
Building a Community of Audio Game Designers – Towards an Online Audio Game Editor

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Abstract

We introduce the Online Audio Game Editor (OAGE) which we have conceived to (a) advance our understanding of audio games in general, (b) to investigate the audio game design process, (c) and to build a community of audio game designers. Thus, OAGE constitutes a fully-implemented prototype to create, play, and (later) share audio games online. Our intention is to iteratively extend this editor to respond to the users' feedback and needs. Through a process of reflective analysis and adaptations, we aim to uncover more of the very core of audio game design, a genre of computer games which is currently under-researched. In contrast to wide-spread video games, little is known about proper design processes in audio games or valid guidelines to aid their development. We show how OAGE is intended to serve as a *research vehicle* to recruit audio game designers as participants (a significant challenge due to their small number), to catch up with the state of knowledge about video games, and also to promote audio games.

Author Keywords

Audio Games; Audio Game Design; Online Editor; Community Building

ACM Classification Keywords

H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous;

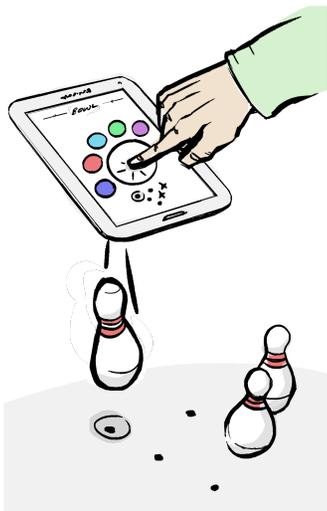


Figure 1: The principal concept of editor OAGE illustrated. The audio game *designer* navigates through a virtual playground in a bird's eye perspective and a) selects positions for game elements and b) then specifies their properties. In the illustration, we can see the designer 'drop' an object which will later aurally represent a bowling pin. He or she accomplishes this by selecting according properties with a pop-up wheel of icons (see Figure 3). Later the designer will also add a *Movable* object as the bowling ball and a player object (cf. Figure 2). To aid the design process, the audio game (prototype) can be played immediately by switching to *play mode*. Currently, we are working on an online platform for 'exporting' and sharing finished audio games.

Introduction

Our aim is to advance the understanding of audio game design. To this end, we created an Online Audio Game Editor (OAGE) to be used as an experimental platform or *research vehicle*. The underlying motivation for this approach is to get access to motivated people who engage in audio game design or enjoy audio games as players, and at the same time, to build an online community to make this kind of game more popular. While video games mainly rely on graphics and images, audio games utilize mental *imagery* and are thus open to a more diverse audience of players.

In the course of this paper, we briefly explain what audio games are and how they have been researched in the HCI and interaction design community. We then introduce OAGE including its features and underlying design concept (Figure 1 provides a figurative preview of one the main interfaces of the editor). Concluding, we lay out our plans on how to use OAGE to study audio game design and to advance knowledge in this domain.

Audio Games and Related Research

Audio games are played by drawing on sound (with hearing) and without using images (vision) as within the widely-spread genre of video games. This makes audio games interesting for a diverse group of players. People with normal and with impaired vision alike can enjoy the experience of playing non-visual games based on sound. To do so, people usually enjoy audio games with their eyes closed in a quiet environment to be able to immerse themselves in the audio game. Creating interesting audio games with an engaging user experience however remains a challenge, as players need to be supported carefully in building their mental imagery.

To date, the audio games community is relatively small. One of the best known Internet forums constitutes <https://www.audiogames.net> where audio gamers (but not primarily audio game *designers*) meet and exchange. In contrast to video games, there are far fewer titles available, and academic research has picked up investigations into audio games only recently. For example, a keyword search for the term *audio games* in the *ACM Digital Library* reveals no more than 21 hits. Much of the existing work on the topic was contributed in the form of design guidelines [2, 5, 6], recommendations [1, 9] or anti design rules [7]. Nevertheless, our understanding of audio games is quite restricted, and while being interesting recommendations, the value of these guidelines remains questionable as there is no follow-up design work drawing on these.

