



SOMNIUM **VR1**

Frequently Asked Questions

www.somniumspace.com

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Should I use SteamVR or OpenXR?

This will depend on how the end application (game, flight/racing sim) connects to the headset. Mainly there are two options:

- 1) Application which uses OpenVR/SteamVR API:
 - This means that the application will always connect to SteamVR, and it's up to SteamVR to provide connection to the headset.
 - SteamVR then uses custom drivers specific for each headset.
 - For Somnium VR1 we provide the Somnium SteamVR Driver, which is included in the Somnium VR1 Tool application.
 - This driver is installed directly to /SteamVR/drivers/ folder so SteamVR will automatically recognize it.
 - This means that we don't edit the openvrpaths.vrpath file as some other SteamVR drivers do.
 - You can freely choose which drivers will be enabled or disabled by accessing the main SteamVR menu – Settings – Startup/Shutdown – Manage Add-ons.
 - You can also disable/enable the specific SteamVR drivers from their own service app, but this behaves the same as disabling/enabling them in the SteamVR menu.
 - For Somnium headset this can be done in Somnium VR1 Tool, either on the homepage or on the Settings – Software – Drivers page.
- 2) Application which uses OpenXR API:
 - This means that the application connects directly to specific OpenXR runtime, so it doesn't need SteamVR (except for access to tracking data mentioned below).
 - Only one OpenXR runtime can be active on the PC at one time, and this is controlled by changing the registry key "HKEY_LOCAL_MACHINE\SOFTWARE\Khronos\OpenXR\1\ActiveRuntime".
 - For Somnium we provide the Somnium OpenXR Runtime, which is included in the Somnium VR1 Tool application.
 - You can enable the specific OpenXR runtime (i.e., set it as currently active OpenXR runtime on the PC) from its own service app.
 - For Somnium headset this can be done in Somnium VR1 Tool, either on the homepage or on the Settings – Software – Drivers page.
 - When running an OpenXR application with the Somnium OpenXR Runtime, SteamVR will still be accessed in the background to get tracking data from lighthouse base stations.
 - If you also have the Somnium SteamVR Driver enabled, you should make sure that SteamVR is turned off first before starting the end application (game, flight/racing sim).
 - If SteamVR is running and renders image into the headset, the end OpenXR application will not be able to initialize properly, and it will crash or it will start in desktop mode.
 - As an alternative to Somnium OpenXR Runtime you can also utilize the SteamVR OpenXR runtime.
 - This OpenXR runtime is provided as a part of standard SteamVR installation.
 - It creates a bridge between SteamVR software and OpenXR compatible applications, so you can use this runtime along with the SteamVR driver for



specific headset mentioned in 1) even if the end application doesn't support OpenVR/SteamVR API directly.

- So, for this approach to work correctly with Somnium VR1 you'll also need to enable the Somnium SteamVR Driver.
- You can enable the SteamVR OpenXR runtime in the main SteamVR menu – Settings - OpenXR - "Set SteamVR as OpenXR runtime".
- Enabling this OpenXR runtime will disable the Somnium OpenXR Runtime, and vice versa, as only one can be active at any time.

How can I enable foveated rendering?

The availability of foveated rendering depends on the implementation in the end application (game, flight/racing sim). Mainly there are two approaches:

- 1) OpenXR foveated views / quad views:
 - Somnium VR1 OpenXR Runtime supports foveated rendering based on separate textures/views for background and foveated area.
 - SteamVR API has no support for foveated rendering, so you won't be able to use Somnium SteamVR Driver with this kind of foveated rendering.
 - This technique is also called quad views, because in total the application renders 4 different views:
 - Background view for the left eye.
 - Background view for the right eye.
 - Foveated area for the left eye.
 - Foveated area for the right eye.
 - The end application needs to support OpenXR implementation for foveated views / quad views.
 - XR_VIEW_CONFIGURATION_TYPE_PRIMARY_STEREO_WITH_FOVEATED_INSET (OpenXR 1.1 specification only)
 - XR_VIEW_CONFIGURATION_TYPE_PRIMARY_QUAD_VARJO (also available in OpenXR 1.0 specification)
 - If the end application uses older OpenXR API (1.0 specification) it also needs to support the "XR_VARJO_quad_views" extension.
 - See OpenXR specification for more details (<https://registry.khronos.org/OpenXR/specs/1.1/html/xrspec.html#XrViewConfigurationType>).
 - Currently known applications which support this: DCS World, Pavlov VR, Unreal Engine 5, Unity 6.
 - Most end applications have an option to enable or disable foveated views / quad views.
 - For example, in DCS there is a "Use Quad View" option in the VR settings, which needs to be enabled to utilize foveated rendering.
 - You can customize the resolution of the background, resolution of the foveated area, and size of the foveated area, in Somnium VR1 Tool (on Settings - Headset - Rendering page).
- 2) Custom foveated rendering implementation:
 - Nowadays many end applications are utilizing their own implementation of foveated rendering.



