



Installation and preparation

Platform: windows 10
Onno Spatial Engine VR
Jack Audio Connection Kit 1.9.11

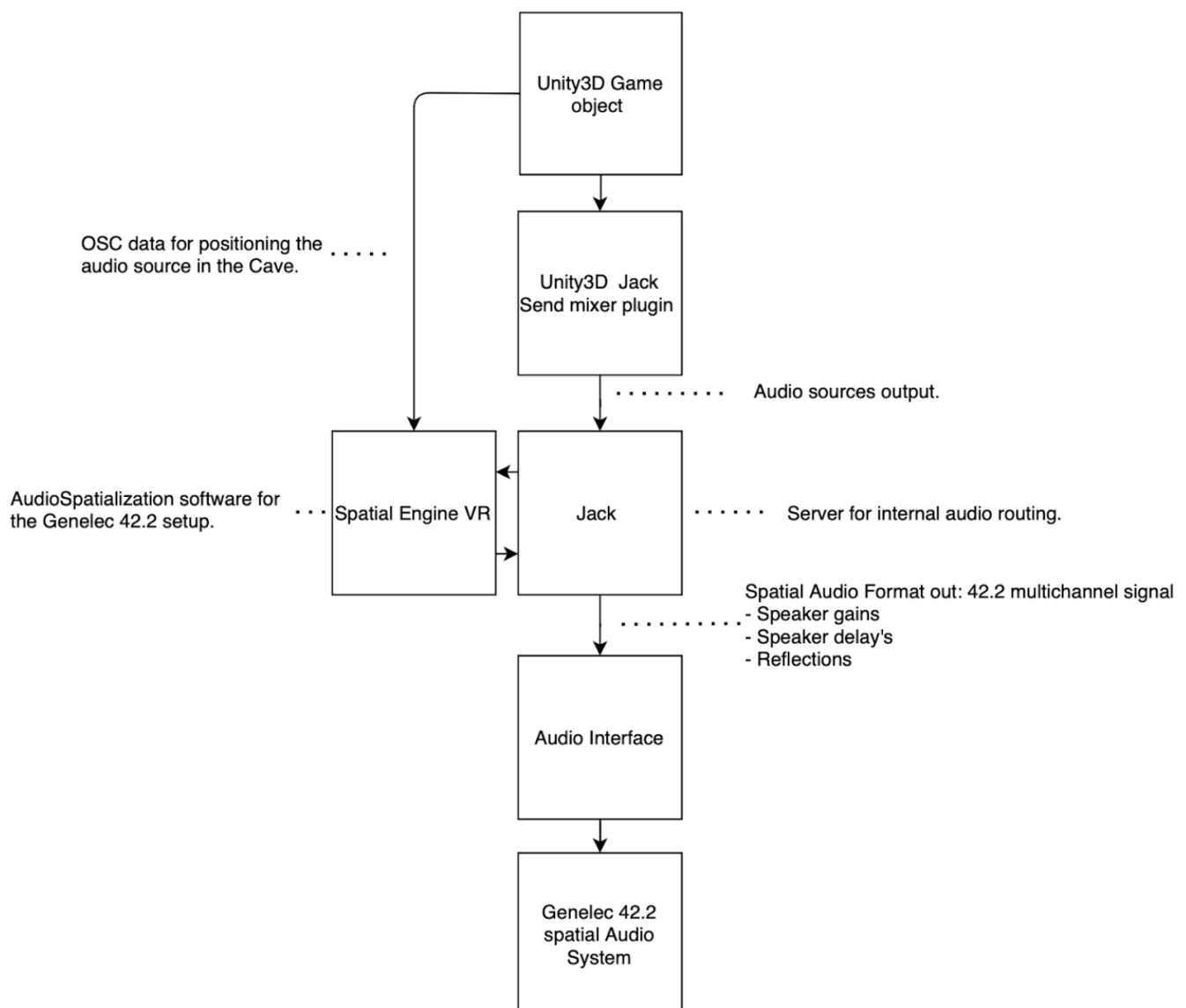
10-12-2020

0: Objective:

Level: expert, some familiarity with digital audio processing is required.