The present work was inspired by the *Tangible Audio Game Development Kit* (TAGDK) by Urbanek and Guldenpfennig [8] who proposed a tangible framework for prototyping audio games. In more detail, they introduced a concept for assembling virtual audio-scapes and games based on a *LEGO* bricks metaphor. That is, the users were offered a set of physical *LEGO* bricks in different colors, which they could use to create game elements like players, sound sources or obstacles. Such arrangements of physical bricks were then mapped to virtual game elements, and hence, a playable audio game. In short, the TAGDK enabled people to create playable prototypes for audio games with tangibles. As we will detail in the subsequent section, we created a virtual variant of the concept of TAGDK which allows users to assemble audio games using virtual bricks on a conventional computer/tablet (to aid the readers' understanding: the bricks of OAGE feature a circular shape as opposed to the classic rectangular *LEGO* shape). By using a software interface, we can offer more options or game elements compared to [8], reach out to potential designers

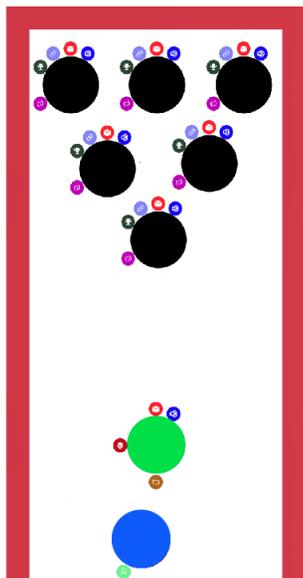


Figure 2: The making of an audio 'bowling' game using OAGE in *editor mode* and bird's eye view. Six black circles represent pins, one green circle represents the bowling ball and one blue circle the player. The small structures around these objects (clearly visible and scalable in our software) represent corresponding properties. E.g., the bowling ball is defined by the properties *Movable*, *Obstacle*, *Sound*, and *Harmful* (Note the text box on next page for further explanations or see [8]). When playing the game, the user wears headphones and tries to swipe the ball towards the six pins by controlling the avatar. They then receive audio feedback in response to their input (spatialized sound: ball rolling, pins being hit, etc.).

online, don't have to provide tangibles (better scalability), and can later share finalized games more easily.

The Online Audio Game Editor (OAGE)

OAGE is a fully-implemented tool which audio game designers and gamers can use alike to create, share as well as play audio games without installing (proprietary) software in a web browser. Currently, we are implementing a user management system which allows interested people to register, play games online, develop and share audio games, hence, to form an online community of audio gamers and designers.

OAGE has been developed in Unity¹ drawing on an iterative user-centered design process. Due to the importance of sound quality in audio games in terms of realism and spatialization, we decided to use Steam Audio² as a third-party sound plug-in for Unity that enhances the sound perception by the players due to its – in comparison to the built-in Unity 3D sound – more realistic sound propagation that takes e.g. level geometry into account. Audio game designers that use OAGE can design their games by using a tablet or a regular computer, since OAGE supports both.

As briefly explained above, OAGE builds on the *LEGO* brick principle as proposed by Urbanek and Güldenpfennig [8]. The audio game designer is offered different virtual game elements in different colors which represent *Objects*, *Properties* and *Links*. A game object again can be composed of a combination of several bricks or more abstract circular shapes as in the implementation of OAGE (compare Figure 1, 2, and the text box). By means of these elements

¹Unity is a 3D game engine which designers or developers can use to create computer games. Games can be exported to several platforms (e.g., consoles, mobile phones, web browser). We use Unity as the tool in which we build our online tool.

²<https://valvesoftware.github.io/steam-audio/>.

