



AVPro Windows Media Unity Plugin

Version 2.5beta

Released 19 August 2013

**Brings fast playback of HD video
and audio content to Unity.**

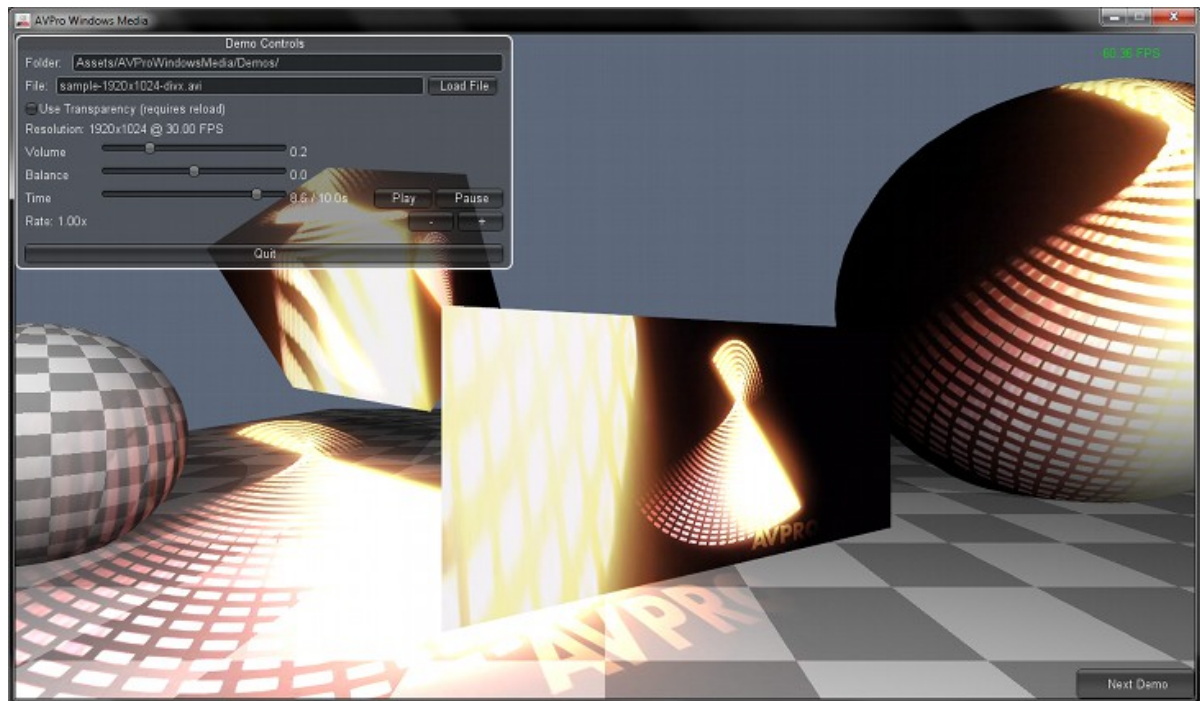
1080p - AVI - H.264 - MP4 - WMV - DV and more.

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1. Introduction



“AVPro Windows Media” is a plugin for Unity that allows playback of supported DirectShow content in a fast and easy manner.

The plugin is aimed at the high-end user group that require video playback features beyond Unity’s built-in video support.

DirectShow is a trademark of Microsoft Inc., registered in the U.S. and other countries.

2. System Requirements

- Unity Pro 3.5 and above including Unity 4.0.
- The plugin only supports Microsoft Windows (32-bit and 64-bit).
- Codecs for any video/audio you want to play.

When playing back high resolution videos a decent CPU and GPU must be available. Integrated chipsets may not handle HD content well, especially when using the DirectX rendering path in Unity 3.x.

3. Installation

1. Import the unitypackage file into your Unity project.
2. You may need to **move the “Plugins” folder into the root of your project.**
3. Ensure you have the relevant **codecs installed** for the content you want to play.

4. Features

4.1 General

- Play multiple DirectShow videos (or audio) simultaneously.
- Play videos from disk or from memory.
- Audio volume control.
- Frame by frame playback.
- Seeking.
- Playback rate control.

4.1 Alpha / Transparent Movie Support

The plugin supports video codecs that support an alpha channel, allowing playback of transparent videos - something that Unity's native Ogg Theora codec doesn't allow.

Codecs with alpha channel support include:

1. Lagarith (<http://lags.leetcode.net/codec.html>)
2. Uncompressed 32-bit AVI

The H.264 codec is meant to have alpha support, however so far we haven't found any DirectShow codecs for Windows that support alpha.

