



Thank you for purchasing the Volumetric Audio Volume extension for SabreCSG!

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Installation Instructions

This package is an extension for the SabreCSG level design tools. In order for it to load you must first add SabreCSG to your project. It's completely free, open source and can be downloaded from GitHub (do not use the SabreCSG package from the asset store, it's outdated and no longer maintained by the author):

<https://github.com/sabresaurus/SabreCSG>

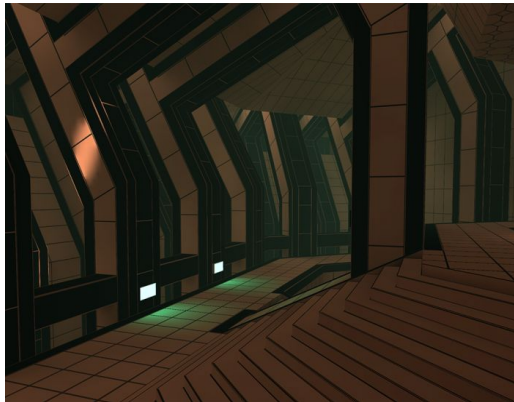
You can simply copy and paste the downloaded SabreCSG folder into your project's "Assets" folder. There is a quick video tutorial on how to install SabreCSG here:

<https://youtu.be/KDheSZcagsw?t=30>

Afterwards you can add the "00Laboratories/Volumetric Audio for SabreCSG/" folder to your project and if done correctly you can begin using it immediately.

SabreCSG Introduction

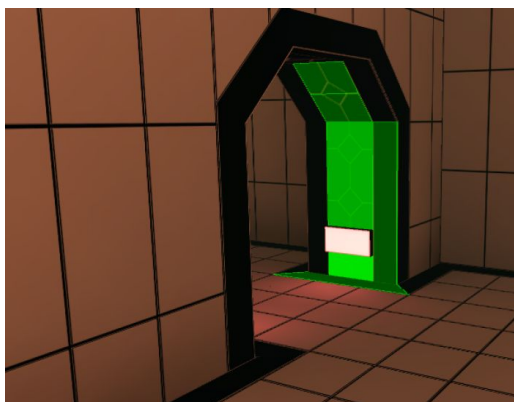
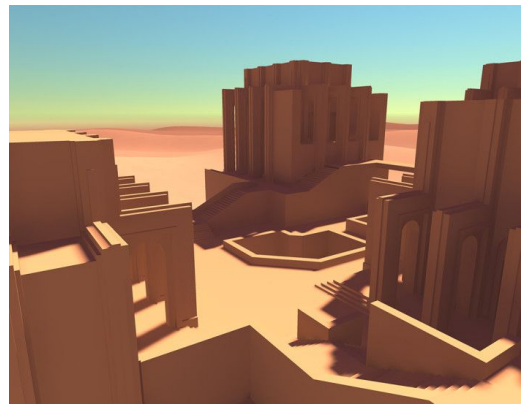
SabreCSG is a set of level design tools for building complex levels quickly inside Unity. Using Constructive Solid Geometry techniques SabreCSG allows you to add and subtract brushes to create great levels without needing to understand 3D art packages.



Add and subtract brushes together to make great play spaces

Boolean brushes allow you to add and subtract arbitrary shapes together to rapidly create walls, rooms or carve out doors and windows. The brushes are used as a template for building the final geometry allowing you unprecedented flexibility for making minor tweaks or big changes simply by modifying the brushes.

Powerful brush and geometry tools
SabreCSG comes equipped with a whole range of tools for editing brushes and geometry, from intuitive resize tools which let you quickly block out spaces to vertex and edge editing modes which let you go in and tweak in more detail, to advanced clipping tools allowing you to bevel or cut entire brushes in two.



Apply materials and edit UVs

With its surface tools, SabreCSG allows you to translate, rotate and scale surfaces, apply new materials, exclude faces from the final geometry for speed. And with newly upgraded features there's a whole set of new helper functions to speed up your workflow.



SabreCSG Quickstart

Create Your First Brush

To begin using the SabreCSG tools in Unity, once you have imported SabreCSG, you will need to create a CSG model in your scene.

To do this, from the menu bar select “GameObject -> Create CSG”. This will add a blue volume to the center of your scene. Once you hit the “Rebuild” button (or press “Ctrl+Shift+R” on PC, “Cmd+Shift+R” on OSX), the brush will be converted into your level’s geometry. Brushes, which are primitive 3D volumes, are the building blocks for your level in SabreCSG.