- Laying out the fundamentals for part 2: Linking dynamic audio-channels from Unity3D's audiomixer to Spatial Engine VR.
- Installing dependencies and preparing windows 10 for multichannel audio communication.
- Installing Studio Onno - Spatial Engine VR: Custom software to control to spatialize
- Audio-sources on the 42.2 Genelec system with Unity3D.
- Setting up JackD Audio Server: Route audio internally on your machine with low latency.
- Configure JackD Audio Server to work with Unity3D's default audio preferences.

The system we are building



Let's get started!

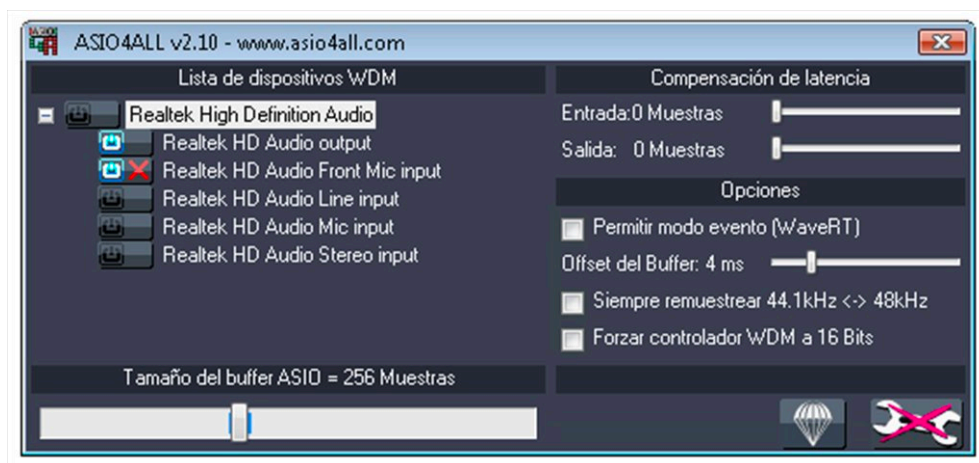
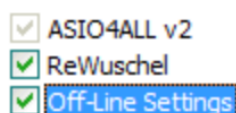
1.1 Install Visual c++ dist. Kit. 2019

<https://support.microsoft.com/nl-nl/help/2977003/the-latest-supported-visual-c-downloads>
Spatial Engine VR needs Visual C++ dist. kit to run.

1.2 Installing ASIO4All:

> Install ASIO4ALL V2 Universal Audio Driver <http://www.asio4all.org/>

> Make sure to get the ASIO4ALL control panel: select "offline settings" in the installation menu. It's best to install all software that comes in the bundle.



Only for tutorial purposes.

This free utility is a Universal driver that will work with any hardware interface supporting Asio. We recommend to start with ASIO4ALL because it is a relatively simple utility to test out your hardware. However, In a later stadium, it is wise to use dedicated Asia drivers. ASIO4ALL is a "one size fit's all" It's not particularly efficient, nor is the quality as good as a dedicated driver. Use the provided asio panel tool to bring up the control panel.

1.3 Disable randomize memory allocations (Bottom Up ASLR)

- > Open Windows Security
- > Open App and Browser Control
- > Scroll down to Settings for exploit protection
- > Disable: Random memory Allocations (Bottom Up ASLR)
- > Restart your Machine to implement the changes.