4.2 Unity Integration

The “AVPro Windows Media” plugin provides an API for playing Windows Media content. Additionally some helpful Unity components have been created to allow drag and drop use of the plugin without any scripting. See the “Unity Components” section below.

Movies are uploaded to standard Unity texture objects.

4.3 Dynamic File Loading

The plugin supports loading files directly from the file system. This allows content to be replaced and updated without relying on having Unity installed. This is especially useful when creating an application that must be maintained/updated by a third party, or for live applications where content is being created while the application is running.

Another benefit of loading dynamically instead of importing into Unity is the time it takes to import assets. If you have a lot of video content, importing the assets can take a very long time. In this case, loading them dynamically provides a much better workflow.

Videos can also be loaded from memory which means the files can be stored in packages and played without the user ever being able to see the files on disk.

4.4 Video Codec Choice

Video codecs can be chosen to suit the content and playback requirements. Typical requirements:

- Lossless / HQ encoding

Codecs like Lagarith allow for perfect or near-perfect video encoding. H.264 offers extremely high quality.

- Transparency

See the list of codecs supporting transparency above.

- File size

Codecs like H.264 give great file size reduction, however not everyone is concerned about file size and can choose another codec that is more suited.

- Fast scrubbing / seeking

Codecs without inter-frame dependencies allow for fast seeking and scrubbing. Typical codecs are: DV, Motion JPEG and Lagarith.

- CPU usage

Some codecs (like H.264) use a lot of CPU during decoding. Other codecs can be used (usually at the expense of disk space) to allow for less CPU usage. XVID generally provides a good balance of CPU usage and file size.

We recommend the [LAV codec pack](#)

4.5 Fast Playback of Full HD 1080p Content

The plugin has been optimised to run as fast as possible to allow for smooth playback of HD content. Various methods have been used to achieve optimal performance.

- **Fast OpenGL Rendering Path**

Using direct GPU hardware updates, the plugin is able to render very quickly using little CPU power. This fast path is only available when Unity 3.x is running in OpenGL mode. Unity 4.x has this optimisation for all graphics APIs

You can run your Unity editor in OpenGL mode by adding the “-force-opengl” switch to the shortcut. Builds can also be forced to run in OpenGL mode by using the “-force-opengl” switch on the generated executable files.

- **Fast DirectX Rendering Path**

In Unity 3.x the DirectX rendering path isn't as fast as the OpenGL path however we have made it as fast as possible using various techniques. Note: using the DirectX path a 1280x720 video will use a 1024x1024 texture, as will a 1920x1080 video, so there is often not much difference between them in terms of system load.

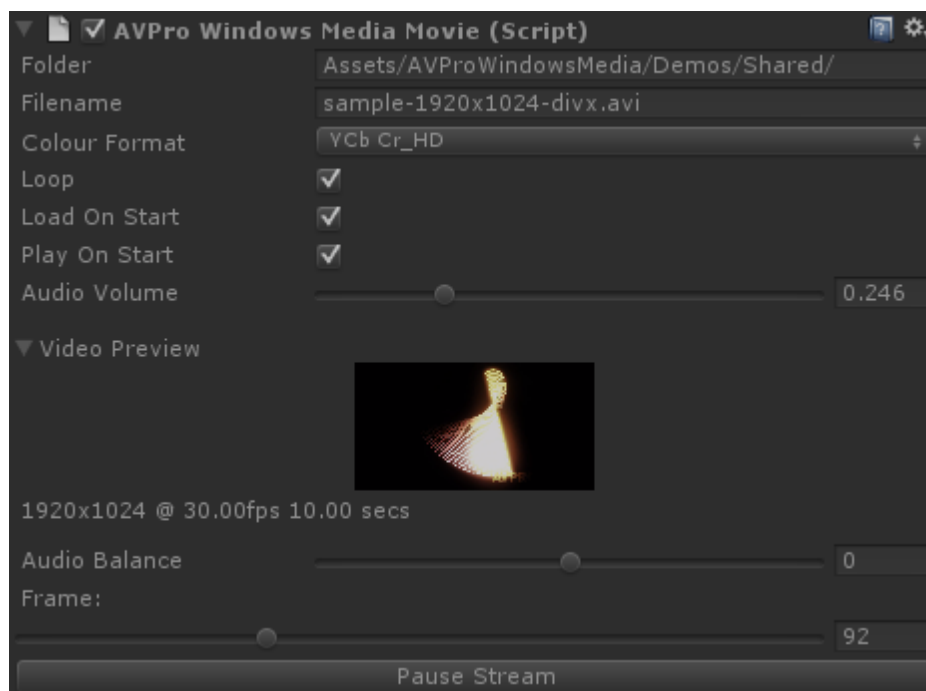
5. Components

This asset includes a number of Unity script components that allow use of the asset without any scripting.

