. Adaptive soundtracks is another method where music changes in response to events that happen within the game. It has received the alternate name interactive music due to this reason as often these changes are to make the music match how the player may be feeling. These changes could be for example, a layer may be added or removed, or the tempo takes a turn. Lastly, generative soundtracks is the most advanced. Generative music is computer-generated, not only adapting with situations to guide user emotions, but is never-ending. (Pute & Pasquier, 2020)

A problem in the game industry is that many studios still choose linear soundtracks over adaptive or generative music, despite the advantages that they carry to increase gameplay experience. (Pute & Pasquier, 2019) It is expensive to compose adaptive music for a game, compared to linear. Because linear music however is a looping audio, it begins to become repetitive for players listening over time which destroys the immersion. (Pute & Pasquier, 2020) When technology is evolving for games ever since it's early-debuts in 1958, it makes sense that music should take a step forward in advancing too.

1.2 Research aim and objectives

Project aim: To solve the issue of repetitiveness in videogame music through improving soundtracks.

Objective 1. Discover what methods can be used inside a game engine through literature reviews.

Reading through literature reviews gives better insight onto the problem, giving an idea of the current state-of-the-art and seeing how this project can use the work of others to find a solution in improving video game soundtracks.

Objective 2. Design/develop a prototype game that will be used as the proposed solution in research.

The proposed solution will be a video game that contains linear and adaptive (or generative) soundtracks. It will be toggleable on what form of soundtracks play. This is ideal for a between-groups study where one group plays the game with linear music, whereas the other plays with the alternative option.

Objective 3. Develop the final build with the desired soundtrack methods implemented.

Using either Unity or Unreal Engine, the design prototype will be developed into a final build. To make sure in-game music has a reasonable impact on player experiences, music assets will have to be either borrowed or purchased online.

Objective 4. Have participants play through the final build to collect primary data.

Participants will be invited to partake in research before consenting. In a between-groups study, one set of participants will be requested to play the game with the setting that it plays linear music. Another group will play the game with adaptive soundtracks. For both sets, participants are required to put on hardware, such as a heartrate monitor and headphones. A webcam will be used to collect facial readings. When the participant has finished playing the game, they are asked to complete a survey which will allow them to answer questions on how they may have felt emotionally during gameplay. Each participant's data is kept and recorded for research.

Objective 5. Use primary data to see which method of soundtracks has a better impact on emotions.

Using readings from hardware and survey answers by each participant, data will be used to tell which method of soundtracks had a better impact on emotions.

2 RELATED WORK

2.1 Generative Music in Video Games: State of the Art

With assistance from the project's supervisor, a term that helped greatly in this project is generative music. Although it is a method of video game soundtracks alternative to adaptive music, the term alone has helped discover a journal article that has helped see the current state of the art in video game music. The source is called *Generative Music in Video Games: State of the Art, Challenges, and Prospects*. This source shows what current issues that music is facing within the gaming industry, explaining the lack of use of adaptive and generative music in modern titles, as well as the repetitiveness of linear music. It is stated that part of why generative music isn't often used is because it can produce worse music than linear according to the composer of the game *No Man's Sky*. (Pute & Pasquier, 2020) If it isn't used often, however then it could be theorised there's a lack of practice in the implementation of generative music.

This source helped bring the idea that this project could serve to see how effective adaptive or generative music would be in games. Almost every game has the issue that music loops continuously to the point of repetition. Encouraging the use of generative music in video games can solve the issue of losing immersion for even players whom have played the same title a lot of times.

2.2 Music Matters

The same authors of the prior journal article made a conference proceeding with research. The source is called *Music Matters: An Empirical Study on the Effects of Adaptive Music on Experienced and Perceived Player Affect*. This source backs up the point that better methods of soundtracks are lacking in video games when they have better advantages over linear music. It makes the point that research on generative music can just improve games, but also assist making generative systems better. A proposed solution for this conference proceeding is shown which is discussed later in the report. (Pute & Pasquier, 2019)

This study gave the idea that a game for a proposed solution would help gather primary data. It also offers ideas on how data could be stored when carrying out participant research. Because this source has carried out research with participants, it further proves that music influences emotion during video games which gives reason for this project to continue off similar work.

2.3 Existing products related to this project

A notable product like this project's proposed solution is Galactic Escape. This was a proposed solution found in one of the literature reviews of this project. Galactic Escape helped in reading tension that participants gave off while music played. It explores the different forms of tension and discusses how it can be produced through games and music. The research project that this proposed solution served for came with tables and graphs to neatly contain data for comparing results with, as well as making the study easier to read. (Pute & Pasquier, 2019) Galactic Escape is comparable to the proposed solution because they both complement their associated projects in trying to improve music for video games.

