



National Centre for Computer Animation

Sound Speech and Music 2

I love deadlines. I like the whooshing sound they make as they fly by. (*Douglas Adams*)



ES Overview

- Introduction to ES
- 2D Graphics in Entertainment Systems
- **Sound, Speech & Music**
- 3D Graphics in Entertainment Systems



Sound, Speech & Music

- Sound Analysis/Manipulation?
- Sound Synthesis
- Speech



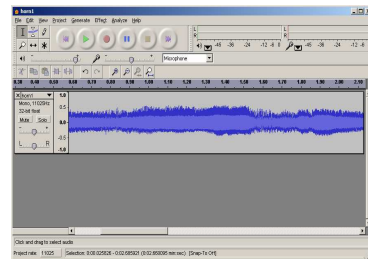
Sound Analysis

When sound is analysed its components are examined:

- period ↔ tempo/speed
- frequency ↔ pitch
- amplitude ↔ volume/loudness

From this we can extrapolate:

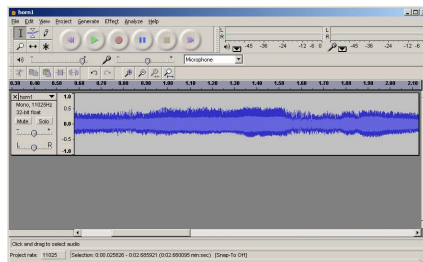
- rhythmic patterns
- different sound sources
(*channels/layers*)





Sound Manipulation

- Sound manipulation software allows us to add effects & filters to a sound to change it, much like an image manipulation program allows us to manipulate pictures.
- see <http://audacity.sf.net>



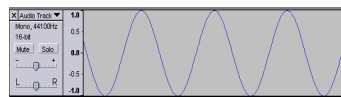
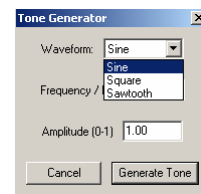
- Amplify...
- BassBoost...
- Change Pitch...
- Change Speed...
- Change Tempo...
- Compressor...
- Echo...
- Equalization...
- Fade In
- Fade Out
- FFT Filter...
- Invert
- Noise Removal...
- Normalize...
- Nyquist Prompt...
- Phaser...
- Repeat...
- Reverse
- Wahwah...
- Cross Fade In
- Cross Fade Out
- Delay...
- GVerb...
- Hard Limiter...
- High Pass Filter...
- Low Pass Filter...
- SC4...
- Tremolo...



Sound Synthesis

Sound synthesis is the opposite of sound analysis and uses sound manipulation techniques.

- a waveform is generated using a given shape, frequency and amplitude
- this can then be shaped into whatever sound is needed using sound manipulation tools





Speech

Speech is sound (*air in motion – in space no one can hear you scream*), created by the human vocal apparatus.

1. air is expelled from lungs
2. air pressure vibrates vocal chords
3. modulation of the articulators (*mouth: lips, teeth & tongue*) forms speech sounds (*phonemes*)

Speech recognition & synthesis can be done using a phonetic key system (*Soundex or Mataphone*).



Sound in Games

Involves:

- playback of sound (*may need to take position/distance into account, as well as any delays due to hardware*)
- playback of music
- speech synthesis (*future tech*)
- speech recognition (*basic forms exist*)