5.1 AVProWindowsMediaManager

There must always be exactly one **AVProWindowsMediaManager** in your scene when you use this plugin. It is also important that this component starts before the other **AVProWindowMedia** components (controllable via Script Execution Order setting). There is nothing to configure in this component.

5.2 AVProWindowsMediaMovie



This component represents a single piece of media (video or audio) that can be loaded and played. The colour format is the internal format that is used to play the video and can affect quality and performance. the options are:

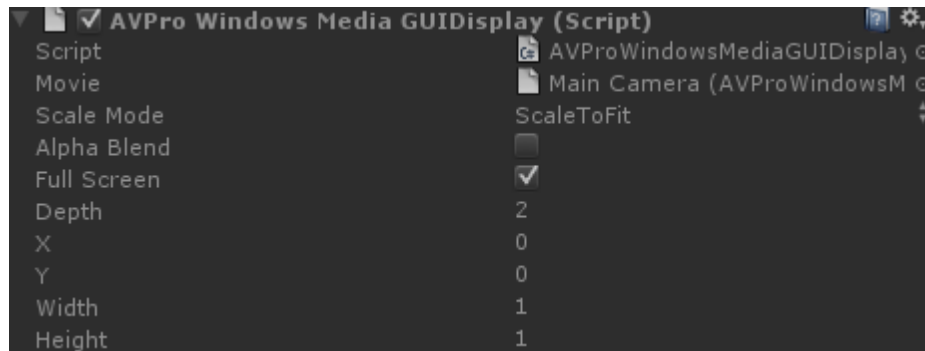
- “YCbCr_HD” (default): Fast playback using the Rec. 709 YUV colour conversion.
- “YCbCr_SD”: Fast playback using the Rec.601 YUV colour conversion.
- “RGBA32”: This mode is slower but it allows for videos with alpha channel.

The colour format cannot be changed once the video is playing.

When the editor is playing additional controls are displayed showing you the contents of the video which is useful during development. Note that having the video preview visible can affect frame rate as it forces update of the Unity UI.

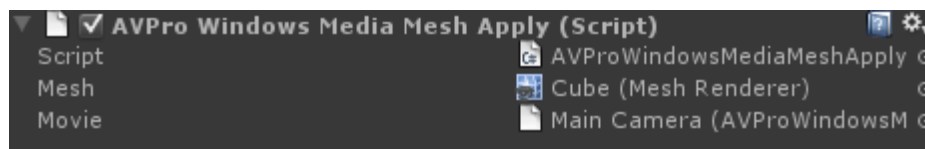
This component simply plays the movie and doesn't display it on the screen. For display take a look at the components below.

5.3 AVProWindowsMediaGUIDisplay



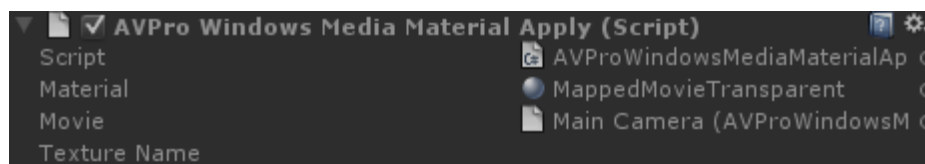
This component displays an AVProWindowsMediaMovie on the screen using Unity's GUI system. Simply select the **AVProWindowsMediaMovie** component you want to display in the "Movie" option. Next you can set the placement of the item on the screen or use the fullscreen default.

5.4 AVProWindowsMediaMeshApply



Use this component to apply an **AVProWindowMediaMovie** to all of the materials used by a mesh in your scene.

5.5 AVProWindowsMediaMaterialApply



Use this component to apply an **AVProWindowMediaMovie** to a material in your scene. Optionally a texture name can be specified to override a specific texture slot in the material.

