Comprehensive VR Manual: How to Use VR Headset and NATUREACH Application for Nature-Based Interventions

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1 Introduction

Virtual Reality (VR) technology offers new and innovative ways to experience nature while also providing an alternative for people who lack easy access to real nature environments. This manual provides a comprehensive guide on how to effectively integrate VR headsets into nature-based interventions within the NATUREACH project.

First and foremost, we cover the technical side: how to use the VR headset, the NATUREACH application, the ”virtual nature environments” etc. In addition to this, we present guidelines on how to improve your interventions based on the specific characteristics of our VR environments. We also cover data collection, hardware maintenance and more.

This is our most comprehensive manual, intended primarily for project staff rather than clients or patients. A ”Quick guide for end users” as well as other useful information is available at: www.slu.se/Natureach/Intervention-Manuals

Preparing the VR Hardware

This chapter will cover all the essential hardware features of the Pico 4 VR headset.

1.1 Unboxing and Setup

1. Upon receiving your Pico 4 VR headset, ensure that the package includes the following: the headset itself, two controllers, glasses spacer, nose pad, USB-C Power Adapter, USB-C to C 2.0 Data Cable, two hand straps for the controllers, a user manual, a quick guide and a safety and warranty guide (see Figure 1).

Figure 1 Pico 4 Unboxed

2. Inspect each item for any damage incurred during shipping.
3. Unpack and familiarize yourself with all the items included in the package.
4. Charge the headset using the provided charging cable. The headset should have a battery life of approximately 3 hours.
5. Install the batteries in the controllers and make sure they are charged (see Figure 2). The controllers use 1.5V AA alkaline batteries.

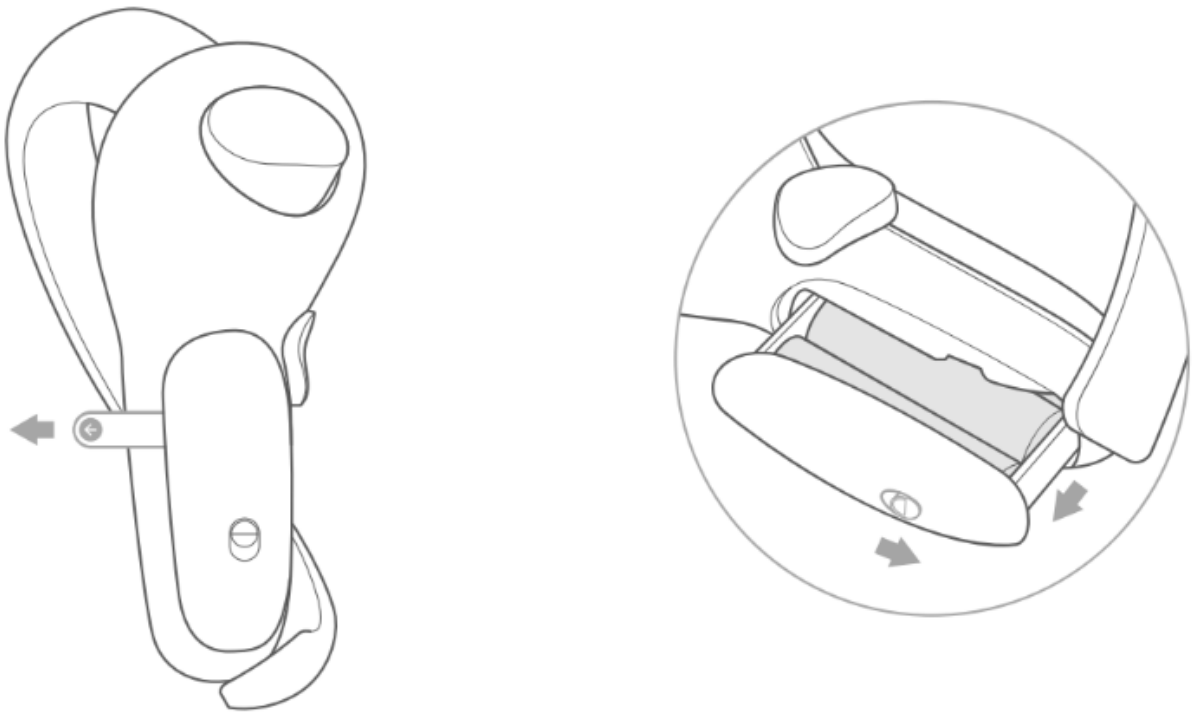

Figure 2 Batteries

6. Attach the nose pad (see Figure 3).

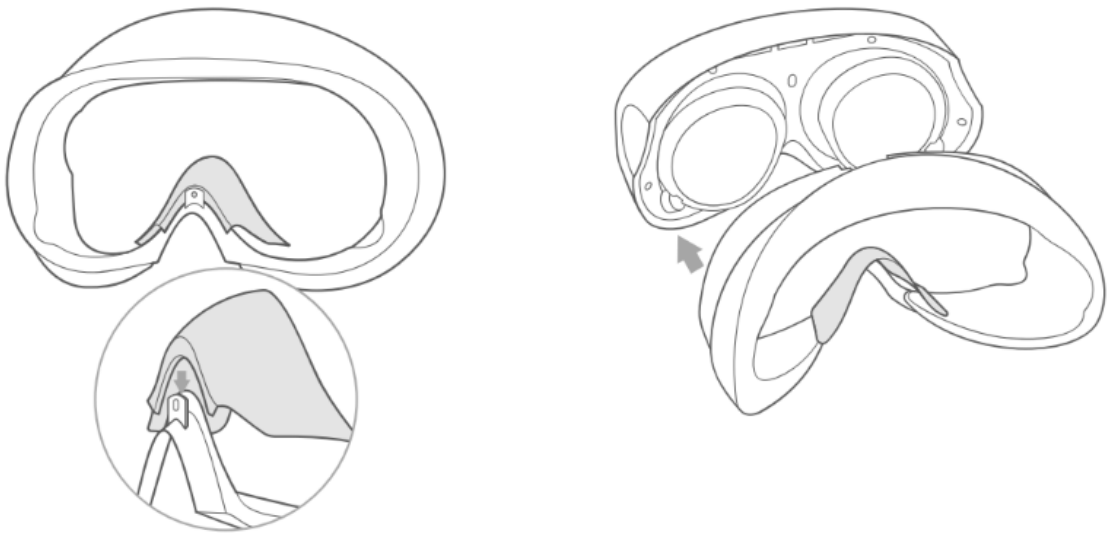

Figure 3 Nose Pad

7. The glasses spacer should only be attached when the VR headset is used while wearing glasses (see Figure 4). The glasses spacer is attached via magnets and should stick firmly on the headset.

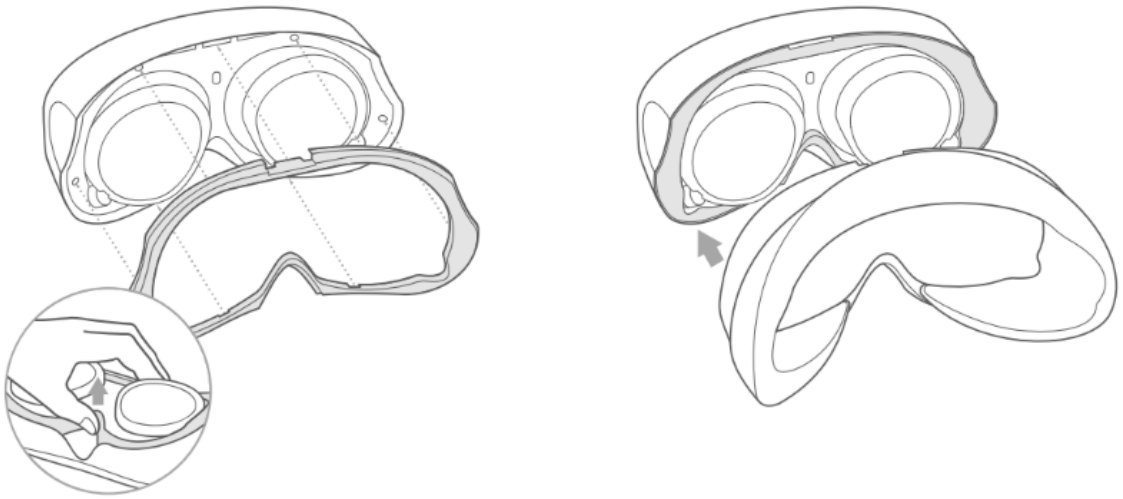

Figure 4 Glasses Spacer

8. Attach the hand straps to the controllers (see Figure 5).

Figure 5 Hand Straps

1.2 Headset Functionality

The headset has the following key hardware features:

1. Power button (see Figure 6 button 1).
   1.1. Power on: Press for 2 or more seconds.
   1.2. Power off: Press for 5 or more seconds.
   1.3. Hardware reset: Press for 10 or more seconds.