The opaque, tiled volume is the actual level geometry produced by rebuilding the transparent, blue brush. When you move the brush and do a second rebuild, notice that the original level geometry moves to the brush’s new location. To create two blocks of level geometry, you need two brushes, which you can make by duplicating the first brush (the keyboard shortcut is “Ctrl+D” or “Cmd+D” on OSX), moving it, and then clicking rebuild.

Additive and Subtractive Brushes

Brushes can be set as additive or subtractive volumes. By default, brushes are additive. When using most of SabreCSG’s tools (e.g. Resize, Clip, or Vertex tools), additive brushes are displayed in blue and subtractive brushes are orange.

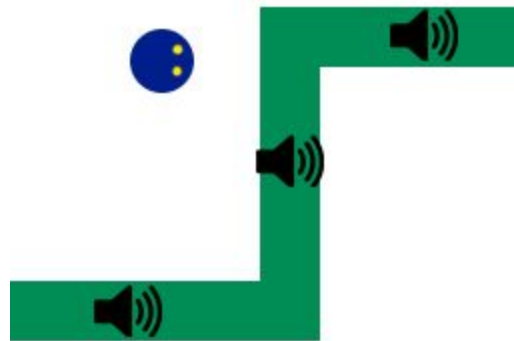
Think of additive brushes like a solid block of clay. You can change the level geometry by creating more additive brushes, much as you could change the block of clay by adding more clay. You can also shape the level geometry using the Clip and Vertex modes. Subtractive brushes are another way of shaping the level geometry that you have already created. Like the clay, however, you can’t subtract from what doesn’t exist, so if you want to build most of your level’s geometry in a subtractive way, it is best to make your first brush a large additive volume. This will give you a large space to subtract within.

For more information please see the SabreCSG wiki pages:

<https://github.com/sabresaurus/SabreCSG/wiki/Tutorial-1>

Volumetric Audio Introduction

The problem with default Unity audio sources is that they are emitting sound from a fixed position. If you have a large sewer pipe with water streaming through it you should be able to hear it coming from the sewer pipe itself no matter where you stand. By default you'd have to place multiple sound sources and then it may appear to come from the side as illustrated in this image:



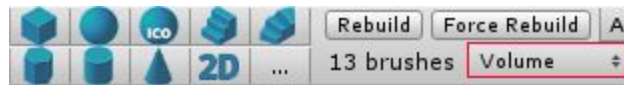
For our player the sound would appear to come from the right and at the center of each pipe segment. It's unrealistic, doesn't make much sense and it takes him out of the immersion of the game.

Volumetric Audio solves this problem by having a sound source that follows the player along the exterior of the pipe. By doing so it appears that the sound comes from the pipe no matter where he stands. It even blends the sound to 2D if he were to enter the pipe so that the sound surrounds him completely (similar to the music), allowing the player to truly immerse in the vast environment of sound with great realism.

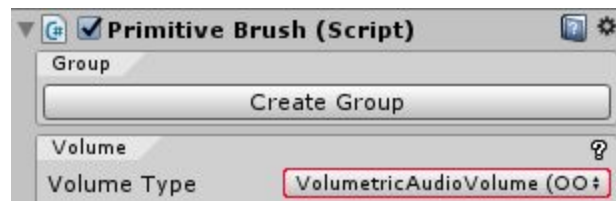
Volumetric Audio Quickstart

Creating The Volume

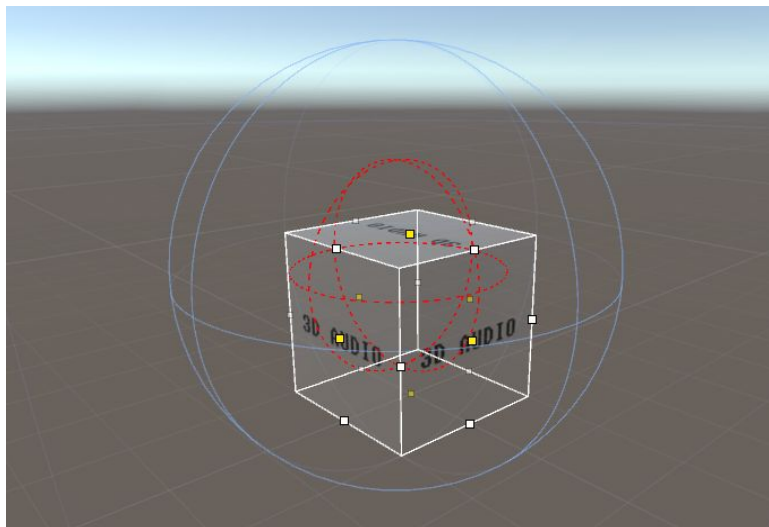
Now that you have installed SabreCSG it's time to add our first Volumetric Audio Volume to the scene. To do so, create a CSG Model and place a primitive brush in the scene (see "SabreCSG Quickstart"). Next in the bottom toolbar set the brush mode to "Volume".



