61st International Conference
Audio for Games

London, UK
February 10–12

The conference was held at London's Royal Society of Chemistry.

CONFERENCE REPORT

Sponsors

A year after the previous conference, almost to the day, the delegation for the 61st International Conference "Audio for Games" arrived at the same auspicious location—the Science Room and the Fish Room at the Royal Society of Chemistry, Piccadilly, London. Once again the conference welcomed delegates from a broad range of disciplines within game audio.

This year virtual reality and augmented reality were key themes. Notable presentations from industry heavyweights including Sony and Microsoft were well balanced with equally impressive input from entrepreneurs and academics. The latter group included Orfeas Boteas and Matthew Collings from Krotos Ltd. who have designed a real-time voice processor, able to turn the mildest man sound into the meanest beast. Queen Mary University of London's Christian Heinrichs and Andrew McPherson delivered their findings on the next generation of procedural game audio.

Conference chair, Michael Kelly, opens the event and welcomes delegates.

PRESENTATIONS

Industry mogul and AES Technical Committee member Scott Selfon initiated proceedings on Wednesday morning with an overview of current trends in high fidelity and nonrepetitive sound effects, music, dialogue, and ambiance in game sound experience. Scott highlighted the importance of spatialization (hearing sounds from where they are perceived to occur) and how this is increasingly critical for traditional game play and virtual/augmented/mixed reality experiences alike. Scott also surveyed real-time 3D sound manipulation techniques in use today and on the horizon, including dynamic simulation of position, distance, and interaction with game geometry and environmental reverberation.

Scott Selfon starts proceedings with Tales of Audio from the Third Dimension.

Alex Case talks timbre.

Following Scott, Alex Case from the University of Massachusetts Lowell discussed the importance of timbre. He asserted that although one of the most important properties of sound, timbre has no dedicated signal processor. Instead, designers shape timbre through different effects. Alex detailed techniques for leveraging the timbre-redefining capabilities of compression, delay, reverb, and distortion processors, making clear the connections between all of these effects and timbre. He

Barney Pratt takes an in-depth look at some of the creative, technical, and philosophical approaches that went into making the sound for *Until Dawn.*

Virtual Reality Spatial Audio discussed by Gavin Kearney (upper photo), Marcin Gorzel, Alper Gungormusler, Pedro Corvo, Jelle Van Mourik, and Varun Nair

also described what to listen for as relevant parameters are adjusted.

Demonstrations highlighted the coordinated use of all of these effects for timbre from slight modifications to a complete resynthesis while maximizing sound design freedom and minimizing resource consumption.

The second industry presentation of day one was from Barney Pratt of Supermassive Games. It focused on immersive, filmic horror. As audio director on "Until Dawn" (which received an 8 out of 10 rating on Game Spot), Barney took a more in-depth look at some of the creative, technical, and philosophical approaches that went into designing the sound of the game. This ranged from seamless immersion and reworking panner plugins for improved voyeurism to improved emotional nuance through more traditional film editing techniques.

In all honesty, Thursday was the day everybody was excited about. Feeling a little delicate after a "roaring" party hosted by Dolby at Tiger Tiger on Wednesday evening, the delegation arrived ready for a day that was to see two presenters from Playdead Ltd., developers of the creepy masterpiece *Limbo.*

Following a five-year collaboration with the conference keynote, Martin Stig Anderson, Jakob Schmidt took us on a tour of the next installment from Playdead—"Inside." The talk focused on the design and implementation of foley for the main character.

Jakob explained how game state and character geometry are analyzed to provide data for audio systems and how a method for context-dependent sound selection is utilized for footsteps. He went on to demonstrate how he had generated realistic sounds including "cloth-on-body" from in-program body geometry and how he sequenced realistic voice sound events through animation feedback using state machines, trigger boxes, and script. As an example, he described how rhythmic breathing was linked to footsteps—an increase in footsteps would synchronize with a gradual increase in breathing rate.

Taking a tough spot between the Playdead presenters, Christian

Jakob Schmid of Playdead presenting the uncompromising audio implementation on *Inside.*

Keynote was by Martin Stig Anderson

Heinrichs and Andrew McPherson presented Foley Designer, a software prototype resulting from a six-month collaborative project between Queen Mary's Centre for Digital Music and Enzien Audio.

The team demonstrated new methods for foley artists to control computational audio models using hardware. A generative audio model of a squeaky door controlled by a mouse pad on a laptop served as the key demonstration. Using the example of vocoded voice acting in *Wall-E*, the pair highlighted the need for the human touch within generative audio and that

human gesture is a fundamental tool in the design of next-generation procedural game audio. They focused on the process of selecting control parameters and on the mapping layer between gesture and sound. By recording high-level control parameters rather than audio samples, they showed that performances can be later varied to suit the details of the interactive environment.