2. Status Indicator (see Figure 6 indicator 2).
   2.1. Blue: Powered on with 20% or more battery left.
   2.2. Red: Charging, battery is less than 20% full.
   2.3. Yellow: Charging, battery is less than 98% full.
   2.4. Green: Charging, battery is more than 98% full.
   2.5. Blue flashing: Powering down.
   2.6. Red flashing: Battery is less than 20% full.
   2.7. No color: Sleeping or powered off.

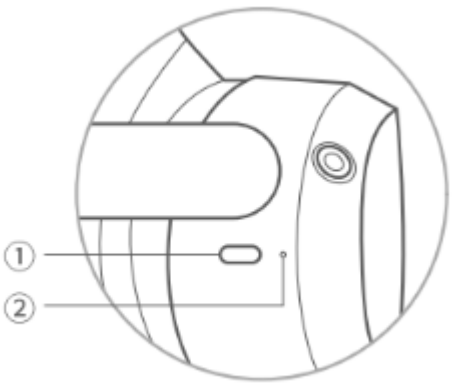

Figure 6 Power button and Headset Status Indicator

The headset has the following features: (see Figure 7).

3. Face cushion.
4. Volume buttons.
5. RGB see-through camera.
6. Top strap.
7. Strap dial.
8. Tracking cameras.
9. USB-C interface.

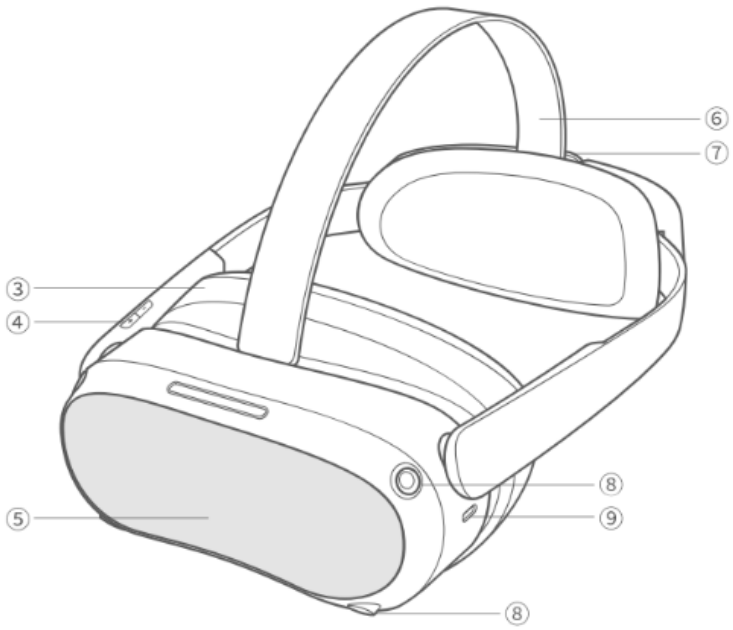

Figure 7 Headset Details

The head-mounted display consists of the following parts: (see Figure 8).

10. Speakers.
11. Proximity sensor.
12. Eye tracking cameras.
13. Face tracking camera.

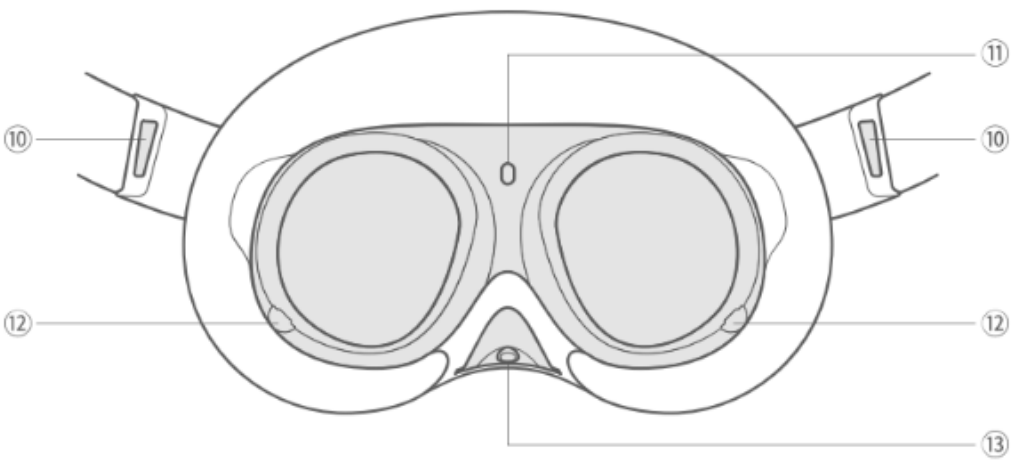

Figure 8 Head-Mounted Display

1.3 Controller Functionality

The controllers have the following buttons and functionalities: (see Figure 9 and Figure 10).

1. Joystick, each controller's joystick functions like a cursor. The position is indicated via a white laser and dot. The controller's joysticks function separately and independently.
2. Open the menu.
3. Home.
   3.1. Power on: Press and hold for 2 or more seconds.
   3.2. Power off: Press and hold for 5 or more seconds.
   3.3. Return home: Press.
   3.4. Recenter the screen: Press and hold for 1 second.
4. Status indicator.
   4.1. Blue: Firmware updating in progress.
   4.2. Flashing Blue: Searching for connection.
   4.3. Flashing Red and Blue: Pairing in progress.
   4.4. No color: Connected or powered off.
5. Grip.
6. Capture. The capture button can be used to take screenshots.

