PHYSICS-BASED SOUND SYNTHESIS FOR VIDEO GAME ENVIRONMENTS

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CCT REU
Traditionally, sound effects in video games consist of pre-recorded sounds.

Synth-A-Modeler (SaM) allows users to create physical models that can be compiled to creating code that generates sound based on changeable physical variables, such as mass.

By placing generated C++ code into a native plugin, Unity can utilize the computed sound data.

An interface can be made to directly change the values of each physical component of the model from within Unity.
WHAT IS SYNT-H-A-MODELER?

• Open-source modular environment for designing physical models composed of:
  • Virtual strings
  • Masses
  • Ground
  • Resonators
  • Port
  • Various touch links
  • Audio Output
  • Display

• Models can be used for:
  • Synthesizing sound
  • Haptic Feedback
  • Visual feedback

• Compiled via the Faust (Functional AUdio STream) programming language into a wide range of targets for musical applications
SYNTH-A-MODELER TARGETS
FOOTSTEP MODEL USED
• Step by step process of converting a physical model in SaM into a useable C++ code for a native plugin
• Information is passed back and forth between the native plugin and C# script within Unity
• For game objects that rely on Unity’s physics engine for behavior, game object animations and an animator is not necessary to utilize the plugin.
• Unity uses Microsoft .NET Framework for interoperability between C-Family languages
THE RESULT
GENERAL DISCUSSION

Current Limitations:

• Interface must be manually created within a game object’s C# scripting component
• Physical Models are currently made outside of Unity
• DSP files cannot be directly used within Unity

Goals for the Future

• Automate user interface creation
• Integrate the graphical interface of Synth-A-Modeler into Unity, allowing users to create models from within
• Get Unity to accept and utilize DSP files
REFERENCES

• https://docs.unity3d.com/Manual/
• http://msdn.microsoft.com/en-US/
QUESTIONS?