In the inspector you will be able to see the primitive brush settings, set the volume type to "VolumetricAudioVolume (OOLaboratories.SabreCSG.VolumetricAudio)".

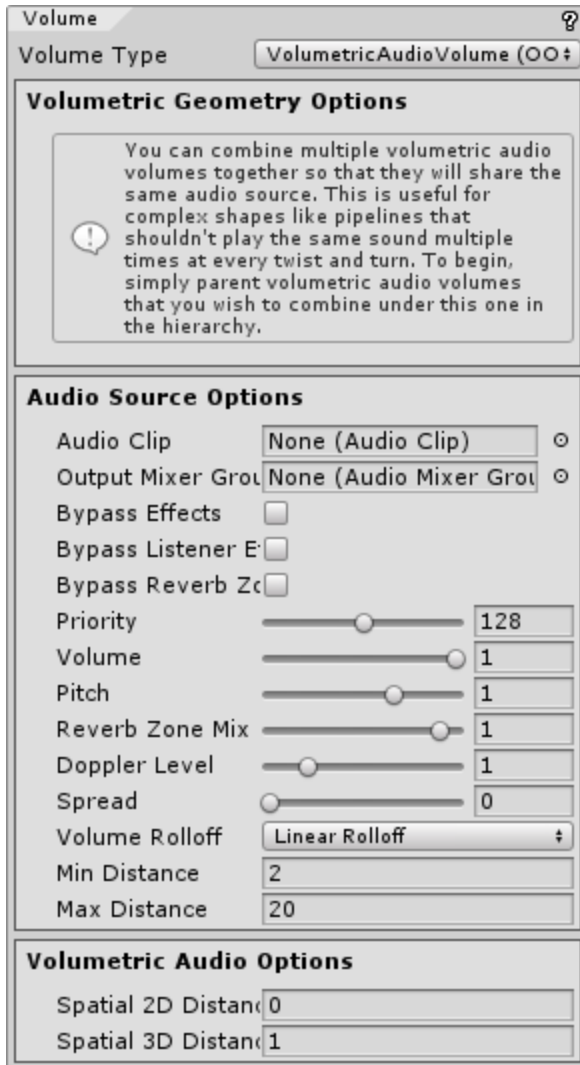


You should now be able to see the "3D AUDIO" brush with some rotating spheres.





The Volume Inspector Settings



Audio Clip: The audio clip played by the volumetric audio source.

Output Mixer Group: Set whether the sound should play through an Audio Mixer first or directly to the Audio Listener.

Bypass Effects: Bypass/ignore any applied effects on the volumetric audio source.

Bypass Listener Effects: Bypass/ignore any applied effects from the Audio Listener.

Bypass Reverb Zone: Bypass/ignore any reverb zones.

Priority: Sets the priority of the volumetric audio source. Note that a sound with a larger priority value will more likely be stolen by sounds with smaller priority values.

Volume: Sets the overall volume of the sound.

Pitch: Sets the frequency of the sound. Use this to slow down or speed up the sound.

Reverb Zone Mix: Sets how much of the signal this volumetric audio source is mixing into the global reverb associated with the zones. [0, 1] is the linear range (like sound volume) while [1, 1.1] lets you boost the reverb mix by 10 dB.

Doppler Level: Specifies how much the pitch is changed based on the relative velocity between the audio listener and the volumetric audio source.

Spread: Sets the spread of a 3D sound in speaker space (prevents having sound all in one ear sometimes).

Volume Rolloff: Which type of volume rolloff curve to use for the volumetric audio source.

Min Distance: The minimum distance where the volumetric audio source volume stays the loudest possible. Outside of this minimum distance it begins to attenuate.

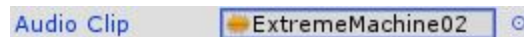
Max Distance: The maximum distance the volumetric audio source stops attenuating at.

Spatial 2D Distance: The spatial 2D distance affects the distance from the volume before the volumetric sound fully transitions to 2D (inner radius).

Spatial 3D Distance: The spatial 3D distance affects the distance from the volume before the volumetric sound fully transitions to 3D (outer radius).

Playing Some Volumetric Sound

To immediately hear the amazing volumetric sound all you have to do is assign the “Audio Clip” in the inspector.



Live In-Editor Audio Preview

You do not have to enter play mode as this extension features live audio preview in the editor. It's important that you disable/enable the scene view audio icon often as it tends to be a little buggy, this is not our fault.



