



# **3D and Enhanced Game Audio using OpenSL ES**

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# SRS Labs Overview

- SRS (NASDAQ: SRSL) is an **IP licensing company** with audio solutions originating from Hughes Aircraft
- SRS is the **industry leader** in audio post-processing
- SRS' **extensive IP portfolio** includes advanced voice processing, audio enhancement, and surround sound technologies
- SRS' **patented solutions** are based on practical application of the principles of psychoacoustics
- Developed a **complete OpenSL ES 1.1 implementation** – **first** in the industry
- **More than 1.5 billion** products have shipped worldwide featuring SRS technology



# Why Audio Matters?

- People notice when a game has good audio
- The most bang for the buck
- Impresses people subconsciously and makes the graphics look better
- Triggers Emotion
- Gives the CPU/DSP something to do



## Why OpenSL ES?

- Royalty Free
- Scales well with hardware
- Good selection of audio effects
- Playback from various sources (file, memory, streams)
- Provides the native audio support in Android since 2.3

# 3D Rendering Techniques

- **Pan and Fade**

- Pan according to the angle to the source
- Fade based on the distance
- Fails at headphone and stereo output
- No front and back experience
- No Height

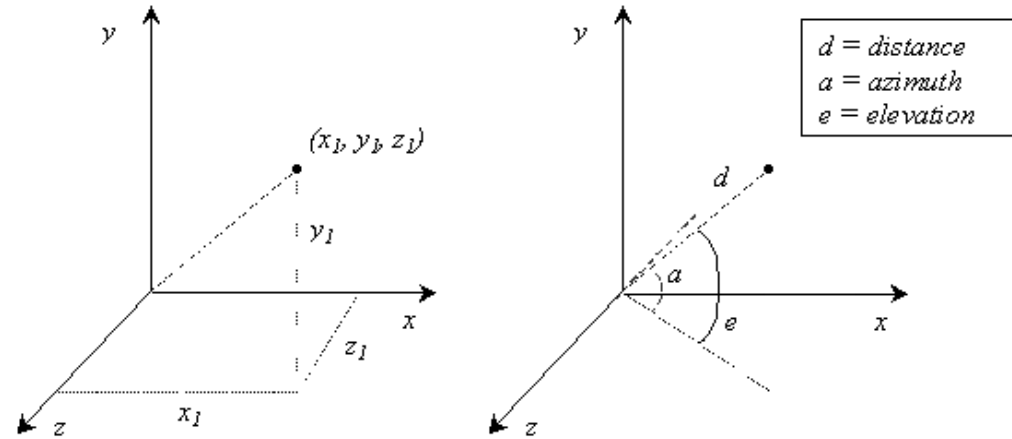


- **HRTF**

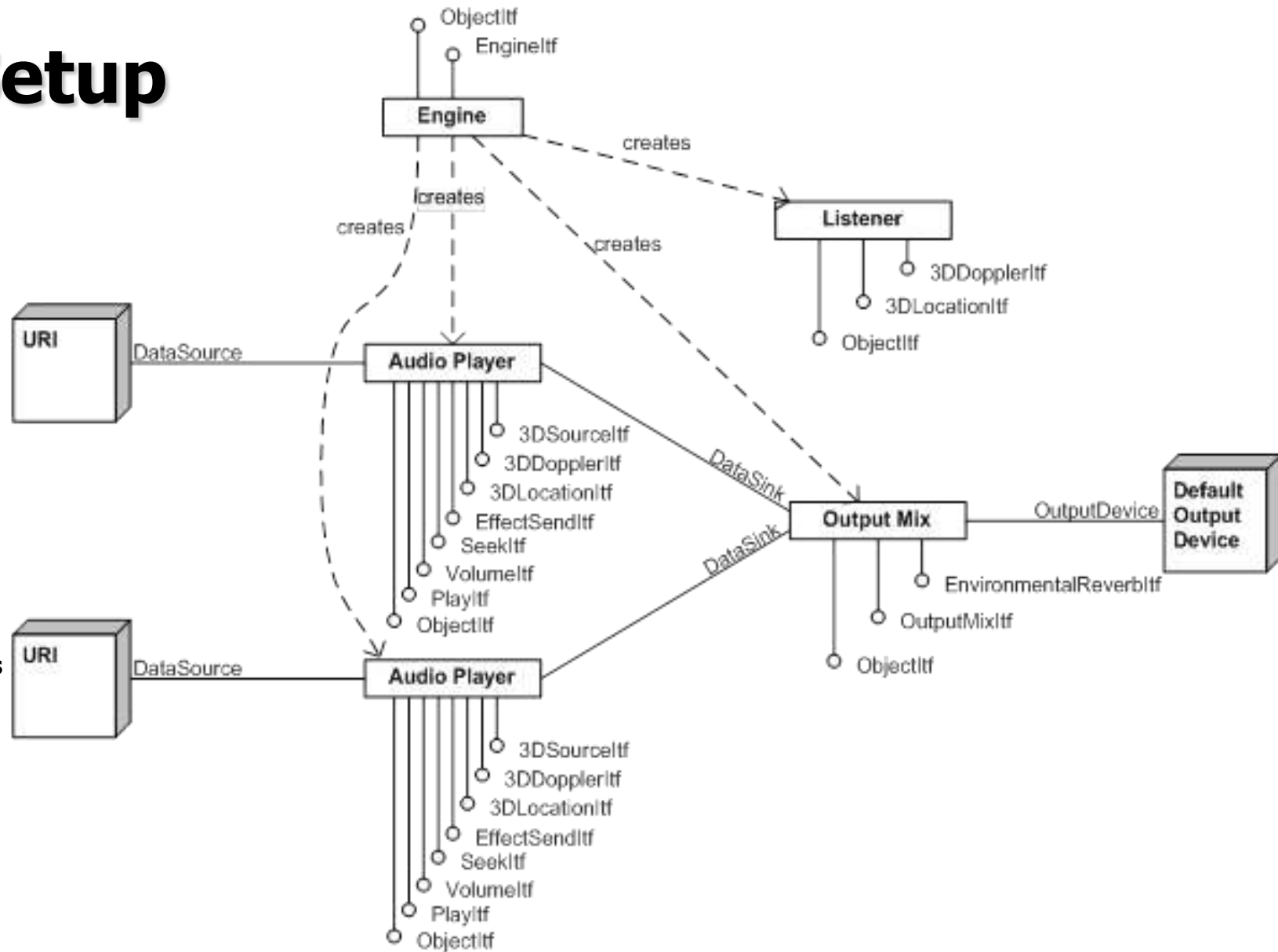
- Head-Related Transform Function
- Psychoacoustic
- Models how the ear works to render the sound anywhere around your head

# 3D Audio in OpenGL ES

- **3D interfaces for Player Object**
  - 3D Location
  - 3D Source
- **Listener Object**
  - 3D Location
  - Follows camera or character
- **Doppler**
  - Changes pitch based on relative velocity
- **Macroscopic**
  - Sets the size for sounds that cover a big area
- **Optimizations**
  - 3D Hint (Quality of 3D rendering)
  - 3D Group Object
  - 3D Commit