The second installment from Playdead came from internationally renowned composer and sound designer Martin Stig Anderson who delivered the conference keynote to a packed Science Room. During his introduction he highlighted how important it was for "every sound designer to have a voice" and to "develop their own style." He went on to play a trailer for the upcoming Playdead title *Limbo* (though he was noncommittal on the release date).

Martin talked at length about the new feature and how he creates the dark suspense that is the trademark of Playdead. His techniques were enthralling and inspiring in equal measure. They include making sound changes in odd places, creating musical materials from inanimate objects, and associating different sounds to cause confusion and uncertainty. Photographs of Martin's studio showed tape delays and wire recorders used to manipulate various sound recordings and loops, from birds (which sounded "far too alive" before being sonically manipulated) to traffic and ambiance.

Andersen reflected on how the dynamic relationship between sound and image can be explored as a means to reveal new stories and emotional experiences, he continued to describe how the first visual representation of one of his pieces "Ring Road" changed his perception of his own work. As a result Martin's following pieces, "Rocket Man" and "Rabbit at the Airport," both combined audio and visual aspects

Further demonstrations of the techniques Anderson employs showed how spectrum analysis is used while scoring and record-

Plenty of opportunities for knowledge-sharing and networking at lunch

The local pub also proved to be a lively debating parlor.

Engrossed in the Fabric demonstration on the second day.

ing his work. He gave in-depth demonstrations on how he mixes orchestral recordings with recordings of cloth, for example, to create dark textures and depict vague associations with an orchestra without referencing an exact score. He described making music on a three dimensional lattice, devising complex sound objects moving in the continuum. To highlight this we were treated to a retrospective journey through some of Martin's scores starting with "Sleepdriver," for which he recorded traffic sounds that were edited and spliced according to movement in pitch and rhythm before being filtered to extract melody.

Anyone would have been nervous to take to the stage following such a gripping presentation, however Orfeas Boteas and Matthew Collings of Krotos Ltd. were the perfect choice. The duo demonstrated software that also sought to solve the issue of real time foley for film, TV, and games. This time the focus was on monsters. So, following a brief history lesson on some original processes for achieving scary sounds for animals (examples ranged from *The Monster from the Black Lagoon* to the T-Rex in *Jurassic Park*) the team moved on to demonstrate their software "Dehumaniser." This vocal processor essentially allows voice artists to lip sync to monsters "live," creating roars and screams in real time. The duo had some hilarious before and after videos in the presentation, enabling us all to hear the unaffected roars from one side of the studio glass before hearing the (really very impressive) results from the control room. They then ran a live demo enabling audience members to lip-sync to a T-Rex.

Joe Thwaites from Sony Computer Entertainment Europe used three key examples and gave an interesting perspective on music for virtual reality applications to bring Thursday to a close.

"The Deep" shows off the immersive experience that can be created in VR by virtually lowering the wearer of the Sony Head Mounted Display (HMD) into the ocean. "The London Heist,"

Simon Goodwin showing that two into one won't go.

Chanel Summers single handedly changing the way stories are told.

in which the player plays a captive to East End villains, shows how gamers can manipulate virtual objects with their hands. Finally "Street Luge" enables users to steer a road luge with movements of their head after being released from the back of a moving van.

The HMD provides 3D audio in stereo through spatialization. Binaural recording is used to generate the audio. The Heist provided the best example of this through means of a voice from a mobile phone that is being waved around in front of you by a violent, scary thug as you're tied to a chair.

Virtual reality (VR) provides new ways and challenges in presenting sound and music to the user; in turn, this has implications for composition and sound creation. If placed carelessly, music can distract VR users from the immersive experience and affect the suspension of disbelief. Using diegetic sound, from car stereo speakers for example, was one method highlighted of introducing music. A more subtle approach was demonstrated on Street Luge whereby musical elements were added to the sound track from passing car stereos. A bass part here and a hi-hat there, so to speak. In summary Joe asserted that traditional techniques are still relevant and that 2D music is as useful as 3D music in VR. Fewer minutes of music are generally required in VR worlds but more interactive techniques should be utilized to integrate the music.

Self-proclaimed iconoclast Simon Godwin took to the podium and delivered his impression on how it has become tolerable for traditional noninteractive audio to be downmixed from multi-channel formats into fewer channels. The talk gave an amusing look back over mono and then stereo techniques, using Beatles recordings as examples, the entire band being panned hard left and the vocals hard right.

