Procedural Audio for Virtual Environments workshop

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ABSTRACT

Sound design is a crucial aspect of interactive virtual environments (VEs). Often, this activity is fixated by the constraints of the tools we use or our perception of that medium. In this on-site workshop, we present methods to model sound-producing objects and their behaviour. In particular, participants will learn and apply procedural audio principles to leverage the experience and interaction with the virtual environment through sound.

CCS CONCEPTS

• **Applied computing** → **Sound and music computing**; **Physics**; • **Human-centered computing** → **Interaction design theory, concepts and paradigms**; *Interaction design process and methods*; *Accessibility design and evaluation methods.*

KEYWORDS

Interactive Audio Procedural Audio, Virtual Environments

ACM Reference Format:
Balandino Di Donato and Rod Selfridge. 2022. Procedural Audio for Virtual Environments workshop. In *Proceedings of Audio Mostly (AM'22), September 6–9, 2022, St. Pölten University of Applied Sciences, Austria.* ACM, New York, NY, USA, 2 pages. https://doi.org/10.1145/0000000.0000000

1 AIMS AND OBJECTIVES

This workshop is inspired by combining the teaching experience and research experience in this field of the two authors.

The research behind this workshop is based on Rod Selfridge's PhD thesis [1] on Real-Time Sound Synthesis of Aeroacoustic Sounds using Physically Derived Models (see overview video[1]). Upon this body of knowledge, this workshop aims to explore procedural audio for virtual environments principles and practices in an interdisciplinary, diverse, interactive and collaborative setting. Musicians, technologists and sound artists from different backgrounds will be invited to create a procedurally generated audio for a virtual environment provided by the instructors.

Our objective is also to facilitate discussions and reflection around this topic.

[1]https://youtu.be/JiU9oKosnys

AM'22, September 6–9, 2022, St. Pölten University of Applied Sciences, Austria

ACM ISBN 978-1-4503-XXXX-X/18/06…$15.00
https://doi.org/10.1145/0000000.0000000

2 WORKSHOP PROGRAM

This is a 4-hours on-site workshop where participants will undertake practical activities. The workshop can be extended to a full-day workshop upon the availability of the Conference Program. If this is possible, we will host a Discussion Forum, where we ask participants to discuss the challenges, pros, and cons of adopting procedural audio to design sound for virtual environments.

2.1 Introduction (30 minutes)

The workshop will be introduced to all participants, together with a presentation of the topics. The introduction will include the presentation of the instructors, principles of interactive audio for virtual environments and procedural audio. This will be followed by the presentation of the two Hands-On activities (see Sections 2.2 and 2.3). In the case the workshop can be extended to a full-day, a Discussion Forum will follow practical activities (see Section 2.4).

2.2 Hands-On no.1 (2 hours)

The first Hands-On activity will focus on realising sound models that will be then implemented in the Virtual Environment. The procedural sound design will be realised Pure Data [2]. The instructor will lead the class with a Learning-by-Doing approach, where the participants will actively participate in the class delivery.

2.3 Hands-On no.2 (1.5 hours)

In the second Hands-On, participants will learn how to implement these sounds in the Virtual Environment using Unity [3]. Participants will finalise their procedurally generated soundscape for virtual environments with a similar approach adopted in the first Hands-On.

2.4 Optional, Discussion Forum (2 hours)

The discussion forum is to open up the floor for questions and reflections in the field of procedural audio for virtual environments. The discussion, facilitated by the instructor, will also be the object of research. The instructors will collect participants' responses (upon informed consent, see Section 6.2).

3 TECHNICAL SETUP

This workshop will be delivered in person during the conference. Participants will have to come to the workshop with a computer able to run Pure Data's and Unity's latest stable versions. Participants will be required to have Pure Data and Unity already installed on their computers.

[2]https://puredata.info/
[3]https://unity.com/

The instructors will require the use of a projector and a stereo speaker set-up adequate for the size and shape of the room in which the workshop will run.

4 PARTICIPANTS

The workshop welcomes any number of participants within the limits of the conference venue capacity and the conference policy.

5 DRAFT OF CALL FOR PARTICIPATION

We invite the Audio Mostly community to the Procedural Audio for Virtual Environments workshop. In this workshop, you will learn about Procedural Audio for Virtual Environments and its application. You will be first introduced to concepts, theories and current work in this field, and later you will learn how to implement a procedural audio model in an interactive virtual environment using the Pure Data and Unity software. Details about software version will be sent closer to the day. Please, make sure that your computer can run that software smoothly.

6 ORGANISERS

6.1 Balandino Di Donato

Balandino Di Donato is a Sound Artist, Researcher and Lecturer in Interactive Audio at the Edinburgh Napier University. He conducts research and teaching in Sound Design, Game Audio and Interaction Design. Former Lecturer in Creative Computing ad University of Leicester. During his PhD at Royal Birmingham Conservatoire (BCU), he explored the design of embodied interactions with audiovisual processes during music performance. He worked as Research Assistant at Goldsmiths, University of London on the realisation of EMG-interface and -driven AI as part of the ERC-funded project: BioMusic; and, as Research and Artistic Assistant at Centro Ricerche Musicali in Rome. He authored and contributed to the development of software and interfaces for musical expression (Myo Mapper, Interga Live, TUI Metis). His research focuses on Digital Arts and Human-Centred Interaction Design. Currently, he leads the Creative Informatics funded BSL in EMI project.

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6.2 Rod Selfridge

Rod Selfridge is a Lecturer in Interactive Audio at Edinburgh Napier University. Previously he was a post-doctoral researcher in media production at KTH Royal Institute of Technology, Stockholm, researching sound design practices and sonic interaction design. As a postdoc at The University of Edinburgh he carried out research into heritage musical performances of lost spaces recreated in VR and as a postdoc at Queen Mary University of London (QMUL) he carried out research into live musical performances, augmented by mixed reality visuals. He has a PhD from QMUL in Media and Arts Technology, which focused on sound effect synthesis and procedural audio.

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ETHICAL STANDARDS

This workshop will be conducted complying with all Edinburgh Napier University Research and Integrity Committee Policy[4]. It provides the framework and guidelines for conducting research with integrity and promoting good practice in all aspects of research.

REFERENCES

[1] Rod Selfridge. 2018. *Real-Time Sound Synthesis of Aeroacoustic Sounds using Physically Derived Models.* Ph.D. Dissertation. Queen Mary University of London, London, United Kingdom.

[4] https://www.napier.ac.uk/research-and-innovation/research-search/school-research/school-of-health-and-social-care/research-ethics-shsc