- Most often this is done by rendering the 4 different views similar to OpenXR quad views but then submitting them to the VR runtime merged into standard mono or stereo images.
- This approach is independent on the used runtime, so it can also work when using the OpenVR/SteamVR API, which doesn't have native support for foveated rendering.
- Most end applications have an option to enable or disable foveated rendering.
 - For example, in MSFS 2024 there is a "Foveated Rendering" option in the VR – VR Graphics menu.
- Most end applications will also provide option to change the size and/or quality of the foveated area.
 - For example, in MSFS 2024 there is a "Foveated Rendering Scale" option in the VR – VR Graphics menu.
 - The foveated rendering options in Somnium VR1 Tool will not apply to this kind of foveated rendering implementation, as it is completely independent on the runtime.
- Currently known applications which support custom foveated rendering: MSFS 2024, iRacing, Falcon BMS.

Then depending on the state/availability of eye tracking we differentiate:

- 1) Fixed/static foveated rendering
 - It's available even if eye tracking is not calibrated or not supported by the headset.
 - The foveated area will be placed in approximately middle of the view (depending on the FOV and resolution values).
- 2) Dynamic foveated rendering
 - Requires headset with eye tracking support.
 - Eye tracking has to be calibrated first, otherwise only foveated rendering will be used.
 - For Somnium VR1 you can calibrate eye tracking either with the "Calibrate Eye Tracking" button in Quick Settings section or on Settings - Headset - Eyes page. You can also use one of the physical buttons on top of the headset, if it is configured for this functionality on Settings – Headset – Buttons page.
 - While the "Simple" eye tracking calibration should be enough for most use-cases, we recommend using the "Advanced" eye tracking calibration for more precise eye tracking results.
 - Then when eye tracking is enabled the foveated area will move according to the eye tracking results.
 - For Somnium VR1 eye tracking will be automatically enabled after successful calibration. Alternatively, you can enable or disable it on the Settings – Headset - Eyes page.

How can I use hand tracking?

Hand tracking variants of Somnium VR1 headsets are equipped with embedded version of Ultraleap hand tracking sensor, so any application which supports Ultraleap hand tracking will also be directly compatible with Somnium VR1.

There are several options on how to utilize the Ultraleap hand tracking in a VR application:





- 1) Direct support for Ultraleap API
 - If the end application integrates Ultraleap API, it can connect directly to Ultraleap runtime (installed from Somnium VR1 Tool).
 - This approach is independent on the used headset or VR API (SteamVR, OpenXR). This is supported for example in Ultraleap demos from their website (Blocks, Cat Explorer, etc.) or in most game engines (Unreal Engine, Unity).
- 2) Support for OpenXR hand tracking functionality
 - If the end application supports OpenXR hand tracking extension (XR_EXT_hand_tracking) it can utilize any hand tracking data provided by OpenXR runtime.
 - If you are using Somnium OpenXR Runtime, it provides hand tracking data directly through standard OpenXR API.
 - If you are using SteamVR OpenXR runtime you can utilize the Ultraleap OpenXR API layer, which is provided as part of the Ultraleap installation.
 - This approach is utilized for example in DCS.
- 3) SteamVR add-ons
 - Even if the application doesn't support hand tracking directly, it can still be utilized as a standard VR controller.
 - You will need a third-party add-on for SteamVR which masks Ultraleap hand tracking data as VR controller (for example: https://github.com/SDraw/driver_leap).

Which reprojection options are supported by Somnium VR1?

Asynchronous reprojection is a technique aimed to make the VR image more responsive, even if FPS in the end application can't match the frequency of the headset displays. There are several different types and implementations of asynchronous reprojection and what is available will depend on the used end application and VR API.

- 1) SteamVR
 - If you are using the Somnium VR1 SteamVR Driver, you can utilize all standard functionality of SteamVR.
 - The main algorithm for reprojection in SteamVR pipeline is called motion smoothing, and it will automatically limit FPS to half the refresh rate if it can't match the full refresh rate of the displays.
 - This is supported in all SteamVR compatible applications by default, as it doesn't require any additional implementation on the application side.
 - This functionality can be disabled in SteamVR settings.
- 2) OpenXR runtime
 - If you are using Somnium OpenXR Runtime with a compatible OpenXR end application, you can utilize two different algorithms for reprojection called "timewarp" and "spacewarp".
 - Timewarp
 - It uses rotational data (3DoF) to predict changes in rotation between the time when the image is originally rendered and when it is displayed inside the headset.
 - It is supported by all OpenXR applications by default, as it doesn't require any additional implementation.