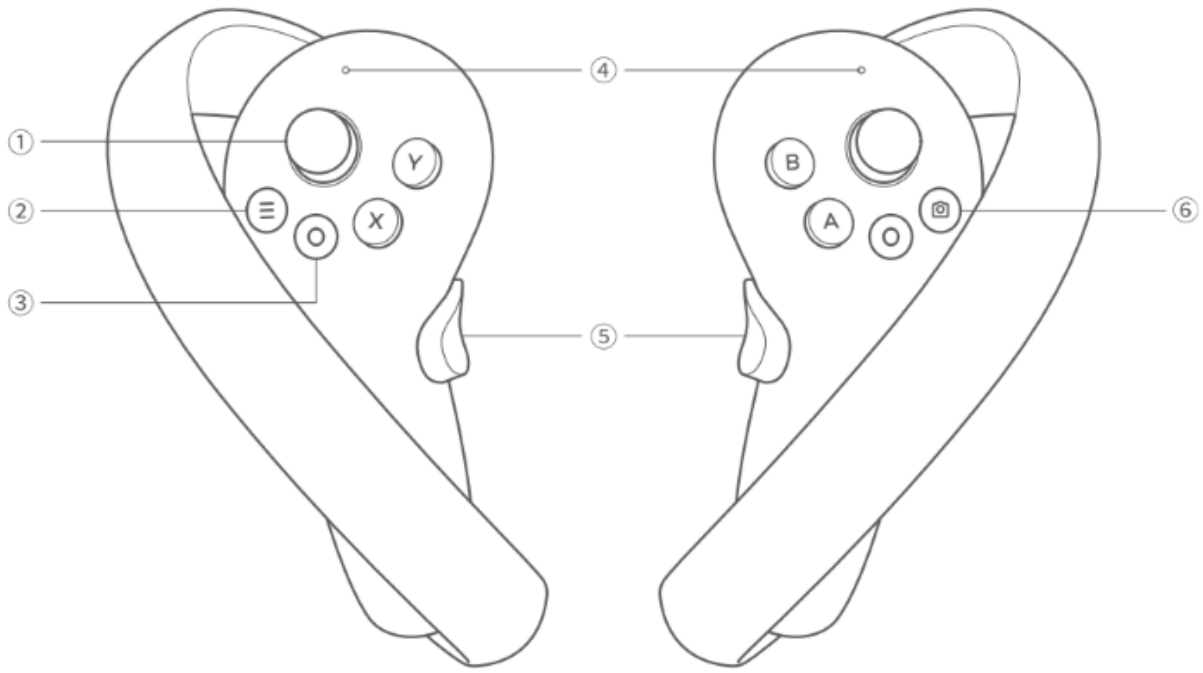

Figure 9 Controller Functionality

7. Trigger. Used in conjunction with the joystick. You can use the trigger to select things.
8. Battery case.
9. Tracking ring.

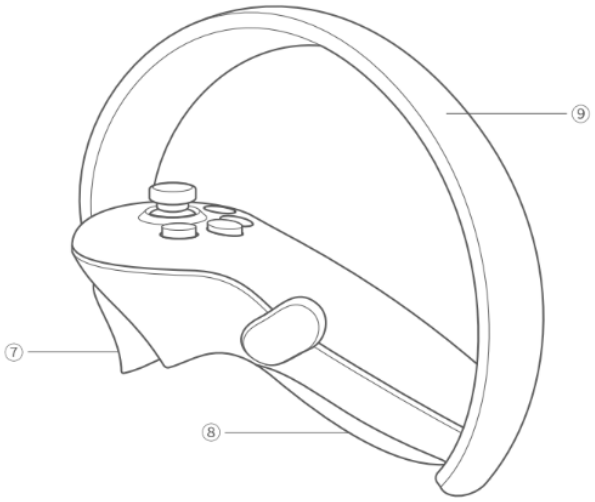

Figure 10 Controller Functionality 2

1.4 Disassembly

The headset can be disassembled in the following way: (see Figure 11). This is especially helpful when cleaning the headset.

1. Detach the face cushion by gently pulling it backwards.
2. Unhook the top strap by pulling it downwards and then pulling it backwards.

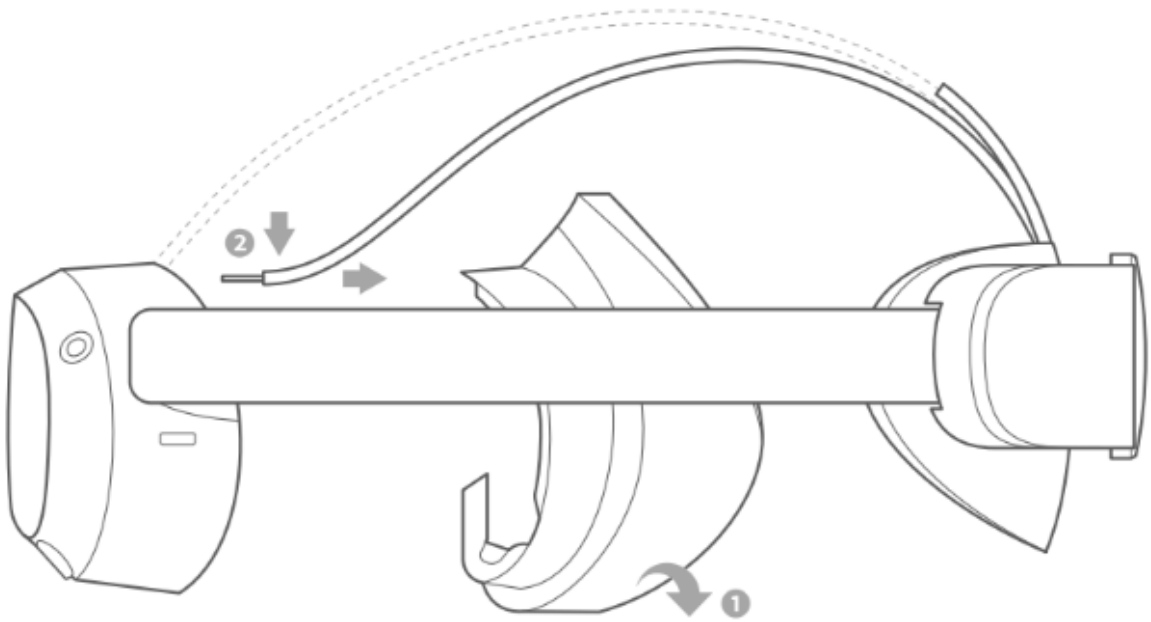

Figure 11 Disassembly

1.5 QuickStart

The headset can be used following these simple steps:

1. Power on the controllers by pressing the home button for 2 or more seconds (see Figure 12). The controller should vibrate to indicate that it has been turned on. For more information see the chapter on Controller Functionality.

Figure 12 Power on Controllers

2. Power on the headset by pressing the power button for 2 or more seconds (see Figure 13). The status indicator should turn blue to indicate that the headset has been turned on. For more information see the chapter on Headset Functionality.