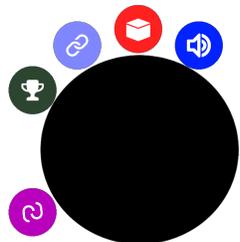


Figure 3: The menu of OAGE for selecting and positioning game objects on the virtual game area. The wheel of icons is faded-in and overlaid after a position was selected and allows for assigning different properties, e.g., the emission of sound.

and combinations, many basic functions for creating audio games are applicable by the designers [8]. In OAGE, there are two modes that a designer can use. The first mode *editor mode* allows game and level editing in a bird's eye view of the game (e.g. Figure 2). In this mode, the designer can stack different elements together to form game objects using an overlaid wheel of icons when marking a position (see Figure 3). For example, a sound source could be placed on an obstacle-object to generate a game element that is insurmountable but emitting spatialized sound. The second mode *play mode* allows the designer to immediately play the designed game so that adjustments can be made and tested in a tight design-evaluation cycle. Furthermore, when in *editor mode*, the designer can alternatively choose a third-person view to build an audio game in a 'Minecraft' manner (i.e., 'walk around' in a three dimensional scene and directly manipulate game objects).

As next steps, we will engage in building an online community of audio game designers and players around OAGE.

Exemplary description of a game object and its properties representing a pin in the above mentioned bowling game:



Obstacle (red): This object is insurmountable and solid.

Sound Source (blue): The pin emits sound so that the player can locate the 'target'.

Destructible (purple): The object can be destroyed by the ball.

Win Condition (dark green): In combination with destructible, this object must be destroyed to succeed in the game.

Link (light blue): The object is linked with other objects (the other pins) which requires the player to 'destroy' all pins to finish the game.

Planned features for this platform are, for example, commenting, rating, discussions, etc. For one thing, this is important for making audio games more popular and for offering a greater variety of audio games. This endeavor also resonates well with the current theme of the DIS conference *Diversity and Design* as audio games are potentially more inclusive than video games and can be also fully enjoyed by people with visual impairments. For another, we seek to establish this community to gain first-hand experiences of how people create and enjoy audio games. To this end, we are also prepared to make re-adjustments to OAGE to meet the users' needs. Furthermore, we aim at using this platform to recruit and study audio game designers to advance our understanding of the audio game design process.

Discussion

One of our overarching research goals in the investigation of audio games is to describe underlying design processes. Here, the driving motivation is primarily to better support audio game design with, for example, guidelines or recommendations. However, in order to accomplish this, it is crucial to actually *study* audio game designers in their day-to-day development work. Such ethnographically informed studies of people or participants are a fruitful and valuable method to understand their needs, for example, requirements for tools to aid audio game design [4]. In combination with research methods like questionnaires, interviews or log-file analysis, this allows a better understanding of the applied design process itself [3].

Unfortunately, audio game designers are hard to recruit due to the genre's limited popularity and non-existence in mainstream game culture. While video game designers are relatively easy to find (there are numerous video game studios around the world), it becomes relatively hard to reach out for audio game designers. Should we, however, suc-

ceed in building (only a small) community around OAGE, this would lead to two advantages. On the one hand, we would have access to more participants (given that some developers provide their consent). On the other hand, these data would be of relatively high 'ecological validity', that is, 'real' data from the field as opposed to observations under artificial conditions.

We acknowledge that this is an ambiguous endeavor. Still, we have accomplished one major milestone by now, namely the implementation of OAGE as a browser-based software. This already allows us to study how participants use it in our office or lab. However, as stated above, we want to use OAGE for recruiting audio game designers from the Internet as participants and also to share audio games online. Therefore, we are currently working on the second milestone, to open OAGE to the public as an online platform for designing and enjoying audio games. It is likely that we don't necessarily need to build a community of thousands of users anyhow. To begin with, and considering the relatively small number of studies on audio games, every single user that we can recruit using OAGE is potential progress.

Conclusion

We presented OAGE to aid the design and understanding of audio games. By means of this toolkit we aim at studying how designers create audio games and at advancing our scientific understanding of this process. At the same time, the online environment of OAGE is conceived to share audio games, and hence, it is intended as a platform for distribution and introducing audio games to more people and a more diverse audience.

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