- It can't compensate for translation changes (6DoF) so for example if you move forward/backward you will still be able to notice the lower framerate.
- Spacewarp
 - It uses full 3D depth map of the virtual scene to also compensate for translation changes (6DoF)
 - It requires the end application to submit depth map data with each frame (using XR_KHR_composition_layer_depth extension).
 - Currently known applications which support this: MSFS 2020/2024, Unreal Engine 5, Unity 6.
 - The spacewarp implementation in Somnium OpenXR Runtime is still experimental and may not work correctly on all PC/software setups.

If I encounter any issues with the Somnium VR1 Tool, software, or headset itself, which files should I send to Somnium support?

To provide detailed logs please enable the Logs - Advanced option on the Settings – Software – Drivers page in Somnium VR1 Tool. Then run the end application again and send all log files from "C:/ProgramData/somnium/logs" folder (you can use Open Logs Folder button to open this folder directly), specifically:

- openxrRuntime_xxx.log
- somniumSdk_xxx.log
- old_logs folder
- tool_logs folder

If this issue was encountered while using the SteamVR driver, you should also send us System Report file from SteamVR:

- Open SteamVR.
- Select "Create System Report" from the main SteamVR menu.
- In the new window select "Save to File".

If the end application also has its' own logs, you should send those as well.

- For example, for DCS you can find the dcs.log file in "C:\Users\username\Saved Games\DCS\Logs"

How can I fix the "Headset is already in use" error while trying to run an OpenXR application?

If you see the "Headset is already in use" error, it means that two different applications or VR APIs are trying to initialize the headset at the same time.

Most often this happens if SteamVR is already rendering image into Somnium headset, and you try to start another application through our OpenXR runtime.



To fix this issue:

- Make sure that SteamVR is not running before you start the OpenXR application, and that you do not already have another OpenXR application running.
 - If you the Application name in bottom right corner of Somnium VR1 Tool is empty, it means that no application is currently running.
- If the issue persists, try disabling the SteamVR driver completely (either through Somnium VR Tool on Settings - Software - Drivers page, or through SteamVR in Startup/Shutdown - Manage Add-ons).
- If you want to run the application through SteamVR instead, either make sure that the application supports OpenVR API, or enable the OpenXR runtime included in SteamVR (in main SteamVR menu – Settings - OpenXR - "Set SteamVR as OpenXR runtime").
- See details in "Should I use SteamVR or OpenXR?".

Why can't I enable or calibrate eye tracking?

First of all, eye tracking is only supported on some variants of Somnium VR1 headsets (Visionary, Titan, Ultimate), otherwise you won't have access to eye tracking buttons or settings page.

If you have one of the supported headset variants, but eye tracking can't be activated or you see "Could not initialize camera stream." or "Unsupported frame format" errors, please follow these steps:

- 1) Check if the camera device is recognized
 - Open Windows Device Manager and check that you see the "Somnium EyeCam" device in the Cameras category.
 - If you don't see "Somnium EyeCam" device unplug the main headset USB from the PC, plug it in another USB3 port, and check Device Manager again.
 - If you still don't see "Somnium EyeCam" device, then it could be a hardware issue with the camera device itself, so in that case please contact Somnium support directly.
- 2) Check if the camera data can be accessed
 - Open a camera stream player (for example Camera software which is built into Windows).
 - Select "Somnium EyeCam" as the stream source.
 - You should get a full green image (due to custom image encoding).
 - If you try aiming the headset displays toward a natural light source (window) you should also see some changes in the camera stream image (the image will still be green tinted).
- 3) Allow camera access in Windows privacy settings
 - Open "Camera privacy settings" in Windows Settings.
 - Make sure that "Allow access to camera on this device" is On.
 - Make sure that "Allow apps to access your camera" is On.
 - Make sure that "Allow desktop apps to access your camera" is On.
- 4) Send all Somnium logs to Somnium support (see "If I encounter any issues with the Somnium VR1 Tool, software, or headset itself, which files should I send to Somnium support?")





Which tracking system is supported by Somnium VR1, and do I need any additional accessories to be able to use the headset?

Somnium VR1 currently supports only lighthouse/SteamVR tracking system.

- The tracking sensors are embedded inside the Somnium VR1 headset, and you'll also need lighthouse/SteamVR base stations which act as a source of the tracking signals.
- For most standard setups we recommend using at least 2x lighthouse base stations v2.0. Some setups can work with only one base station or can work with the older v1.0 base stations, but the tracking quality will be limited.
- Any lighthouse compatible VR controller will work with Somnium VR1 headset. We recommend using the Valve Knuckles controllers, but also the Vive controllers or other third-party VR controllers are compatible. When using a new VR controller with Somnium VR1, first pair it through SteamVR - Devices - Pair Controller menu.