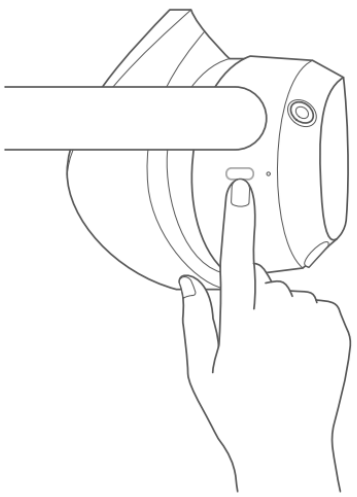

Figure 13 Power on Headset

3. Release the top strap and turn the strap dial to adjust the headset for a comfortable fit (see Figure 14).

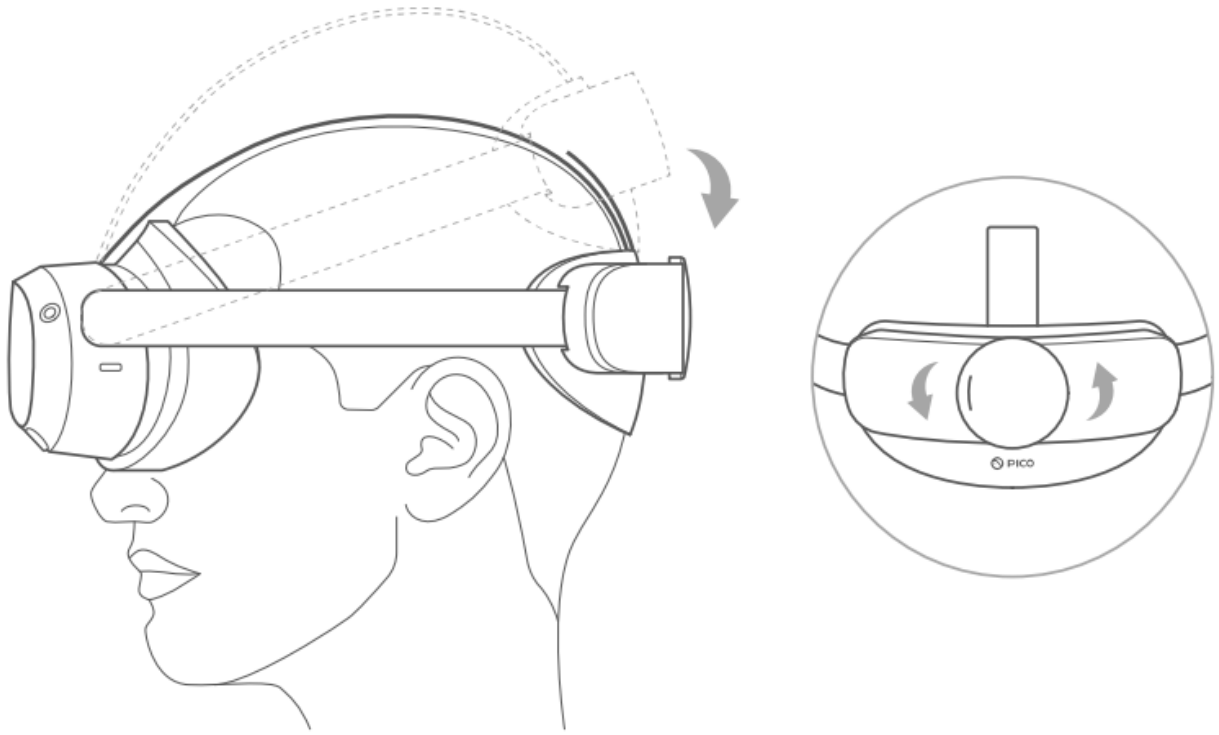

Figure 14 Adjust top strap and strap dial

4. Ensure the headset fits snugly on your head without being too tight.
5. Tighten the strap dial and fasten the top strap.
6. Make sure the headset stays comfortably on your head.
7. If the screen gets foggy during the VR experience, it means some air is getting through from your nose into the lens. Readjust the headset.
8. The view should be very clear and sharp during the VR experience, if the view is not clear, readjust the headset again.
9. We recommend that you primarily use the VR headset in a sitting or semi-reclined position. If, due to health reasons, you can only use it lying down flat on a bed, we recommend using a special pillow to make it more comfortable.

1.6 Using VR Headset with Eyeglasses

If you normally wear eyeglasses or contact lenses for nearsightedness in your day-to-day life, it's likely best to also wear them when using the VR headset. The reason is that the VR headset has built-in lenses that make the image appear to be further away, meaning that a nearsighted person might see a blurry image without eyeglasses or contact lenses. By the same logic, if you typically wear reading glasses only when reading books etc. you probably won't need them when using the VR headset even though the screen is physically very close to your eyes. When using the VR headset with eyeglasses we recommend using the glasses spacer (see Figure 4).

2 Preparing the VR Software

Follow the steps in this chapter in order, unless otherwise instructed. Following the steps discussed in this chapter is only necessary during the initial setup of the Pico 4 headset for use or during maintenance.

2.1 Opening the Settings Menu

The settings menu can be opened from the Pico starting screen (see Figure 15).

Figure 15 Pico 4 Settings

2.2 Connect to a Network

Connecting to a network is only necessary during screen casting, maintenance, when updating the system or downloading videos via the headset. During regular use the headset does not need to be connected to a network, unless you want to cast the VR headsets screen to an external device. To connect to a network, follow these steps:

1. Open the Settings menu.
2. Navigate to the WLAN tab.
3. Connect to a Network.

2.3 Update the System

Updating the system is only necessary during the initial setup of the Pico 4 headset and periodically after that once you have been informed about a new system update. To update the system, follow these steps:

1. Open the Settings menu.
2. Navigate to the General tab.

3. Open the system version tab.
4. Make sure there are no updates, and the system is up to date.

2.4 IPD Adjustment (Automatic)

IPD stands for “Interpupillary distance” and doing an IPD adjustment calibrates the headset to match the distance between the pupils of the person wearing the headset. This is important since an incorrect IPD setting can lead to unnecessary eye strain and a worse looking image. The calibration can be done manually but we recommend that you turn on the automatic IPD adjustment to make it easier and faster.

Enabling the automatic IPD adjustment only needs to be done once, at the initial stage of setting up the Pico 4 headset for use. To do that, follow these steps:

1. Open the Settings menu.
2. Navigate to the Display tab.
3. Select the IPD Adjustment option.
4. Turn on Automatic IPD Adjustment.

Once enabled, the IPD adjustment will turn on automatically if the IPD between the previous user and the new user are different enough to affect the viewing experience. The automatic IPD adjustment requires the user to look at a rotating green dot (see Figure 16). The calibration is accompanied with audible English instructions.

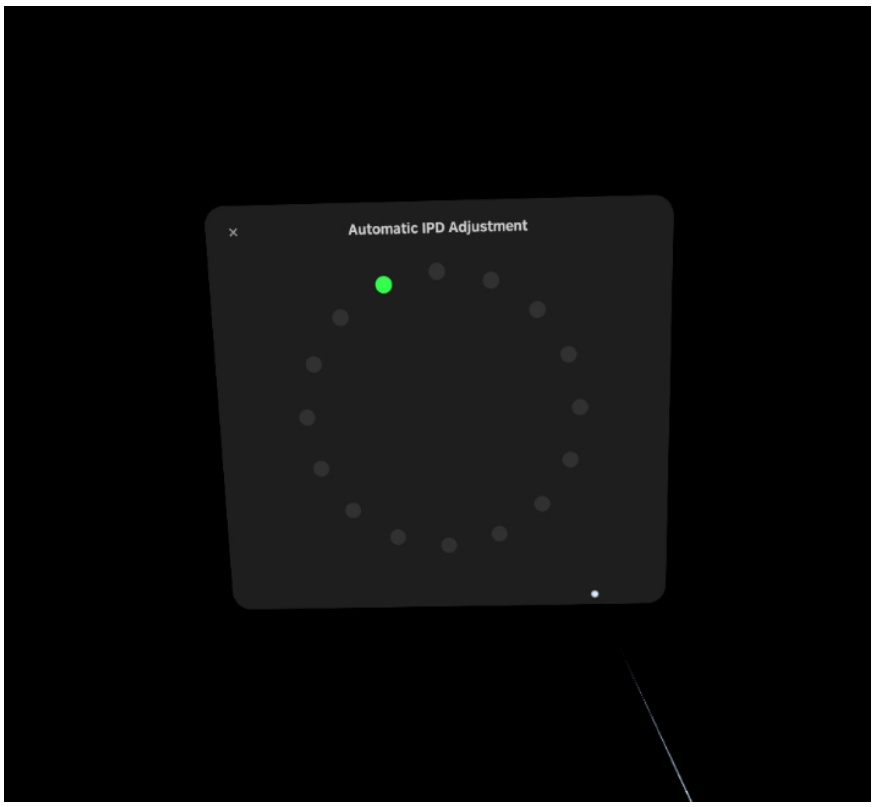

Figure 16 Automatic IPD Adjustment

2.5 Enable Developer Settings

This step only needs to be taken at the initial stage of setting up the Pico 4 headset for use. The developer settings can be disabled the same way as they are enabled. During regular use the developer settings can be disabled.

1. Open the Settings menu.
2. Navigate to the General tab.
3. Select the About option.
4. Navigate to the Software Version option and click it 7 times.
5. The developer settings should now be enabled.

2.6 Disable Play Boundary

This step only needs to be taken at the initial stage of setting up the Pico 4 headset for use. The system asks you to confirm that you have read the displayed warning when turning off the play boundary. Please read the warning carefully and remember to inform the users that the play boundary has been turned off.

1. Open the Settings menu.
2. Navigate to the Developer tab.
3. Turn off the Play Boundary option.

2.7 Quick IPD Adjustment

This step only needs to be taken at the initial stage of setting up the Pico 4 headset for use.

