

SALMON VR - Meta Quest User Manual

March 1, 2025

This document explains how to install and operate SALMON VR for Meta Quest (hereinafter referred to as "this application").

System Requirements

- Meta Quest 3
- A computer running macOS or Windows 11.
- A smartphone with the Meta Horizon app installed to enable developer mode.

Installation

This app isn't available on the official Meta Quest store. Therefore, you must enable developer mode on your Meta Quest 3. Note that the following procedure refers to the information at the time of writing this document (2025/02/21).

Enabling Developer Mode

1. Setting up Two-Factor Authentication (2FA) via SMS

To register your Meta Quest 3 for development, your linked Facebook and Meta accounts must have 2FA enabled via SMS.

1. Go to your Meta Account Center.
2. Select "Password and Security."
3. Choose either your Facebook or Meta account. Follow the instructions for that account. If your accounts don't appear, add them through your profile.
4. You may be asked to verify via email. Follow the instructions provided.
5. Set up 2FA via text message. (Using an authenticator app may not work for developer registration.)

2. Registering Your Account as a Meta Developer

1. Log in to your Facebook account and go to [\[https://developers.facebook.com/async/registration\]](https://developers.facebook.com/async/registration) (<https://developers.facebook.com/>

async/registration).

2. Follow the on-screen instructions. You'll need to verify your phone number and email address, and select your occupation.
3. Once registered, verify that you can log in to your App Dashboard.

3. Creating an organization

Once you have registered your Meta account as a developer, the first step is to create a new 'organization'. Follow the steps below to create it.

1. Open the App Dashboard and select "Create Organization" (located to the left of your profile icon).
2. Enter your organization name.
3. Review the terms and conditions and follow the instructions.
4. Verify that your organization appears in the dashboard sidebar.

4. Enabling Developer Mode in Meta Horizon

1. If you haven't already, install the Meta Horizon app on your smartphone and log in with your registered developer account.
2. In the app menu, go to "Device Management" > "Devices."
3. If you haven't paired your Meta Quest 3, select "Add Device" to pair it.
4. Select your Meta Quest 3 from the list of connected devices and choose "Headset Settings."
5. Select "Developer Mode" and turn it on. If this fails, review the developer registration and organization creation steps.

Installing the APK File

Once developer mode is enabled, connect your Meta Quest 3 to your computer via USB to install the APK file.

1. Installing ADB (Android Debug Bridge)

You'll need ADB installed on your computer. Follow the instructions below to carry out the installation. For more information on *adb*, see below.

[Android Debug Bridge \(adb\) | Android Studio | Android Developers](#)

Download from the web

It can be downloaded from the following pages

[SDK Platform-Tools](#)

The installation procedure is as follows.

1. Download the SDK Platform-Tools for your platform from the above page. /
2. Extract the downloaded zip file and move the contents to the directory where the environment variable (PATH) passes.

Install from Homebrew (macOS only)

adb can also be installed from Homebrew. If you already have Homebrew installed, perform the following command in the terminal.

```
brew install android-platform-tools
```

2. Connecting Meta Quest 3 to Your Computer

Connect your Meta Quest 3 to your computer using a USB cable (Meta's official Quest Link cable or a USB 3.0 cable is recommended). Allow USB debugging if prompted.

Also, when the computer and Meta Quest 3 are connected via USB, if the warning dialogue 'Do you want to allow USB debugging?' When the warning dialogue 'Do you allow USB debugging?' is displayed, select 'Allow' or 'Always allow from this computer'. If this dialogue does not appear when connecting to the computer for the first time, restart Meta Quest 3 and then make the USB connection with the computer again.