Why are some buttons in Somnium VR1 Tool disabled?

Some buttons in Somnium VR1 Tool will be disabled / grayed out depending on the version of the headset you have, and which end application is currently running.

- If your Somnium VR1 headset doesn't have eye tracking support, the "Eye Tracking Calibration" button in Connected Device section will always be disabled, and you won't be able to access the Settings - Headset - Eyes page.
- If your Somnium VR1 headset doesn't have hand tracking support, you won't be able to access the Settings - Headset - Hands page.
- If your Somnium VR1 headset doesn't have mixed reality support, the "Mixed Reality - Start" button in Connected Device section will always be disabled, and you won't be able to access the Settings - Mixed Reality page.

Also, most of the buttons in Connected Device section of the Somnium VR1 Tool will be disabled if no VR application is currently running

- If you don't see an application name in the bottom right corner of the Somnium VR1 Tool window it means that no app is currently running.
- If you've just started an end application (SteamVR, or any compatible OpenXR application), make sure to click back into the Somnium VR1 Tool window to refresh the button status.
- This includes "Eye Tracking Calibration", "Position Calibration", "VR View - Start", "Virtual Desktop - Start", and "Mixed Reality - Start" buttons.
- When no application is running you will also not see current FPS value and pixels per eye resolution value.

If you are using the Somnium SteamVR Driver, some functionality in Somnium VR1 Tool will be disabled, as it uses a different rendering pipeline. Some of these functionalities are available directly from SteamVR menu (for example VR View), while some others are not available at all (for example render upscaling).





How can I reset all Somnium settings?

Currently complete reset of all settings is not possible through Somnium VR1 Tool, but this functionality may be added in the future. As a workaround you can do the following manual steps:

- Turn off any running VR applications (SteamVR, OpenXR apps).
- Turn off Somnium VR1 Tool.
- Open Windows Task Manager
- Go to Services tab.
- Find background Somnium services (SomniumVR_DevCom and SomniumVR_Registry) and Stop them (right click the service and select Stop).
- Open the "C:/ProgramData/somnium/runtime/config" folder.
- Delete the "config.json" file.
 - We recommend creating a backup of this file in case you'll want to reapply some current settings in the future.
- Start Somnium VR Tool.
 - The background Somnium services will be started automatically when Somnium VR Tool starts.
 - Now all settings will be using default values.

How can I switch to different display frequency than the default 90Hz?

Latest version of Somnium VR1 firmware supports also 72Hz and 120Hz modes, which you can switch in Somnium VR1 Tool before running the end application.

- Make sure that your Somnium headset is updated to the latest firmware (1.1.5.128).
 - You can update firmware on Settings – Headset – Firmware page.
- Go to Settings – Headset – Screen page.
- Select the desired Display Mode.
- Start the end application.
 - Be aware that the 120Hz mode is still experimental and may not work correctly on all PC/software setups.
 - When 120Hz mode is selected the fans inside the headset will be automatically set to boost mode (higher RPM), so you can hear them more than with other display modes.
 - If you are using the Somnium SteamVR Driver, you will need to change the refresh rate in SteamVR itself (in main SteamVR menu – Settings - General – Refresh Rate).

Can I use Somnium VR1 headset with AMD or Intel GPU?

Currently Somnium VR1 is only supported and tested on Nvidia graphical cards, so you can't use it on other GPUs. We are currently working on experimental support for AMD GPUs, but this is not yet available in standard Somnium VR1 Tool software. Please contact Somnium support if you are interested in testing the experimental AMD GPUs support.





Can I use Somnium VR1 headset with a laptop?

Yes, Somnium VR1 headset can be used on compatible laptops, but it may require some additional hardware and settings optimization.

- Make sure that your laptop is equipped with dedicated Nvidia GPU.
- If your laptop is not equipped with full DisplayPort port, make sure to use compatible DP->USB-C or DP->miniDP adapter.
 - If your laptop has both the graphical USB-C port and miniDP port, we recommend using the USB-C port for Somnium VR1 headset connection.
 - The quality of DP adapters may vary between different brands, but most often any adapter which supports 4K/60 Hz display should also work with Somnium VR1 headset.
- If your laptop also has an integrated GPU, make sure that it is switched to using Nvidia GPU only.
 - Open Nvidia Control Panel.
 - Go to 3D Settings – Manage Display Mode tab.
 - Switch display mode to "Nvidia GPU only" and apply the settings change.
 - On some laptops you can alternatively change this behavior in the BIOS or in the provided manufacturer service application.

Is OpenXR Toolkit compatible with Somnium VR1?

No, we don't officially support OpenXR Toolkit, as it was recently discontinued and it's no longer supported by its' developers. It can still be beneficial for some end applications, as it supports some functionality which is not originally available there, but we don't include it in our compatibility testing.