1. Open the Settings menu.
2. Navigate to the Developer tab.
3. Select the Business Settings option.
4. Navigate to the General tab.
5. Navigate to the Quick IPD Measurement option and turn it on.

2.8 Check Internal Clock (date and time)

The internal clock is set automatically by default. But just to be on the safe side, it's good to check the date and time before using it for the first time and after changing to winter- and summertime or when changing time zones (after a trip to Finland/Sweden for example). If the date and time are incorrect you can follow these steps to set it manually.

1. Open the setting menu.
2. Navigate to the general tab.
3. Select the Date and Time option.
4. Click on the Auto option. It should now be unselected.
5. Set the date and time manually.
6. Click on the Auto option again. It should now be selected.

2.9 Set NATUREACH Application as Home Screen

This step only needs to be taken at the initial stage of setting up the Pico 4 headset for use. Make sure you have read and completed the chapter on Downloading and Installing the NATUREACH application before attempting this step. Setting the NATUREACH application as the home screen makes using the VR headset easier for the patients. When the NATUREACH application is set as the home screen the application automatically opens when you power on the headset. This removes the end users need to start the application each time and to learn how the Pico menus work. However, setting this option does make it harder to do anything else with the headset besides using the NATUREACH application. We recommend you do this step last after having read and completed the rest of the chapters in this VR Manual.

1. Open the Settings menu.
2. Navigate to the Developer tab.
3. Select the Business Settings option.
4. Navigate to the Home Screen tab.
5. Select the NATUREACH360 application.
6. You should get a pop-up about restarting the VR headset. Select Restart Now.

After the home screen has been switched to the NATUREACH application it can be changed back to the regular Pico home screen by following the steps above and selecting the PICO Launcher option.

Note: If the home button on the hand controller stops working after changing home screen, restart the headset and it should start working again.

2.10 Eye protection (optional)

The Pico 4 VR headset has a setting called “Eye protection”. This looks similar to “night shift” on iPhones or “night light” on windows in that it reduces blue light from the screen (among other things). Turning this setting OFF will lead to slightly more realistic colors in the virtual nature environments. Turning it ON is intended to help with eyestrain. As we have no deeper information on exactly what this setting does, we cannot give an official recommendation on whether to use it or not. To change this setting. follow these steps:

1. Open the Settings menu.
2. Navigate to the Display tab.
3. Turn Eye protection ON/OFF

3 Downloading and Installing the NATUREACH application

This chapter will cover downloading and installing the NATUREACH application. Before you can install the NATUREACH application you first need to download the installation file. You can either download the installation file directly to the VR headset using the built-in web browser or download it first to a computer and then transfer it from the computer to the headset.

3.1 Option 1: Downloading the NATUREACH Application using a Computer + VR Headset

1. Open a web browser on your computer and go to this website: www.t.ly/FbdSc
   This is a OneDrive folder called “NATUREACH downloads”. It contains all the files you need. You might be asked to log in using your Microsoft365-account.
2. Open the folder called “NATUREACH-app installation files” and download the content inside.
3. Connect the VR headset to the computer with a USB-C cable.
4. If you are using a PC, the VR headset will automatically show up as a new device on the computer called ”PICO 4 Enterprise”. If you are using a Mac, you might first need to download additional software that allows the computer to connect to Android devices.
5. When you have located the device, open it, and navigate to the following folder: PICO 4 Enterprise > Internal shared storage > Download
6. Copy the downloaded installation file to this folder and safely eject the device.
7. If you have more than one VR headset, simply plug in the next headset and copy the same file to the same folder on that device.

3.2 Option 2: Downloading the NATUREACH Application using only a VR Headset

1. Put on the VR headset and connect it to the internet using Wi-Fi (for more information see the chapter titled Connect to a Network).
2. Open the Pico browser and go to this website: www.t.ly/FbdSc (see Figure 17 and Figure 18).
   This is a OneDrive folder called “NATUREACH downloads”. It contains all the files you need. You might be asked to log in using your Microsoft365-account.

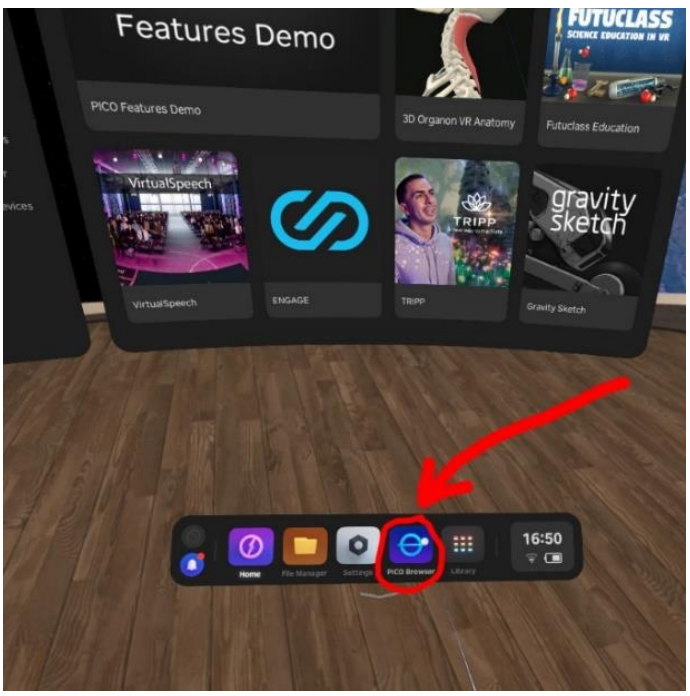

Figure 17 Pico Browser

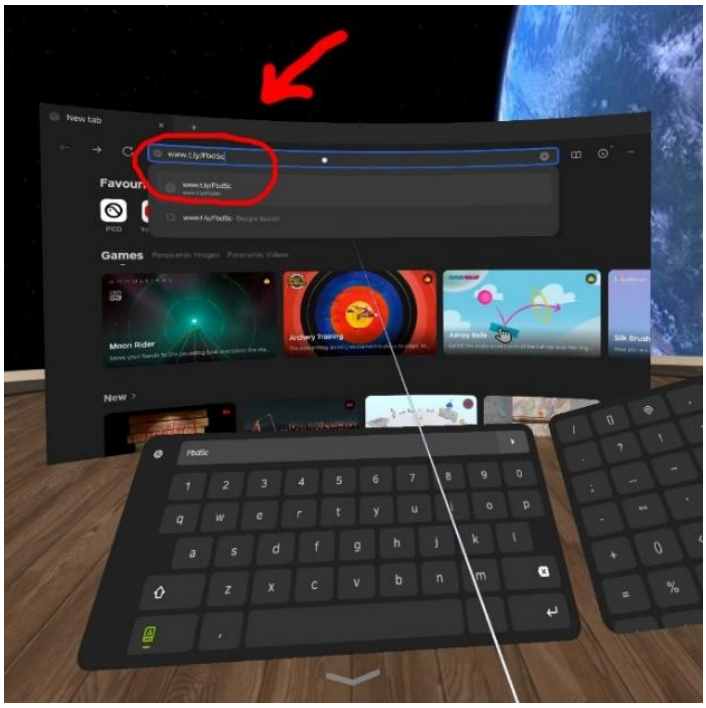

Figure 18 Pico Browser Search bar

3. Open the folder called “NATUREACH-app installation files” and download the content inside.
4. If you have more than one VR headset, repeat this process on the other headsets.

3.3 Installing the NATUREACH Application

Once you have downloaded the application, installing the application is accomplished following these steps:

1. Navigate to the file manager on your VR headset.
2. Navigate to the APKs tab (see Figure 19).

Figure 19 Pico 4 APKs Tab

3. Select the NATUREACH360 file.
4. Select the option to install the application (see Figure 20).

Figure 20 Install NATUREACH application

5. You should get a pop-up once the installation has finished (see Figure 21).

Figure 21 NATUREACH application Installed Pop-up

Once the installation is complete you should see the NATUREACH application in the library menu.