6. Tips

For best results we recommend:

1. If you're using a version of Unity before 4.0 then run your application or Unity with "-force-opengl" switch as this plugin runs much faster in OpenGL.
2. If you need to create and destroy many AVProWindowsMediaMovie components, it's best to reuse the existing components as this is faster and involves less memory reallocations.
3. If you're using a version of Unity before 4.0 then when using 1080p videos it's actually best if your input video has a maximum height of ≤ 1024 as this means the plugin can use a texture with a height of maximum 1024 instead of 2048 in the case of true 1080p.

7. FAQ (Frequently Asked Questions)

1. What codecs are needed to play MP4/MKV files?

Install Haali Media Splitter (<http://haali.su/mkv/>)

2. How do I fix the error: “DLLNotFoundException”?

You need to move/copy the “Plugins” folder from your “AVProWindowsMedia” folder into the root of your folder structure. This means the “Plugins” folder should be moved to your “Assets” folder. Unfortunately this is a limitation in the way Unitys Asset Store handles plugins.

3. How do I make a 64-bit Windows build?

Unfortunately Unity doesn't handle 32-bit and 64-bit DLLs automatically so you have to copy the files manually. This asset comes with a 32-bit (default) and 64-bit DLL. When you have created a 64-bit Windows build copy need to replace the AVProWindowsMedia.dll in your “{YourBuildName}_Data/Plugins” folder with the 64-bit DLL. The 64-bit DLL needs to be renamed to AVProWindowsMedia.dll

4. My H.264 encoded video doesn't play smoothly, how can I make it play smoother?

H.264 videos (often in a .mov or .mp4 container) are often highly compressed and this can make them slower to play back. The H.264 encoder has many many options that can be used to tune how the videos are compressed and how they play. We've found that the tool FFmpeg can be used to convert videos for faster playback with the following command-line:

```
ffmpeg -i input.mp4 -c:v libx264 -pix_fmt yuv420p -preset veryslow -tune fastdecode -profile:v main -coder 0 -g 6 -crf 20 -flags -loop output.mp4
```

5. Which Unity video-playback plugin is better: AVPro Windows Media or AVPro QuickTime?

If you need easy cross-platform (PC-Mac) video support then AVPro QuickTime is the only way to go. It is possible to use both plugins together and get the best of both worlds but this would require some scripting to create a basic wrapper to encapsulate both plugins.

If you are focusing on Windows PC only and need high performance then we recommend using AVPro Windows Media as we have found QuickTime support on PC to be lacking (especially in multi-threaded video codec performance) since the QuickTime engine for PC hasn't been updated in some time.

QuickTime though can be easier as it only requires a single install whereas on the PC you need to know what codecs you need to support and potential install multiple codecs.

You can contact us with your requirements if you're not sure. We also have downloadable demos on the website which you can use for testing. Here is a table to help you decide:

	AVPro QuickTime	AVPro Windows Media
Windows PC Support	Yes	Yes
Mac Support	Yes	No
Great performance playing multiple HD videos on Windows PC	No	Yes
Requires additional installs	Only on Windows PC - you must install the QuickTime player	Only if you want to support codecs that Windows doesn't natively expose to DirectShow
MP4 / H.264 Playback	Supported	Must install a codec

6. I'm trying to play a very high quality H.264 video and I only get a blank screen with audio playing, how can I fix it?

Windows 7 and 8 have their own preferred list of codecs and (at least in Windows 7) the DirectShow video decoder is unable to play H.264 videos encoded with the "High" profile. It can only handle "Simple" and "Main". You can either re-encode your video using a "Main" profile or do the following:

- 1) Install [LAV](#) filters
- 2) Install [Codec Tweaker](#)
- 3) Run Codec Tweaker, go to "Preferred decoders" and change "H.264" from "Microsoft" to "LAV Video".

7. The video isn't playing back smoothly, what could the cause be?

The first thing to check is your hardware to make sure it's suitable. You'll need a decent GPU and CPU with the specifications related to the resolution of video you're trying to play back and also the encoding of the video.

If the video file is very large or the video is a high frame rate then your hard drive speed could also be an issue. You should find out how many MB/s your drive can read and work out how many MB/s your video requires for playback (by using file size

in MB / frames per second).

The format your video encoded with also plays a part. Some codecs require a lot of processing to decode. H.264 is usually one of the most expensive codecs. You can however encode H.264 using fast-decode option (mentioned in FAQ 4 above) which really helps.

Some codecs are configurable and can be tuned for better playback. The Lagarith codec for example has options for multi-threading which can be enabled. To view these options you can use software like Virtualdub to configure compression codecs.

If your video plays smoothly in the editor but is jerky when you make a build then disabling Unity's multi-threaded rendering can help. Go to Player Settings, switch the Inspector to Debug disable and disable "MT Rendering".

