

Chunity for Audio-First VR

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Audio is often left as an afterthought in the design of virtual reality experiences for modern commercial head-mounted displays. Most such development takes place in game engines like Unity, which unmodified has no complex audio functionality: out of the box, Unity's audio engine can only play audio files, do panning-based spatialization, and use a few audio filters. Chunity was created to bring audio-first programming to Unity. Chunity embeds the programming language Chuck inside the Unity programming environment and audio engine. This enables a few key components of audio-first programming: (1) the ability to write complex synthesis techniques and exert high-level control over audio (including reliable, fast communication between audio and graphics code); (2) the ability to drive graphics events via audio as needed to achieve robust, precise control over time; and (3) the ability to program audio code in the same workflow as the rest of the application, achieving a tight integration both of functionality and of the programmer's mental model overall.

We will present some student work that relies on Chunity, followed by a prototype of a new audio programming language manipulated entirely from within VR. This prototype is (tentatively) called VRAPL (virtual reality audio programming language). The primary goal of VRAPL is to create a virtual world where the entire environment can be controlled via audio. Users of VRAPL arrange virtual blocks into sculptures that represent their programs. Programs can generate spatialized audio from within the world; they can also be used to visualize audio with graphic displays. More importantly, audio generator blocks can be used to drive physics calculations in the world, e.g. using a square wave to cyclically levitate then drop a drumstick above a drum (see <https://youtu.be/f6078Pvqjbs>). Also, timing blocks can be used to cause discrete actions to occur in the world via timing generated exactly with Chuck.

Chunity will be released through the Unity Asset Store and on <http://chuck.stanford.edu/chunity/>.