3.4 Initial Setup

Once you have installed the NATUREACH application on the VR headset, you need to do the initial setup, which requires you to check the applications settings and configure it to your particular needs. To configure the NATUREACH application for regular use, follow these steps:

1. Navigate to the Library menu on your headset.
2. In the library you should see an application named NATUREACH360. Open the application.
3. The application should ask you to allow it to access eye tracking. Click allow.
4. This should open the application's settings menu (see Figure 22).

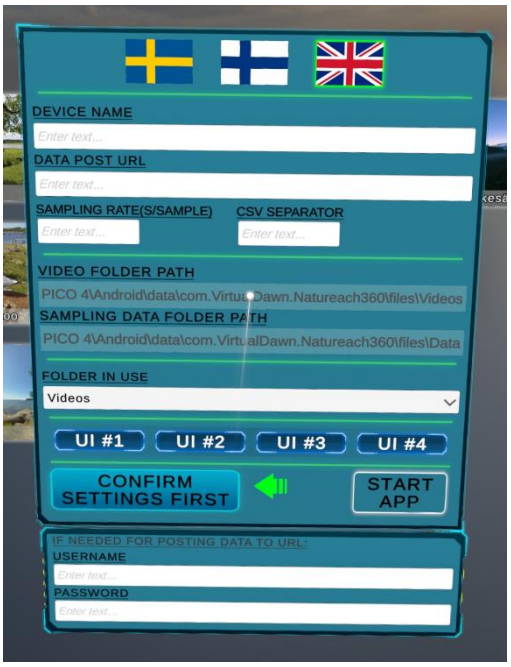

Figure 22 NATUREACH application Settings Menu

The NATUREACH application's settings menu is operated via the hand controllers. To configure the application, follow these steps:

1. In the top row choose the language by selecting the appropriate countries flag.
2. Select UI #1.
3. Select CONFIRM SETTINGS FIRST.
4. Select START APP.

This should open the application's standard view, which is the same view that opens after you start the application going forward.

The settings can be changed later if necessary (see the chapter on Configuration if you want to change the settings).

4 Adding VR Nature Environments

Before you can view any virtual nature environments in the NATUREACH application you first need to download the right video files from the internet if you do not already have them saved locally. Then you need to put them in the correct folder inside the VR headset. Make sure you have completed **ALL** the steps discussed in the chapter on Downloading and Installing the NATUREACH application before going forward.

You can use the same two methods for downloading as you did with the NATUREACH application, but there are some more things to keep in mind since the files are much bigger and also need to be put in a specific folder.

4.1 Option 1: Downloading VR Environments using a Computer + VR Headset

This is the best option if you are using many headsets and have access to a computer. This is how you do it:

1. Open a web browser on your computer and go to this website: www.t.ly/FbdSc
   This is a OneDrive folder called “NATUREACH downloads”. It contains all the files you need. You might be asked to log in using your Microsoft365-account.
2. Open the folder called “VR environment files” and download all the video files (.mp4) you want + the small image files (.jpg) with the same name. It is important to always have both the video file and the image file of the same scene.
   Also download the file called “localisation.csv”, which contains the language information and translations for all the video titles.
   The mp4-files are quite large (around 15GB each) so make sure you have enough space on your computer to store them. Long download times are normal for these file sizes. Please take this into account when you plan your work. A fast internet connection is recommended.
3. When all the files are downloaded, plug in the VR headset in the computer using the USB-cable that comes with the headset. If your computer doesn’t have a USB-C port, you can pick another USB-cable that fits your computer. For fast transfer speeds, make sure both your computer and cable use at least USB 3.0. (This is often, but not always, indicated by a blue color inside the connector and port).
4. If you are using a PC, the VR headset will automatically show up as a new device on the computer called ”PICO 4 Enterprise”. If you are using a mac, you might first need to download additional software that lets the computer connect to android devices.
5. When you have located the device, open it and navigate to the following folder:
   PICO 4 Enterprise > Internal shared storage > Android > data > com.VirtualDawn.NATUREACH360 > files > Videos.
   Copy all the files you downloaded to this folder and eject the device when you are done.
6. If you have more than one VR headset, simply plug in the next headset and copy the same files to the same folder on that device.

4.2 Option 2: Downloading VR Environments using only a VR Headset

This is the best option if you only want to put files on one VR headset or do not have access to a computer. This is how you do it:

1. Put on the VR headset and connect it to the internet using Wi-Fi.
   Open the Pico browser and go to this website: www.t.ly/FbdSc

This is a OneDrive folder called “NATUREACH downloads”. It contains all the files you need. You might be asked to log in using your Microsoft365-account.

2. Open the folder called “VR environment files” and download all the video files (.mp4) you want + the small image files (.jpg) with the same name. It is important to always have both the video file and the image file of the same scene. Also download the file called “localisation.csv”, which contains the language information and translations for all the video titles. The mp4-files are quite large (around 15GB each) so make sure you have enough space on your computer to store them. Long download times are normal for these file sizes. Please take this into account when you plan your work. A fast internet connection is recommended.
3. When the download is complete, open the “File Manager” and click on “All Files” then “Download” (see Figure 23).

Figure 23 Pico 4 File Manager

4. Select the videos and thumbnails that you want to add to the NATUREACH application, as well as the localization file. Press the scissors icon. Then go back to the “All Files” folder (see Figure 24 and Figure 25).

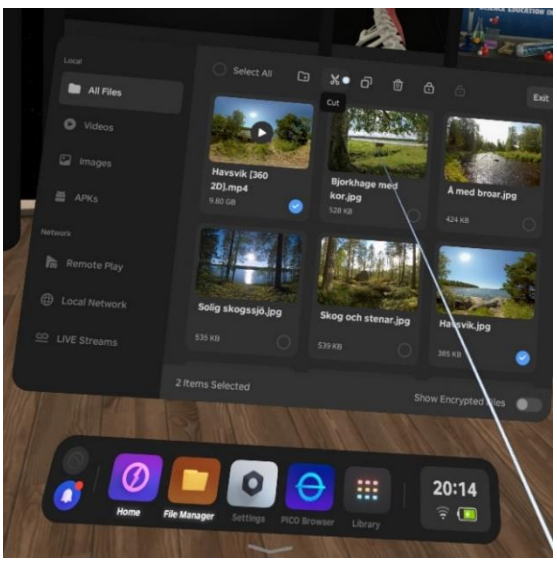

Figure 24 Select Files

Figure 25 Cut and Return

5. From there, navigate to the following folder: All Files > Android > data > com.VirtualDawn.NATUREACH360 > files > Videos
   Press the “paste” icon in the top right corner to add the files to this folder.
   You are now done.

You can repeat this exact procedure with all the headsets you want to use in the project.
If you want a more efficient way to put these files on more than one headset, read the next chapter.

4.3 Moving Files using an External Storage Device

This is a good complement to the other two options, especially to the “no computer” way. It is particularly useful if you want to put the files on more than one headset.

In this example we will assume that you previously downloaded the files directly to a VR headset and want to copy them to more VR headsets. However, if you have the files on a computer, it works pretty much the same.