Why do I need to disable ASLR? We are going to stream audio from Unity3D into Spatial Engine VR using Jack. It is important to turn off any inter-app communication restrictions imposed by microsoft security center. For more information, see this issue:

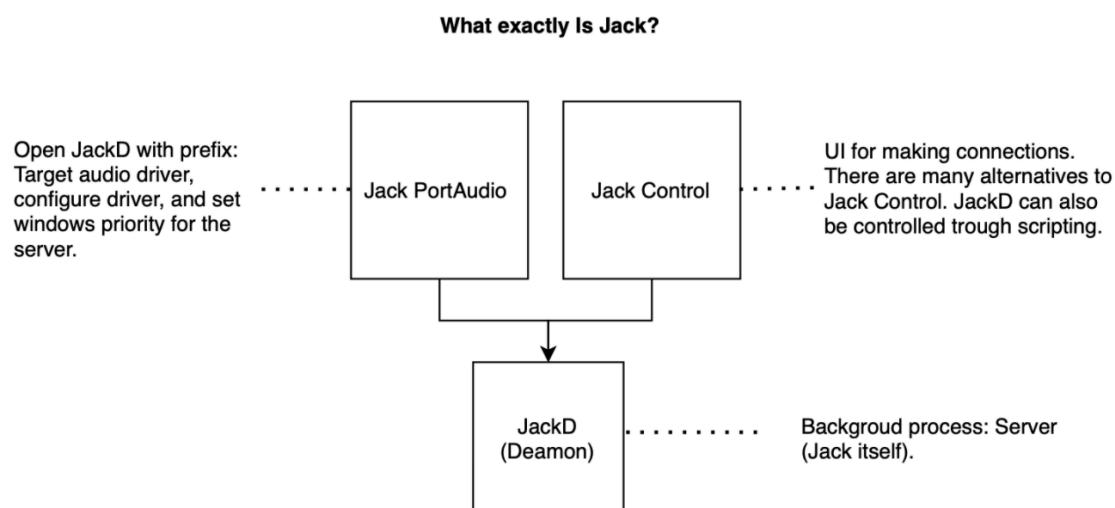
<https://github.com/jackaudio/jack2/issues/332>

1.4 Reboot your PC

2: Install Spatial Engine VR

- > Make sure Visual Studio C++ dist. Kit is installed.
- > Open SpatialEngineVr-Master > Spatial engine VR > Installer.exe
- > Follow the installation wizard
- > Allow acces to microphone and speakers if asked for.
- > Allow full acces when prompted by Windows Firewall

3: Install Jack Audio Connection Kit



Jack Audio connection kit is an open-source realtime audio server for streaming audio between applications. We will use Jack to send multichannel audio from Unity3D to Spatial Engine VR. In spatial engine, the spatial processing will be done. To set up Jack correctly for use with unity3D, follow these steps carefully.

3.1 Download and Install Jack_v1.9.11_64_setup.exe

<https://github.com/jackaudio/jackaudio.github.com/releases/tag/1.9.11>

(for other versions of Jack, Unity3D Jack Send Plugin must be recompiled from source)

Original Windows instructions here: https://jackaudio.org/faq/jack_on_windows.html Our instructions differ slightly to make Jack work in sync with Unity3D. Jack PortAudio and Jack Control can be found in start > applications > jack

We will use the following tools included in the Jack 1.9.11 installation:

JackD.exe: The main executable, the jack daemon itself.

Jack Control: A GUI tool for making connections and configuring the server. We will use it to connect Unity3D audio to Spatial Engine VR.

Jack PortAudio: A shortcut linking to JackD with the intend of backend initialization. We will use Jack PortAudio to start JackDaemon with initial backend parameters, and a target driver.

3.1 DLL registry

- > Unregister previous versions before installing a new one!
- > Open an elevated command prompt as administrator and navigate to the Jack installation folder. Then type the following command:

```
regsvr32 "C:\Program Files\Jack\64bits\JackRouter.dll"
```

This will register the JackRouter.dll file into your system. Make sure you get a confirmation that the registry what successful.