'How Can Video Game Atmosphere Affect Audience Emotion with Sound' is a conference proceeding where participants would play through a game while having their facial expressions recorded on camera. This would help to find out how participants may feel when playing through games. (Thiparpakul, Mokekhaow, & Supabanpot, 2021) The idea to use a webcam to read player emotions came from this conference proceeding since it can answer questions that participants may otherwise be unsure how to answer. Although it specifies sound rather than music, it proves that sounds overall in any form is an important aspect of video games to increase the emotions of players. This research is comparable because it focuses on seeing how audio can tamper with how players approach video games.

3 PRODUCT DESIGN

3.1 Proposed product design

This chapter should be approximately 650 words.

In this section you should describe your design for the product. It is usually helpful to use images and/or diagrams to communicate key feature of your design for the product. Images should be centred and formatted ‘in-line with text’, with a figure caption below and callout in the main text e.g. “Figure 1 shows...”.

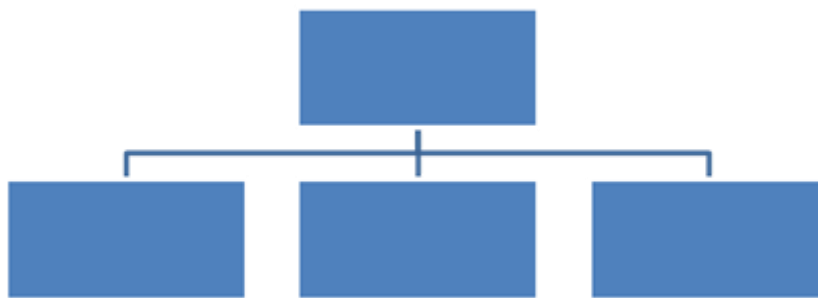


Figure 1: This is a legend. Caption to go below figure.

If needed you can refer to appendices for other preliminary design work such as storyboards or sketches. Appendices do not count towards your word count. Use a callout for appendices e.g. “for preliminary design sketches, see Appendix B”.

3.2 Proposed product features

In this subsection you should provide a table or list outlining your intended features for the product. It is often helpful to do this using a MoSCoW table. Tables should be presented with a caption above. Use a callout in the main text for the table e.g. “Table 1 shows...”. Text in tables does not count towards your word count.

Table 1: This is a legend. Caption to go above table.

| Feature | MoSCoW Rating |
|---------|---------------|
| Text | Text |
| Text | Text |

4 PRODUCT DEVELOPMENT

4.1 Development of a key aspect

This chapter should be approximately 1350 words. In this section you should describe the development of your product based on your designs. Describe the development process undertaken, giving specific details of what you did and why, as well as any technical problems you encountered. You can use subsections to divide your discussion into key areas of your development work.

Remember that in this chapter you can also use figures such as screenshots or tables to show your development work or highlight key areas you have worked on.

4.2 Development of another key aspect

This subsection would look at some distinct area of your development work.

4.3 Development of another key aspect

This subsection would look at another distinct area of your development work.

5 EVALUATION

5.1 Methodology

This chapter should be approximately 1350 words.

In this section you should explain the evaluation methodology used to test your product. What user testing did you carry out? How did you recruit participants? How many participants were there? What did you ask them to do? How did you record the results? You should also briefly refer to ethical procedures you followed and place any participant consent forms and information sheets in an appendix.

5.2 Results

In this section you presents the results of your study. You can use figures/charts and/or tables as needed.

5.3 Discussion

In this section you should discuss and interpret the results of your study. What did you learn from the evaluation about your product which was successful or could be improved in the future?

6 CONCLUSION

This chapter should be approximately 650 words. Here you should summarise the outcomes of the project in relation to your original question. Refer back to your project aims and objectives. Give a summary of what was carried out, what the outcomes were and what was ultimately learned. Point towards the wider relevance of the work you carried out for related investigation in the future.

7 REFERENCES

References should be ordered alphabetically by the name of the author (or, if there is more than one, the name of the first author. The Harvard system is used. Each reference should state the author's name and initials, date (in parentheses), title, publisher and place of issue (if known) e.g. Seber G.A.F. (2003), *Multivariate Observations*, John Wiley, New York.

If the reference is to a journal or to a conference proceedings article, then the journal title, volume, number and page numbers should be added, e.g. Parnas D.L. et al (2001), Evaluation of Safety Critical Software, *CACM*, Vol. 33, No.6, pp. 636-651.

Using internet sources you should add the word "online" in brackets after the title of the work, plus the URL after the name of the publisher.

APPENDIX A - Ethics Forms

You can use one or more appendices to provide any supporting/supplementary information related to your project. Appendices are ordered using letters (A, B, C...). These can include detailed and technical documentation such as table of results, diagrams, program source code, etc, which are essential parts of the project but not directly a part of the main discussion in the report. All contents of appendices should be exclusively, products of the student's own work.

One appendix you should include is 'Ethics Forms'. In this appendix you should copy in your information sheets and consent forms, unless you opt to upload these as a separate zip file on Moodle. It is possible to use other appendices for key examples of code, preliminary design work or other relevant material. Please discuss with your supervisor. Appendices do not count towards your word count.