3. Installing the APK using ADB

Extract the downloaded zip file and place the salmon-vr.apk file in the desired location. move the current directory to the location where the salmon-vr.apk file is located in the CLI, such as Terminal on macOS or Command Prompt on Windows, and execute the following command. First, make sure that the Meta Quest device is authorised. Perform the following command.

```
adb devices
```

The device is ready when the following is output.

```
List of devices attached  
XXXXXXXXXXXX(ID) device
```

If no device is displayed here, check the USB connection with the Meta Quest device. If the device is displayed as unauthorised instead of device, it may be that 'USB debugging permission' has not been granted on the Meta Quest side, try reconnecting the USB or restart Meta Quest and then reconnect the USB. Do you want to allow USB debugging?' If the warning dialogue 'Do you allow USB debugging?' appears, select 'Allow' or 'Always allow from this computer'.

Once you have verified that the device is ready, perform the following command to install the apk file.

```
adb install salmon-vr.apk
```

If the following is displayed, installation has been completed successfully.

```
Performing Streamed Install
```

```
Success
```

This completes the installation of this application.

Launching the App

When the application is launched for the first time, an error is displayed because the Cube file does not exist. However, the directory where the Cube file is placed will not be created unless the application is launched once, so be sure to launch the application once before placing the Cube file. To start the application, open the Meta Quest 3 library, select the 'Unknown Source' menu in the sidebar or drop-down at the top (only displayed when developer mode is enabled) and select 'SALMON VR'.

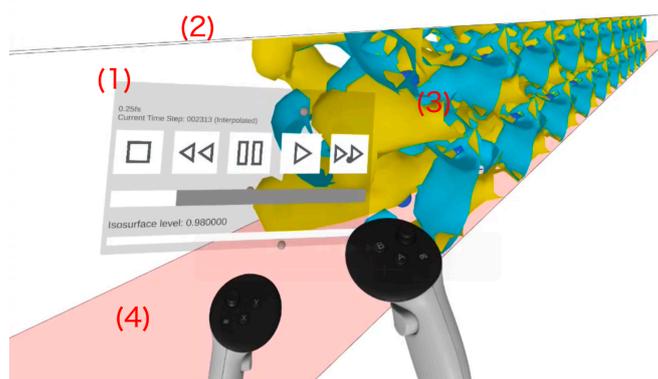
For details on how to set up the Cube file, please refer to the separate instruction manual.

Shutdown

Press the Meta icon button on your right controller and select "Close" from the menu.

Interface Overview

The interface contains:



- (1) GUI Panel (on the left controller): Controls playback and isosurface level.
- (2) Calculation Space: The area within the black lines.
- (3) Atoms and Change of Electron Density: Atoms are spheres, change of the electron density is represented by isosurfaces (blue for positive, yellow for negative).
- (4) Vector Potential: Mapped onto the calculation space floor (2D), red for positive, blue for

negative, transparency increases as the value approaches 0.

Cube Data Rendering and Timeline

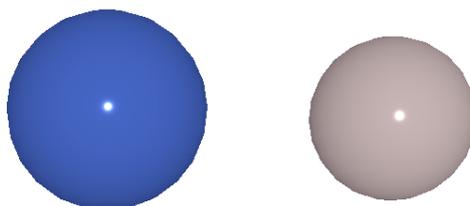
The app loads following data from Cube files.

Data	References
Change of Electron Density Data (for all timesteps)	The filenames follow a pattern like *drho.cube. The exact file format can be modified via a configuration file.
Vector Potential Data (for all timesteps)	Filenames typically follow a pattern like *Ac_x.cube, *Ac_y.cube, *Ac_z.cube. The format is also configurable.
Grid Parameters	Number of grid points in each direction and the spacing between them. Number of atoms, their types, and their positions within the simulation space. This data is obtained from the header of the first Cube file read.
Timestep Data	The timestep is typically derived from the six-digit number after "it" in the Cube filenames (e.g., it000010_Ac_x.cube).

Each piece of data retrieved is rendered as follows.

Atoms

The atoms are rendered as spherical objects with different colours and sizes for each type. As an example, the following figures show the rendering results of silicon (Black sphere) and hydrogen (White sphere).