- > Should respond with:

```
"Successfully registered JackRouter.dll"
```

3.2 Target the audio driver in Jack PortAudio

- > Navigate to start > programs > jack
- > Select Jack PortAudio, and make a shortcut on the desktop.
- > Right mouse click on the shortcut and select "properties"
- > Navigate to shortcut > Target

```
"C:\Program Files\Jack\jackd.exe" -R -S -d portaudio -d "ASIO::ASIO4ALL v2" -r48000 -p1024"
```

This will initialize jackDaemon with a sample rate of 48000hz and a block size of 1024 samples. All JackDaemon backend params can be found here:

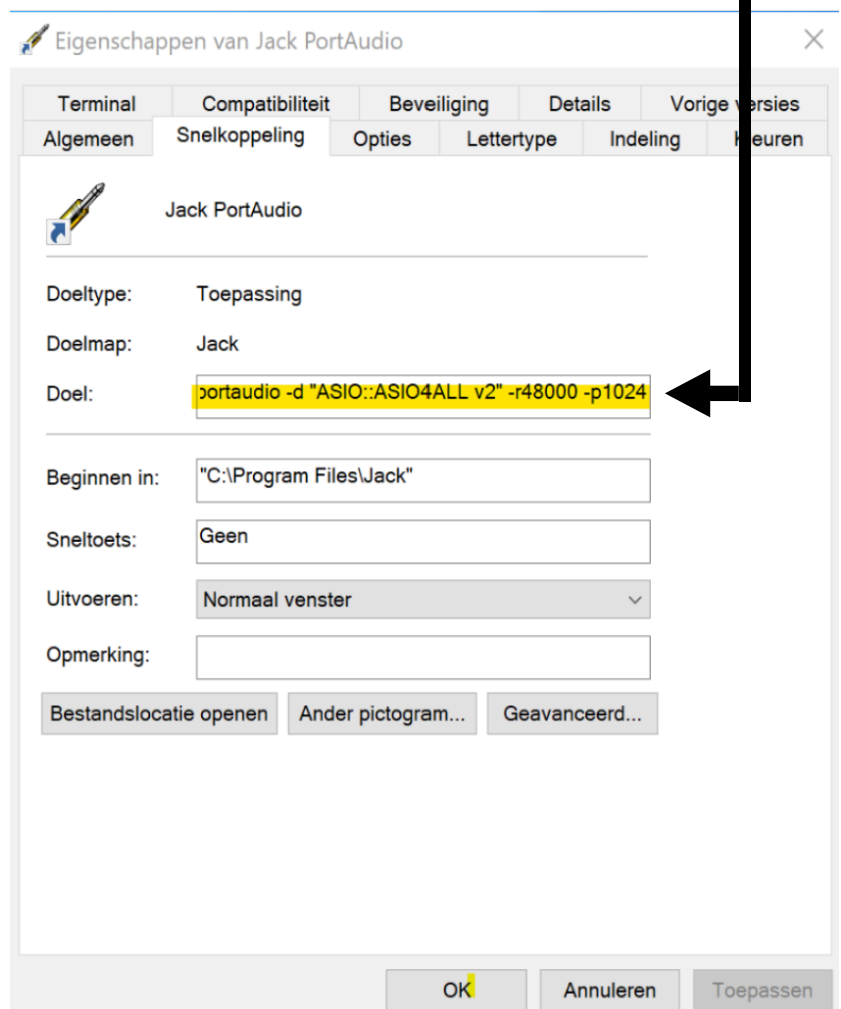
<https://www.systutorials.com/docs/linux/man/1-jackd/>

