Remastering of movie soundtracks into immersive 3D audio

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We have seen blender for graphics modeling, animation, rendering, games...

we use it for doing **audio**!
Introduction

- In the era of 3D cinema, the audio is still basic (5.1)
- The goal: immersive experiences

22.2 standardized by NHK
Introduction

- The BM audio lab
  - Software engineers, physicians, sound designers
- What we do: 3D audio
- Develop an open source audio framework: CLAM

15 loudspeakers in a sphere at Barcelona Media
CLAM audio effects prototyping

http://clam-project.org
3D soundtracks: ideal tools

- A Digital Audio Workstation (DAW) that copes both with audio tracks and 3D scenes.
  - With powerful 3D modeling capabilities
  - With video support
  - → So why not use Blender for that?
- An audio workflow **agnostic** to the number of loudspeakers and layout.
- The system should offer immediate auditory **feedback**.
- The ability to do high-quality (offline) rendering for room acoustics simulation.
We have a movie with it's soundtrack session:
How do we create a 3D immersive version?
Authoring of the auditory scene

Sound design

Merging the Blender Scene into the Ardour session

Fine tuning of audio and spatialization

Export and encode

Loudspeakers layout configuration

Playback for monitoring

Loudspeaker layout independent format

Distribution

Playback cine 22.2

Playback dome

Playback home

...
Distribution

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Fine tuning of audio and spatialization

Export and encode

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Postproduction

Authoring of the auditory scene

Fine tuning of audio and spatialization

Playbacks: cine 22.2, dome, home

Exhibition
Auditory scene authoring

- **Goal**: create a simplified scene mimicking the target movie
- 1st, model the static references in Blender
- 2nd, *(optional)* add information about acoustic materials for reverb simulation
- 3nd, animate objects referring to audio sources and camera/listener
  - Side-by-side check with the video
- 4rd, relate sound objects to audio tracks in Ardour
- 5th, *(optional)* choose the 3D decoding algorithm to be used for each sound object
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Sound design
Sound design

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Playback cine 22.2

Merging the Blender Scene into the Ardour session

Loudspeaker layout configuration

Loudspeaker layout independent format

Authoring of the auditory scene
Merging the scene into Ardour
Merging the scene into Ardour

- **Goal**: incorporate the audio scene into Ardour so it can spatialize the tracks
- It is an automatic process
- Scene sources animation → automation controls for 3D audio decoders plugins
  - Transforming to listener's relative angles and distances
- The Ardour session (XML) is set up adding
  - 3D decoding plugins
  - The necessary routing and extra buses (e.g. 22 channel buses)
- It supports A/B tracks for concatenating takes with crossfades
Sound design

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Loudspeaker layout independent format

Authoring of the auditory scene

Playback cine 22.2

Playback dome

Playback home

...
Fine tuning

- **Goal**: give all the power to the audio engineer
- Edit the audio (gains, effects,...)
- Edit the spatialization (direction, distance,...)
- … while listening to it
Sound design
Merging the Blender Scene into the Ardour session
Fine tuning of audio and spatialization
Export and encode
Distribution
Loudspeaker layout independent format

Authoring of the auditory scene

Loudspeakers layout configuration

Playback for monitoring

Playback cine 22.2
Playback dome
Playback home
Playout to any layout

Automatic detection of loudspeakers
Conclusions

- The workflow is quick and cheap (not a radical change)
  - Examples produced: Pinoccio 3K, Starwars, Ryan, 3D music...
- The content produced is future proof. *Play it at your home and at your dome!*
- Blender (and Ardour and open-source in general) has helped a lot!
- We want to know the blender community
- We also make use of the game engine for similar apps
  
  *(YoFrankie! extensions with 3D-sound presented in LAC2009, see CLAM web)*
Future work

- There is a need for timehead synch b/t Blender and Ardour
- Allow for interactive scene editing with audio monitoring
- Improve merging process
- Lots of things to be improved – these are just the first steps
Acknowledgements

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IMP project

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