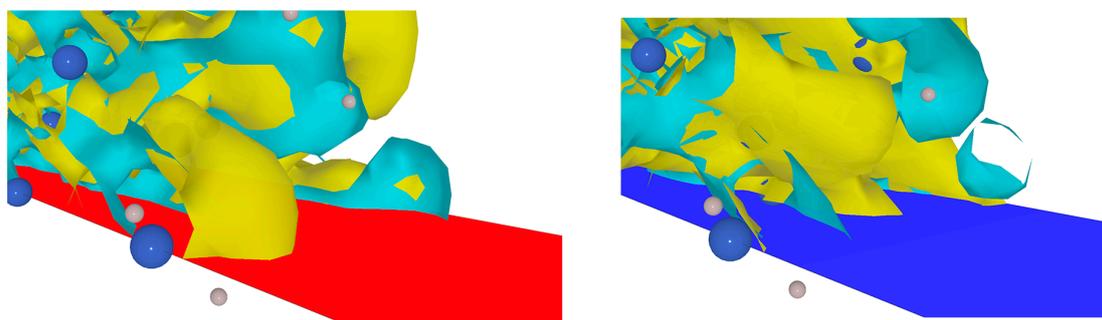


Change of the electron density

The change of the electron density is rendered on two isosurfaces (Isosurface), with integers in black and negatives in black. Isosurface is calculated using the Marching Cube method and the levels can be changed in the GUI panel described below.

Vector potential

The vector potentials are rendered as mapped planes on the floor of the computational space (the planes formed by the grids in the X and Z directions). In this case, the values taken by the Y-directional grid with fixed X and Z are averaged. The values of each grid are represented as red for integers and black for negatives. The closer the value is to 0, the more transparent the image becomes, with 0 being completely transparent. The values are normalized so that the maximum value is perfect red (#FF0000FFF) and black (#0000FFFFFF). As an example, the diagram below shows the results of rendering data when the vector potential is an integer (left) and a negative number (right).



Timelines and timestep completion

The application forms a timeline of the loaded data in the order of the time steps and can be reanimated as an animation. In this case, the time steps are advanced by one, but if the time steps in the loaded Cube file are thinned out, the values are linearly complemented with the values from the previous and next files. For more information on controlling the timeline, see 'Using the GUI panel' below.

Loading a Cube file

This application loads Cube files from the following locations in Meta Quest at start-up.

<MetaQuest internal storage>/Android/data/com.qst.salmonvr/files/

For example, if the directory 'Ac_Je_drho_CUBE', which contains Cube file expressions, is targeted, it should be arranged as follows.

<MetaQuest internal storage >/Android/data/com.qst.salmonvr/files/Ac_Je_drho_CUBE

Direction of Cube file placement

To deploy Cube files, you need access to Meta Quest's internal storage. Access methods vary from platform to platform.

Windows

For Windows, it can be accessed in the same way as external storage by connecting it directly to Meta Quest using a USB cable. The procedure is as follows.

1. Connect Meta Quest to the Windows computer with a USB cable (USB 3.0 or higher recommended).
2. Meta Quest will display a notification 'USB detected', select the notification. If you lost the notification, open the Notification window from the bell icon and find and select the notification 'USB detected'.
3. The Meta Quest storage device is mounted on the computer and becomes read/write accessible from Explorer.

macOS

There are several ways to access the internal storage of Meta Quest on macOS.

A) Using Android File Transfer (not recommended)

By installing Android File Transfer, it is possible to read and write the internal storage of Meta Quest. Android File Transfer can be used to read/write the internal storage of Meta Quest. Android File Transfer is not recommended as the official download link is closed at the time of writing this manual and future updates are not expected. Currently, it can be installed from Homebrew, etc. If Homebrew is already installed, it can be installed using the following command.

brew install android-file-transfer

Once Android File Transfer has been installed, the Meta Quest's internal storage can be accessed by following these steps.

1. Connect Meta Quest to the Windows computer with a USB cable (USB 3.0 or higher

The contents of each variable are as follows.