If you wish to mute the audio you must use the “Mute Audio” button in the Game tab.



Hot Reloading Support

C# recompilations during play are fully supported.

Visualize Volumetric Audio Source

When you have the Volumetric Audio Volume brush selected you can see several spheres, blue, red and possibly even green. In the center of them is the audio source (it doesn't have the usual speaker horn icon). When you fly around in the scene you can see that it tries to follow you and when you enter the volume you will be inside of the spheres. The next chapter will go into more details on what these spheres mean.

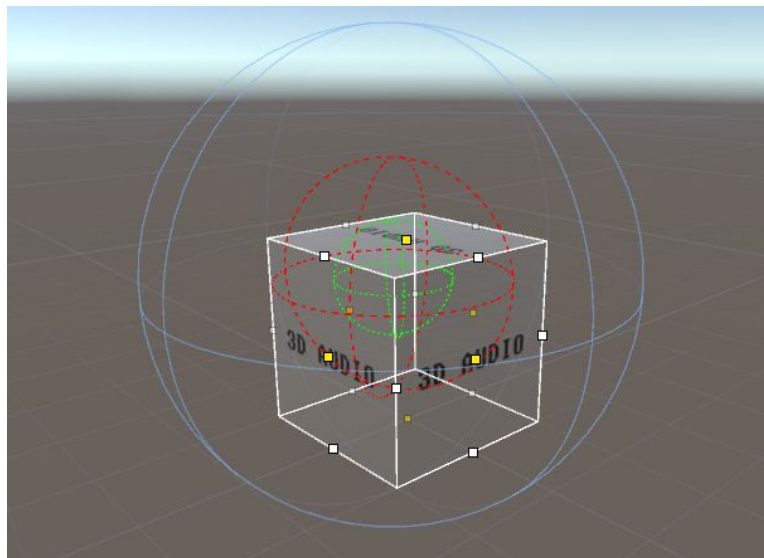
Spatial 2D and 3D Distance

The spatial 3D distance is indicated by the red sphere around the volumetric audio source. When the audio listener is outside of this sphere the sound will be completely 3D (usually changed using the “Spatial Blend” property in the inspector) and will appear to come from a point in space.

The spatial 2D distance is indicated by the green sphere around the volumetric audio source. When the audio listener is inside of this sphere the sound will be completely 2D (usually changed using the “Spatial Blend” property in the inspector) and will appear to surround you, similar to the music, just a stereo sound played equally in both speakers.

The blue spheres are the default Unity spheres. They display attenuation. When the audio listener is inside of the small sphere the sound will play at full volume and anything outside of the large sphere will no longer be heard.

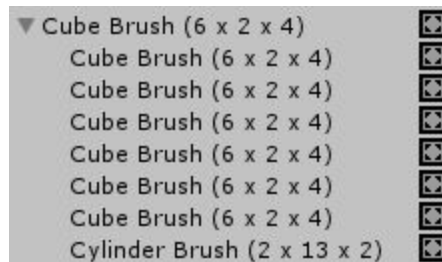
Similar to how the audio fades away when you get further away from it as indicated by the blue spheres, the 2D sound fades into 3D sound when you get further away from it as indicated by the green and red spheres.



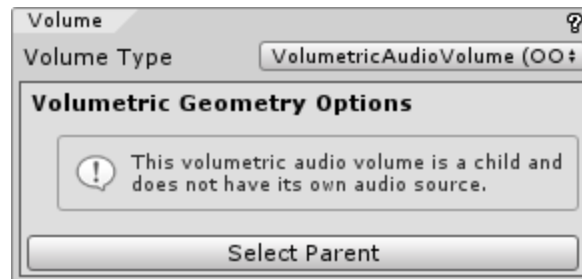


Combining Volumes

You can combine multiple volumetric audio volumes together so that they will share the same audio source. This is useful for complex shapes like pipelines that shouldn't play the same sound multiple times at every twist and turn (SabreCSG only supports convex shapes so a pipeline would have to exist out of multiple brushes). To begin, simply parent volumetric audio volumes that you wish to combine under this one in the hierarchy.



The inspector will change to indicate that the child volumetric audio volume brush no longer has its own audio source, as this is now simply additional geometry used by the parent volume.



Select one of the brushes and have a look at the volumetric audio source while you fly around the scene, it will jump between them or smoothly follow along the geometry that you have created. This allows for realistic long curvy hallways or large ocean bodies without any intersections where you'd suddenly hear the same sound twice. Please note that you cannot parent a child volume to a child volume.