Simon, principal engineer at DTS, went on to highlight how stereo, 5.1, and 7.1 media have traditionally been folded down, and some of the problems this has caused in game implementations. These include perception of direction, inconsistent balance of music, and headroom. He showed how difficult it can be to make sure that a mix for one configuration has the same component balance, especially when both 3D and prerendered content must be considered, and how much that is needed as listener configurations proliferate.

The sometimes difficult last-thing-on-a-Friday-afternoon spot was thankfully given to one of the most charismatic speakers of the week, Chanel Summers, who took us on a journey to explain how she believes we should change the way stories are told. Chanel's interest lies in augmented reality games, where the game world is overlaid on top of the real world. Sound professionals working on these kinds of games face unique challenges since they must not only create great audio, but also audio that blends skillfully with the real world. Chanel was head sound designer on a production of "Leviathan: The Evolution of Storytelling," a groundbreaking production featured in Intel's 2014 Consumer Electronics Show keynote. In this breathtaking presentation Leviathan the whale swam out over a captivated audience.

PAPERS

The Fish Room witnessed some remarkable paper presentations over the course of the two days of the event. It also hosted demonstrations of Tazman Audio's Fabric, software that extends Unity's audio functionality.

Paper Session One focused on spatial audio rendering and consisted of two presentations. The first, "Preliminary Investigations into Binaural Cue Enhancement for Height Perception in Transaural Systems," by Thomas McKenzie and Gavin Kearney, illustrated the applicability of head-related transfer function (HRTF) cue exaggeration in transaural systems for height perception with nonindividualized HRTFs.

Michael Lovedee-Turner, Jude Brereton, and Damian Murphy presented "An Algorithmic Approach to the Manipulation of B-Format Impulse Responses for Sound Source Rotation." The paper presents an algorithm for the rotational movement of a sound source for a constant position in space. An accurate interactive virtual acoustic simulation is of paramount importance in many video game genres, where the smallest error in the audio can lead to the user's sense of immersion being broken. Initial testing shows that the algorithm shows promise but requires improvement.

Paper Session Two centered on audio content and serious games. In "Audio Commons: Bringing Creative Commons Audio Content to the Creative Industries," a collective of contributors presented the Audio Commons Initiative, which is aimed at promoting the use of open audio content and at developing technologies that support the ecosystem of content repositories,

One of many demonstration opporunities during coffee

production tools, and users.

In the final paper session on Thursday, "Safe and Sound Drive: Sound Based Gamification of User Interfaces in Cars" concerned the design of an audio-only serious game for cars that will help drivers to increase ecodriving skills, lower fuel consumption, and encourage safe and environmentally friendly approaches to driving.

"Lateral Listener Movement on the Horizontal Plane: Sensing Motion Through Binaural Simulation," a paper from the Graduate Program in Sound Recording, McGill University and The Centre for Interdisciplinary Research in Music, Media and Technology, both based in Montreal, hypothesized that audio simulations using binaural crossfading between two separate sound source locations could represent a sensation of motion for the listener that is equivalent to real-world motion. Sixty-one trained binaural listeners evaluated the sensation of motion among real and simulated conditions. Results showed that the listeners rated the simulation as presenting the greatest sensation of motion among all test conditions.

The penultimate paper, "Ear Shape Modeling for 3D Audio and Acoustic Virtual Reality: The Shape-Based Average HRTF," was from the Research and Development Division of Yamaha Corporation, Japan. The authors presented a method for modeling human ear shapes, and particularly, a method for obtaining a generic nonindividualized head-related transfer function (HRTF), based on the arithmetic mean of human ear shapes.

Finally, Lucas Mengual, David Moffat, and Josh Reiss presented "Modal Synthesis of Weapon Sounds." The team produced an interactive model that synthesizes high-quality, impact-based combat weapons and gunfire sound effects. A perceptual evaluation was undertaken by comparing the synthesis engine to some of the analyzed recorded samples. In four out of seven cases, the synthesis engine generated sounds that were indistinguishable from recorded samples in terms of perceived realism.

Editor's note: the papers presented at this conference can be obtained from http://www.aes.org/publications/conferences/?confNum=61

AES THANKS 61ST COMMITTEE

Chair: Michael Kelly

Secretary: Natanya Ford

Treasurer: Bill Foster

Papers Chair: Damian Murphy

**Content Team:
Scott Selfon, Steve Martz,
Damian Kastbauer,
and Sam Hughes**

**Volunteer Coordinator:
Brecht De Man**

**Webmaster:
Carl Bussey and Dave Moffat**

The assembled company poses for a group photo at the end of a successful conference.