Key	Value	Type
CubeFilesDirectoryName	Name of the directory in which the set of Cube files to be loaded is located.	text
InfomationText	Additional text to display information on the GUI panel	text
TimestepPerSecond	Specifies the speed of the animation. The value specifies the amount of timesteps to advance per second when the timeline is regenerated (for 100: 100 timesteps per second).	integer
DrhoFileFormat	Electronic density file format.	text
AcFileFormat	Vector potential file format.	text
EnableAcGammaCorrection	Whether the transparency of the vector potential is gamma-corrected or not.	boolean
AcGamma	Coefficient of the above gamma correction (only valid if EnableAcGammaCorrection: true).	number

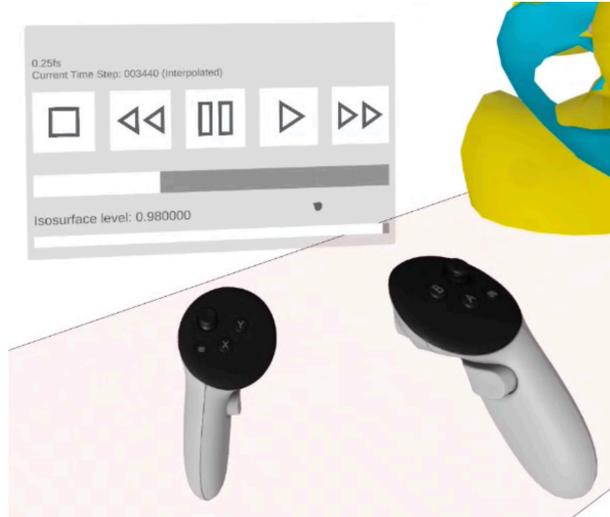
Viewpoint operation

To move the viewpoint, use the Meta Quest left and right controllers. Directions of operation are as follows.

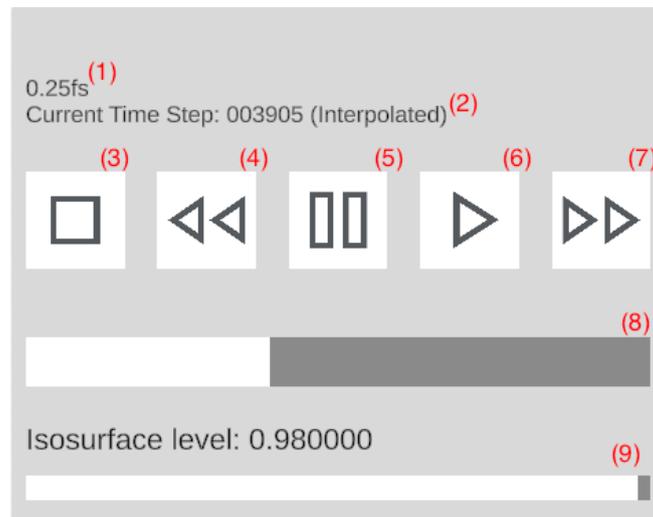
Controller	Action
Left	Up and down: back and forth movement Left/right: left/right movement *Simultaneous left-hand trigger presses increase speed.
Right	Up/down: up/down movement Left/right: left/right rotation *Simultaneous right-hand trigger presses increase speed.

How to use the GUI panel

The GUI panel is displayed in the form of following the upper part of the left controller. Pressing the trigger enables the buttons to be pressed and the slider to be operated.



More information on the GUI panel is provided below.



1. Additional information display (can be changed from the setting file)
2. Current time step value (Interpolated values are followed by Interpolated)
3. Stop
4. Double-speed reverse playback (magnification increases each time it is pressed)
5. Temporary stop
6. Play
7. Double-speed play (magnification increases each time it is pressed)
8. Seek bar (position can be controlled by dragging with the mouse)
9. Change Isosurface Level (value normalized to maximum value)

Timeline manipulation by controllers

The timeline can also be operated from the controller. Directions for operation are as follows.

Button	Action
A	Play/Stop
B	Reverse Playback/Stop
Y	Double-speed regeneration (magnification increases with each press).
X	Double-speed reverse regeneration (magnification increases with each press).