Interactive Sound Design

Leonard J. Paul
Lotus Audio

VideoGameAudio.com
Overview

- **Creative**: How to think about audio for games from an artistic standpoint
- **Process**: How to turn a creative audio idea into an interactive sound design
- **Technical**: How to make the sound design come to life within the limits of the hardware and software
Creative

- Top-down or bottom-up approach

- Top-down means you figure out your “big idea” and worry later about how to actually do it

- Bottom-up means you look at what the hardware and software is capable of and figure out creative ways to get the most of them

- Often you'll be going back and forth between the two as technical issues and process limitations will force you to be more creative
Process

- What do you need to do to get your audio into the game? Over-prepare for the worst
- What tools and resources are you going to use and what software will support your creative design? Work well with your coder & producer
- A good process can be found by making all the right mistakes once and taking risks - exciting!
- Audio is always last, so be prepared for feature drop, no money, no time & no love :)

VideoGameAudio.com
info {at} VideoGameAudio.com
GameSoundCon 2009
San Francisco, CA
Technical

- Find out the limits of the software and hardware and push them
- Expand the software capabilities and design better audio tools to suit the game
- Realize that often you will be pressed by the team for memory & CPU, so hold your ground
- Things can work one day and be broken (and useless!) the next
Games Review

• Some recent games with great audio:
Dragon Age: Forest Ambience
Forest Ambience : Simple Loop

- Creative challenge is how do we make a realistic sounding ambience that can be heard for a long time?
- Process might be to use long loops from a sample library or record your own
- Technical challenges include how to fit it in memory, data compression type, making a seamless loop, mixing it at the right level and making it transition smoothly to the next ambience
Forest Ambience: Simple Loop

- Looping using Wavelab:
  - Green markers
  - Start/End
  - Zero crossing
  - Live audition
  - Crossfade loop
  - Volume flatten
  - Pitch flatten
  - Spectral edit
Procedural Sound Design

- Generate audio in real-time based on rules and behaviours
- Has been used in games since the beginning
- Parametric, generative & real-time (ie. flexible)
- Can combine samples with synthesis
- Allow flexibility of layers and real-time effects instead of stereo bounce – “late binding”
Forest Ambience : Procedural

- Creative challenge is how do we make a realistic sounding ambience that reacts to the player?
- Process in Wwise, make a Blend container that has separate streams for insects, birds, frogs, and wind that are mixed together at run-time
- Technical issues can include: no CPU for synthesis, not enough memory, limited streams & no overlap crossfading between areas
Forest Ambience: Procedural

- Use blend containers in Wwise and react to RTPC (real-time parameter control) from game:
Dragon Roar

- Creative challenges include having a hard time finding a real dragon to record! So, how do we construct the sound?
- Process might include real-time effects processing and techniques such as granulation
- Technical risks include not having enough DSP to support effects processing and synthesis especially on smaller platforms
Chinatown Wars: Ambience
Chinatown Wars: Ambience

- Creative goal is to make the city ambience affected by time of day

- Process is to make separate streams and random one-shots for traffic, pedestrians, cats, and crickets

- Technical challenges include memory, data compression type, making a seamless loop, mixing it at the right level and making it transition smoothly to the next ambience
Sound Design Via Tracker

- Chinatown Wars NDS likely doesn't use synthesis, but it could use noise with envelopes for several things, such as gunshots, explosions & footsteps

- Allows sound artist control over parameters and mix of synthesis and samples but is also tricky to learn
Forza Motorsport 3: Engines
Car Engines

- Creative challenge is to make a reactive and realistic-sounding car engine
- Procedure involves breaking the car engine elements down into shift sounds, exhaust, engine, revs and more
- Technical difficulty is trying to make the content react realistically and keep the memory size small – a car is a complicated “instrument”
But...

- Often there isn't enough time, so people will go with “what they know” and advanced techniques are overlooked
- Long time required for development and tuning
- Leap of knowledge and time to learn for those invested in older techniques
- Requires more CPU for DSP and synthesis
- Balance creative & technical? ->
Demos

• Using Pure Data:
  – Procedural Ambience : Forest
  – Granulation : Dragon Roar
  – Engine : Helicopter
  – Layered Impacts : Crash
  – Granulation : Engine Idle

• Using Half-Life 2 and OSC:
  – Granulation, layering and more
Game Audio Pipeline

```c
ep.m_mSpeakerEntity);
if ( ep.m_pf1SoundDuration )
{
    *ep.m_pf1SoundDuration = engine
}
TraceEmitSound("EmitSound: Raw
ep.m_pSoundName, entindex");
// LEN: Send trace via OSC
```

```
   
   2.
   1.
   0.

s $0-intensity
shuffle 0 2 0.5
voice_num
>| makefilename sfx_alien_fire%
```

GameSoundCon 2009
San Francisco, CA
Pure Data (PD)

- Relatively easy to learn open-source interactive audio implementation environment
- Can integrate directly into game code (as in EA's Spore), but not optimal as it is interpreted
- Create compiled code from (simple) patches as shown by pd2j2me
**Half-Life 2**

- *Half-life 2* is a PC game/XBox that won over 40 “Game of the Year” awards in 2004 and allows users to change the maps and other content of the game using the “Source engine” technology in C++

- *Left 4 Dead* and other games based on Source

- Hammer editor allows for map editing

- Make your own as well
Half-Life 2 Source Mod

- A mod is a modification of the game that can be quite simple or be advanced enough to create an entirely new game (ie. total conversion)

- Change code using Microsoft's free compiler Visual C++ 2008 Express Edition

- Cost for replicating this system is just the cost of the game - $19.95
HL2 Demonstration
Questions?

Leonard J. Paul

e-mail: info{at}VideoGameAudio.com

web: VideoGameAudio.com