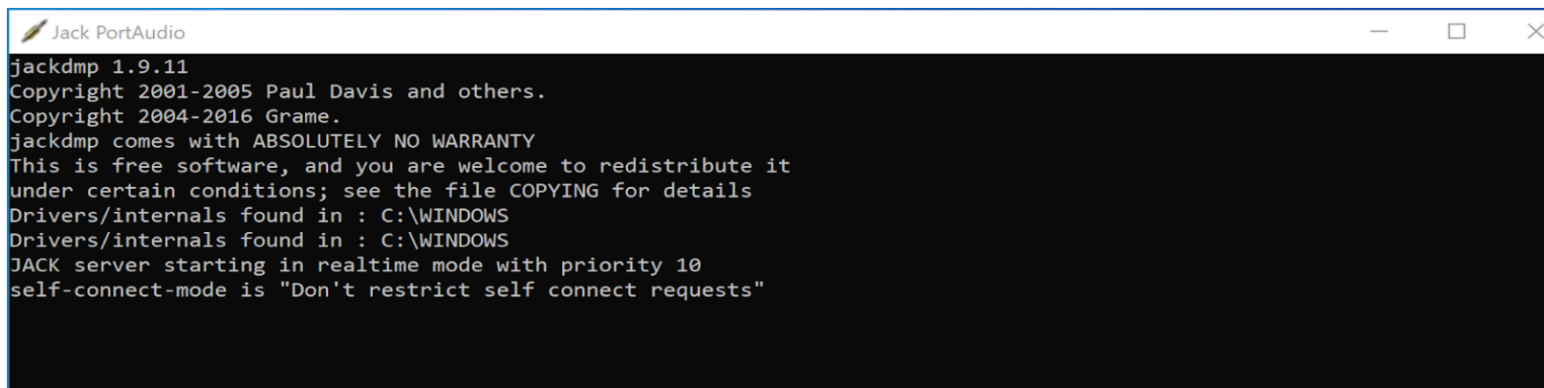
3.3 Using a specific Asio driver.

To use a different driver, open a new elevated command prompt, navigate to the jack installation folder and type in:

```
jackd -d portaudio -
```

This will provide you with a list of all available Asio drivers on your system. You should copy the exact name of your driver, and replace "ASIO::ASIO4ALL v2" with your driver.



A screenshot of a Windows application window titled "Jack PortAudio". The window has a dark background with white text. The text displays the version "jackdmp 1.9.11", copyright information for Paul Davis and Grame, a disclaimer about warranty, and the path to drivers. It also shows the JACK server starting in realtime mode with priority 10 and a self-connect-mode setting.

```
jackdmp 1.9.11
Copyright 2001-2005 Paul Davis and others.
Copyright 2004-2016 Grame.
jackdmp comes with ABSOLUTELY NO WARRANTY
This is free software, and you are welcome to redistribute it
under certain conditions; see the file COPYING for details
Drivers/internals found in : C:\WINDOWS
Drivers/internals found in : C:\WINDOWS
JACK server starting in realtime mode with priority 10
self-connect-mode is "Don't restrict self connect requests"
```

3.4 Verify that the backend targeting was correct

- > Open the Jack PortAudio shortcut.
- > Jack PortAudio should look like the example above.

Any errors displayed on the Jack PortAudio window are likely caused by:

- Synchronization problems with clients
- Invalid or corrupted backend parameters or driver targeting
- Visit: <https://github.com/jackaudio/jackaudio.github.com/wiki>

3.5 Make a shortcut for Jack Control.exe on the desktop

- > Navigate start > programs > Jack
- > Select Jack Control
- > Create a shortcut on the desktop

4: Finished part 1

You should now have the following:

- Visual C++ distribution Kit 2019 installed
- ASIO4ALL Installed.
- Spatial Engine VR installed
- Bottom Up ASLR disabled, this will become important later on
- Jack Server up and running
- 3 shortcuts on the desktop: Jack Control, Jack PortAudio, and Spatial Engine VR

What you should have

Jack is now running as a realtime audio server. Preparations are made for streaming up to 64 audio sources from Unity3D to Spatial Engine using Jack. In Studio Onno: Spatial Engine VR, realtime spatialization is done to render the audio sources in a real physical location on the 42.2 Genelec System.

Proceed to part 2

Linking Dynamic Audio channels from Unity3D to Spatial Engine VR using Jack

STUDIO ONNO



Custom spatial audio solution for Tilburg University - DAF Technology Lab

@Marijn Cinjee & Wes Broersen 2020