You should also check the Asset Store to make sure you're using the latest version of this plugin, and using the latest version of Unity.

If you have questions about your file formats etc you can contact us with your questions.

8. I have compiled the scripts into a DLL and am now experiencing some unexpected behaviour.

Some of our scripts have Unity version-specific preprocessor defines which determine how they compile (eg UNITY_4_0). Usually when you build an external DLL these defines are missing and so the incorrect version of the code can be compiled. You need to add the appropriate compiler defines to your build.

8. Version History

- **Version X**
 - Add subtitle support?
 - Add multiple soundtrack support?
 - Add support for 4:2:0 planar pixel formats?
 - ← Your suggestion here
- **Version 2.5 - Monday 19 August 2013**
 - Added audio delay support
 - Fixed frame extract demo
 - Fixed Unity 4.2 support
- **Version 2.4 - Wednesday 30 May 2013**

- Added support for playing videos from memory
- Added new frame extract demo
- Improved internal frame buffering
- Improved instance handle recycling
- Fixed some bugs
- **Version 2.3 - Monday 29 April 2013**
 - Added Unity 4.1 non-pow2 texture support - optimisation
 - Added new demo that plays multiple videos simultaneously
 - Added frame-rate display to inspector
 - Added IsFinishedPlaying property
 - Fixed lost texture bug when pausing and dragging window
 - Fixed 64-bit crash bug when resizing window
 - Minor bug fixes
 - Added new FAQs to documentation
- **Version 2.22 Monday 18 March 2013**
 - Added Unity 4.1 support
 - Fixed some platform #if issues
- **Version 2.2 Monday 4 March 2013**
 - Added a new demo that plays a queue of videos
 - Improved AVProWindowsMediaManager
 - Optimised and improved pixel format conversion
 - Removed last traces of Overlay mode
 - Added unique plugin ID for GL.IssuePluginEvent()
 - Added path resolve for relative paths when working path isn't that of the EXE
 - Fixed a rare null pointer bug in the plugin
- **Version 2.1 Thursday 20 December 2012**
 - Fixed a bug in Unity 4.0 when playing multiple videos
- **Version 2.0.0 Wednesday 5 December 2012**
 - Added Unity 4.0 support
 - Added Unity 4.0 support for DX9 & DX11 textures updates
 - Improved speed and accuracy of pre-roll to get initial frame
 - Can now seek while paused
 - Fixed bug playing files > 4GB
 - Added better reporting for missing DLL
- **Version 1.50 - Wednesday 4 July 2012**
 - Added 64-bit build.
 - More powerful components for non-scripters.
 - Improved names of components to make them unique.

- Improved demo scenes.
 - Added in-editor preview of videos.
 - Added support for YCbCr Rec.709 colour space.
 - Frame seeking added.
 - Pre-roll added.
 - Improved memory cleanup.
 - Fixed looped video playback bug.
 - Documentation improved.
- **Version 1.40 - Wednesday 3 May 2012**
 - Fixed OpenGL texture update in Unity3.5.
 - Volume is now linear.
- **Version 1.35 - Saturday 10 March 2012**
 - Fixed a thread leak in source filter.
 - Fixed an audio handle leak.
- **Version 1.3 - Friday 17 February 2012**
 - Fixed a memory leak in RenderTexture.
 - Improved API for programatically loading videos.
 - Fixed blank video frame from appearing.
 - Switching between videos of the same dimensions is now faster.
- **Version 1.2 - Wednesday 11 January 2012**
 - Added playback rate control, including reverse.
 - Added audio balance control.
- **Version 1.0 - Thursday 22 December 2011**
 - Initial release submitted to Asset Store.

9. Support

If you are in need of support or have any comments/suggestions regarding this product please contact us.

Website: <http://www.renderheads.com/contact/>

Email: contact@renderheads.com

If you are reporting a bug please include any relevant files so that we may remedy the problem as fast as possible.

10. About RenderHeads Ltd

RenderHeads is an award winning creative and technical company that has been designing and building cutting edge technology solutions since its formation in 2006. We specialise in creating unique interactive audio-visual software for installations at auto shows, museums, shows and expos.

10.1 Services

- Unity plugin development
- Unity game / interaction / augmented reality development
- Unity consulting

10.2 Our Unity Plugins



[AVPro QuickTime](#)



[AVPro Windows Media](#)



[AVPro Movie Capture](#)



[AVPro Live Camera](#)