# 3D Audio Setup



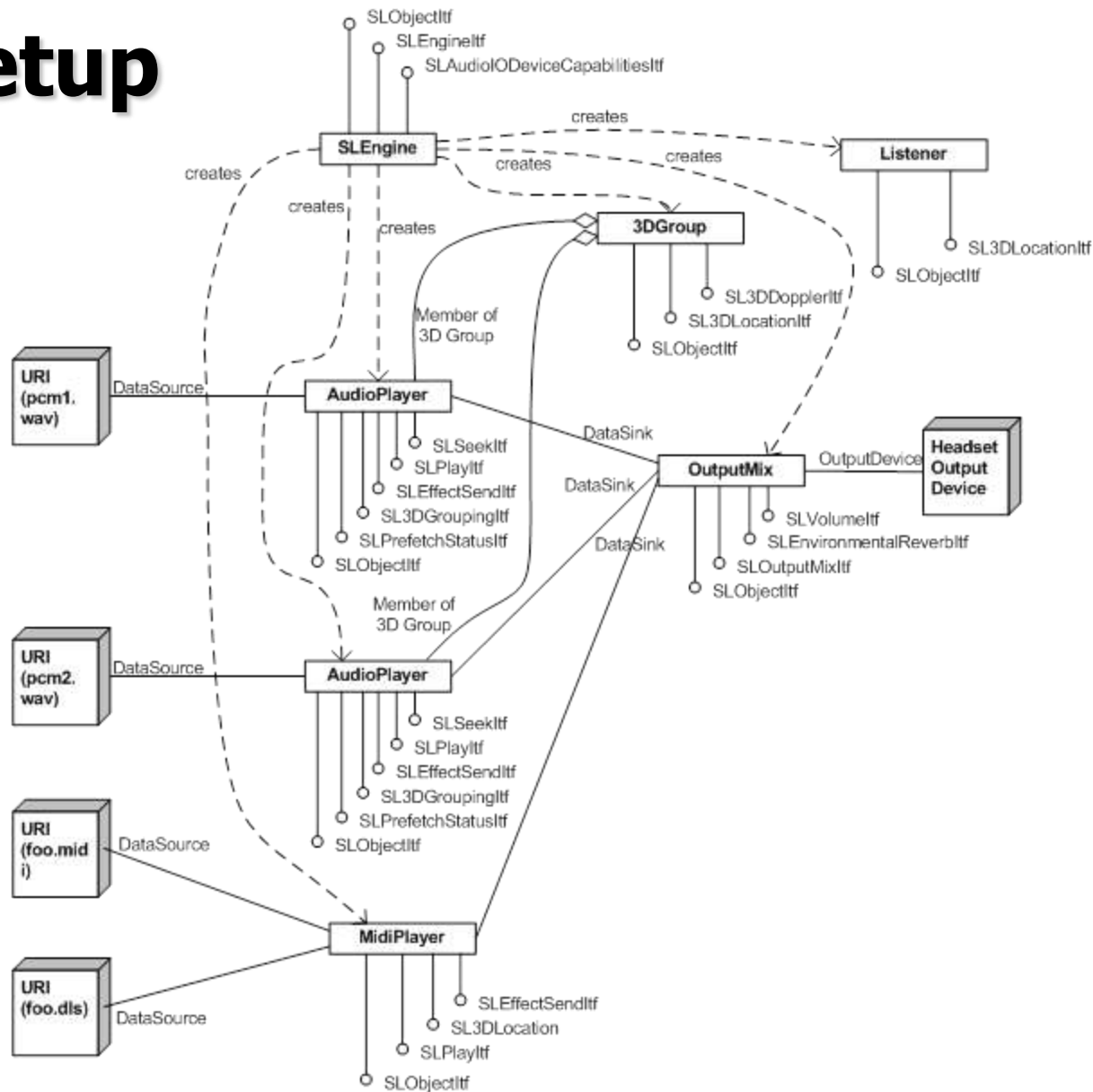
## Setup

- Create Objects with 3D Interfaces
- Set 3D rendering attributes with 3DSourceItf
- Set Doppler Factor

## Playback

- Set Position/Rotation with 3DLocationItf
- Set Velocity with 3DDoppler

# 3D Audio Setup



# Reverberation

- **How much sound bounces around a room**
  - Based on room size and material
- **Preset Reverb**
  - Quick and easy reverb
- **Environmental Reverb**
  - For the person who likes to tweak with settings



- **Add Reverb interface to the Output Mix**
  - Add Effect Send to Players
- **Reverb Zones**
  - Mark each room's reverb type



# Advanced Audio Effects

- **OpenSL ES has other effects to play with**
  - Equalizer, Bass Boost, Pitch, Virtualization, Playback Rate
- **EQ of Death**
  - Apply a low-pass filter with the EQ during low health
  - Lower 3D effect
- **Raise the Cinematic Effect**
  - Apply Stereo Widening on music during dramatic events
- **Underwater Effect**
  - Emulate bone-conduction with EQ (cut high and low bands)
  - No 3D effect
- **Bigger Explosions**
  - Apply Bass Boost to enhance the "boom"
  - Apply low-pass filter with the EQ for a short time afterwards



# Advanced Audio Effects

- **Engulf the player with sound**
  - Use stereo widening on sounds that encompass the player (fire, bees, crowd, etc.)
  - Macroscopic
- **Match Sounds during Slow Mo scenes**
  - Use playback rate and pitch to match the speed of the game
  - One of my favorite effects
- **Car Engine**
  - Using pitch and playback rate on sound based on RPM of engine
  - Crossfade between 2-3 sounds



# Summary

- **Improving your game's audio is easy!**
- **Adding advanced audio to your game enhances the experience and increases sales**
- **OpenSL ES provides you a comprehensive 3D audio solution**
- **Take advantage of the full range of audio effects to add a more engaging soundstage to your game**



**K H R O N O S**  
G R O U P™

**Thank You**

**OpenSL|ES™**

**SFS** 