1. Take an external storage device of your choice (USB-stick or an external hard drive) and plug it in to the VR headset’s USB-port. When plugged in, the device shows up here (see Figure 26):

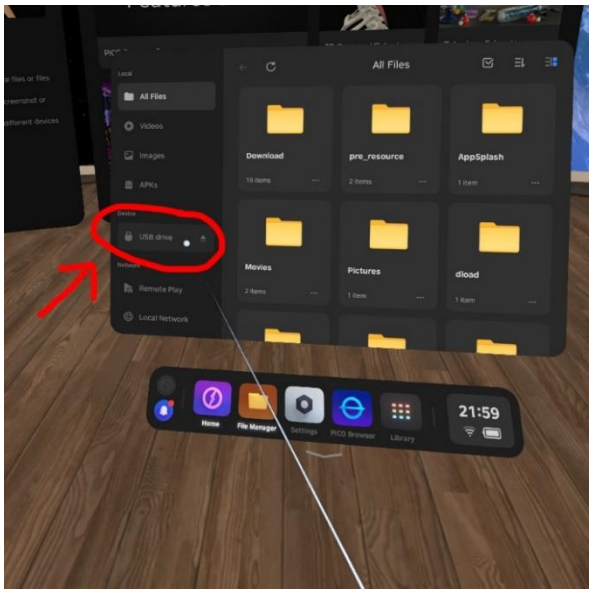

Figure 26 External Devices

2. Copy all the files from the VR headset to the “USB Drive”. Safely eject the storage device, plug it in to the next VR headset and copy the files over to the correct folder on that headset. For instructions on how to find the right folder, please check out the previous chapter. Repeat this procedure for all the headsets. Then you are done.

4.4 Troubleshooting for External Storage Devices

Here are some potential issues that you can encounter (and how to fix them) when trying to move files using an external storage device:

- *The external hard drive or USB-stick does not show up as a “device” in the headset.*

  If the device is in working condition (shows up fine on a computer), the likely issue is that it has a “file system” that the VR headset does not support. We recommend using the file system ExFAT. To change the file system, you need to plug the device into a computer and format it. Please note that formatting always deletes all the data on the device.

- *The device shows up but does not allow me to copy files to it*

  First double check that you have enough free storage space on the device. If that’s not the issue, the problem can be that the device has the wrong file system. For example, a common file system for USB-sticks is “Fat32” and it doesn’t support file sizes larger than 4GB. Since your video files are much larger, the file transfer won't work. As stated earlier, we recommend the file system ExFat which doesn’t have this limitation.

- *The transfer is very slow*

  Pick a faster storage device. Preferably a relatively new device (SSD or flash drive) that uses at least USB 3.0 (this is often, but not always, indicated by a blue color inside the connector). Speeds can also be slower if the storage device is almost completely full. Avoid this.

5 Using VR-headset without hand controllers

As mentioned earlier in the manual, the buttons on the side of the VR headset can be used to adjust the sound volume. Typically, this function works only when the hand controllers are wirelessly connected to the headset. If the controllers are not connected, the purpose of the volume buttons changes automatically. For most use cases this is not an issue, but if you wish to retain the functionality of the headset buttons without access to the hand controllers, follow these instructions.

This chapter explains how to disable the headset control mode that activates when the controllers are not connected to the VR headset. This step requires you to download two files and putting them in the correct places on the VR headset. You can either download the installation file directly to the VR headset using the built-in web browser or download it first to a computer and then transfer it from the computer to the headset.

5.1 Option 1: Downloading the Supplementary Files using a Computer + VR Headset

1. Open a web browser on your computer and go to this website: www.t.ly/FbdSc
   This is a OneDrive folder called “NATUREACH downloads”. It contains all the files you need. You might be asked to log in using your Microsoft365-account.
2. Open the folder called “VR supplementary files” and download the content inside.
3. Connect the VR headset to the computer with a USB-C cable.
4. If you are using a PC, the VR headset will automatically show up as a new device on the computer called ”PICO 4 Enterprise”. If you are using a Mac, you might first need to download additional software that allows the computer to connect to Android devices.
5. When you have located the device, open it, and navigate to the following folder: PICO 4 Enterprise > Internal shared storage.
6. Copy the volumekey file to this folder.
7. Then navigate to the following folder: PICO 4 Enterprise > Internal shared storage > Download.
8. Copy the KeepVolumeKeyFunction file to this folder.
9. Then you can safely eject the device.
10. If you have more than one VR headset, simply plug in the next headset and copy the same files to the same folders on that device.

5.2 Option 2: Downloading the Supplementary Files using only a VR Headset

Put on the VR headset and connect it to the internet using Wi-Fi (for more information see the chapter titled Connect to a Network). Open the Pico browser and go to this website: www.t.ly/FbdSc. This is a OneDrive folder called “NATUREACH downloads”. It contains all the files you need. You might be asked to log in using your Microsoft365-account.

1. Open the folder called “VR supplementary files” and download the content inside.
2. Open the File Manager.
3. Navigate to the All Files Tab.
4. Open the Download Folder.
5. Select and cut the volumekey file.
6. Go back to the All Files Tab.
7. Paste the volumekey file there.
8. If you have more than one VR headset, repeat this process on the other headsets.

5.3 Installing the Supplementary Files

Once you have downloaded the supplementary files, installation can be accomplished following these steps:

1. Navigate to the file manager on your VR headset.
2. Navigate to the APKs tab (see Figure 27).

Figure 27 Pico 4 APKs Tab

3. Select the KeepVolumeKeyFunction file.
4. Select the option to install the application.
5. You should get a pop-up once the installation has finished.
6. Once the installation is complete restart your VR headset.

6 NATUREACH Application User Guide

6.1 Regular Use

The NATUREACH application operates based on eye tracking. You select things by looking at them. The application's eye tracking is depicted as a white line or dot that starts from the middle of the user's gaze and is overlaid on any objects the user looks at. Consequently, during regular use the end user does not require the controllers to operate the application. However, the controllers are required to access the settings menu of the application and for using any features outside of the NATUREACH application. The standard view, which is presented to the user upon opening the application, is the video menu (see Figure 28).

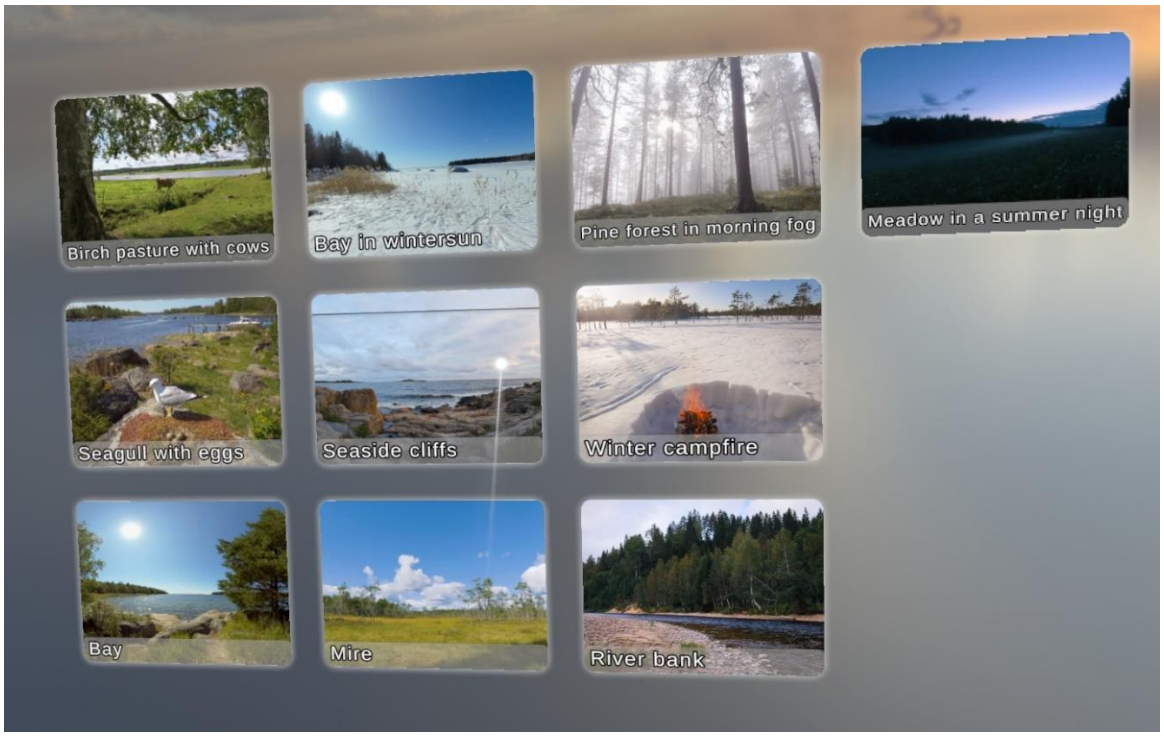

Figure 28 NATUREACH Application Video Menu

The video menu displays all the videos that have been added to the Videos-folder (see the chapter on Adding VR Nature Environments). The video menu has the following functionalities:

1. The video menu is centered based on the users' head and eye positions. This is calculated when the application is opened. The video menu's positioning can be adjusted by turning your head in any direction.
2. Once a good enough position and angle have been found the user can start selecting the video they want to watch. The menu operates on a 3 second delay. This allows the user to look at the video thumbnails for 3 seconds without the selection timer for that video starting. Once a video thumbnail has been looked at for 3 seconds the selection timer starts. The selection timer is 5 seconds, meaning that the total amount of time required to select a video is 8 (3+5) seconds of looking at a thumbnail (see Figure 29).

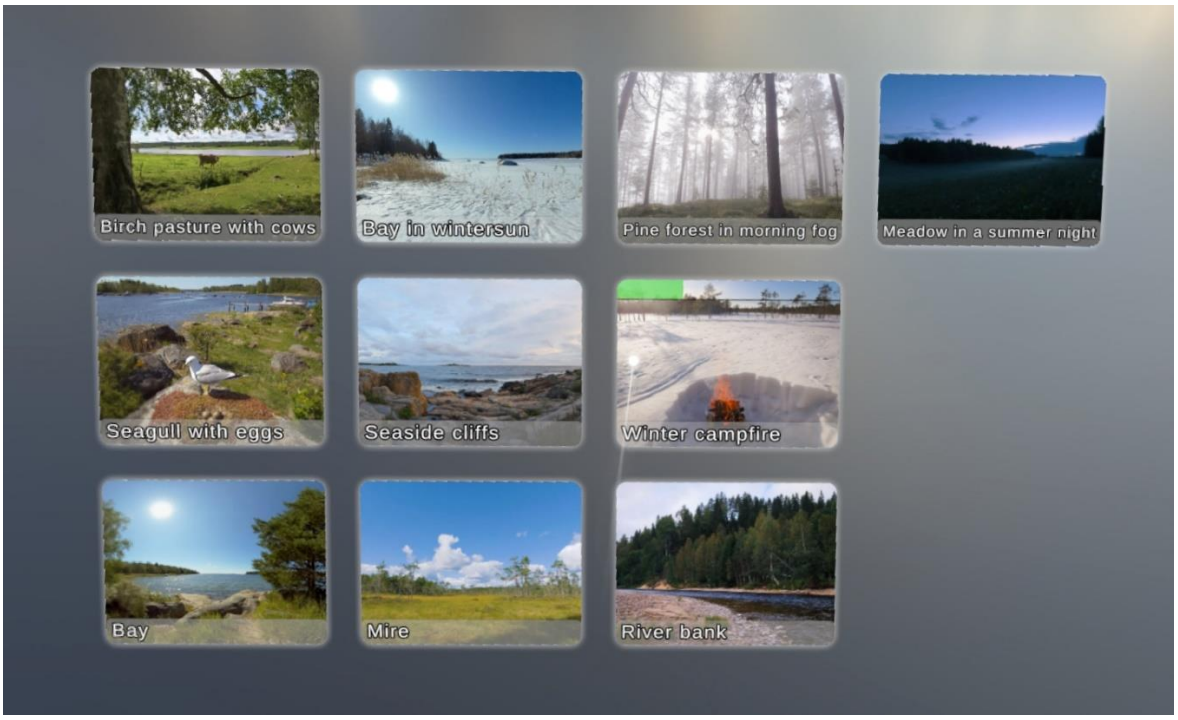

Figure 29 NATUREACH Application Selecting a Video

3. The thumbnails are named based on the application's language settings. This is meant to guide the user in selecting videos that are appropriate for their particular preferences and situation.
4. Once a video has been selected the application opens the video view displaying the video's environment. The video starts playing automatically, playing both video and audio.
5. The user can exit the video and return to the video menu by looking down at the exit button located 90 degrees down below the horizon (see Figure 30).

Figure 30 NATUREACH Application Exiting a Video

6.2 Configuration

You can configure the application by opening the settings menu. This is accomplished by pressing the right-hand controller's joystick. This should open the settings menu, which can be used to change the language settings, as well as any other configuration you might need to make.

The application's eye tracking indicator (white line or dot) can be shifted using the left-hand controller's joystick. You can change the starting point of the indicator to match the user's preference. This is an additional feature and should not be used extensively during regular use.

6.3 Assisting a Person with the NATUREACH application

The NATUREACH application can also be operated via the controllers. This is especially useful in combination with screen casting (see the chapter on Screen Casting), which enables you to assist a person with using the VR headset. When the person using the VR headset is looking at a particular video in the video menu, the assisting person can press the A button on the right-hand controller to start the video the person is looking at.

Once a video is playing for the patient, the assisting person can press the B button on the right-hand controller to go back to the video menu. This allows you to operate the NATUREACH application and assist patients who are unable to use the application by themselves.

7 General guide to “virtual nature interventions” utilizing VR headsets

This chapter contains information relevant for both end users and those who aid end users and/or organize interventions. The guide can be shared directly or be used as inspiration for shorter materials customized for specific user groups.

7.1 Brief Introduction to “Virtual Nature Environments”

The interventions may look quite different for each user group, but they are all based on the use of “virtual nature environments”. These digital environments are produced specifically for the NATUREACH project and are based on real nature environments in Sweden and Finland, captured with specific cameras suitable for VR. The audiovisual design of the environments is inspired by the practice of “forest bathing” and based on the latest research in the field of environmental psychology.

To further examine which environments and nature elements are the most restorative, a variety of sites with different nature types were chosen (see Figure 31). We have also aimed for diversity in terms of seasons, time of day, and weather; both for research purposes and in order to give the viewers more variety.

Figure 31 Examples of VR Environments (Cinematography: Martin Gärdemalm and Esa Siltaloppi Sound Design: Andreas Estensen; Esa Siltaloppi Media).

An important note is that although the environments come in the form of video-files, we should not at all think of them as regular videos, but rather as environments. The experience is not like watching a movie where you follow a certain story. What we are aiming for is instead a feeling of having been transported to a beautiful and authentic place in nature. This is important to think about, both for you as a user and if/when you communicate with clients as having the right expectations can pave the way for a better experience of the interventions.

For further information and an up-to-date list of all the currently available environments, check out the NATUREACH website at: https://www.slu.se/en/Natureach/Environments

There you can also find a printable list of the environments (with images). Having the list on a piece of paper can be a useful tool, especially when working with clients who haven’t had experience with VR before.

7.2 The Room

In order to get the best possible experience in a virtual nature environment it is important to pick an optimal real-world environment to sit in while using the VR headset. The room you sit in should have the following characteristics:

- The room should be as silent as possible. This is crucial.

A gentle and unobtrusive soundscape is an important key characteristic of many “real” nature environments that differentiate them from urban places that often have a high level of noise pollution. Many of our virtual nature environments are therefore purposely designed with very delicate soundscapes with overall lower sound levels than for example films made for TV or cinema. They will therefore not work as intended if the room around the viewer is not silent. It will feel like the sound level is too low, leading to a desire for the viewer to increase the sound volume, which in turn will amplify the video’s background noise and thus reduce audio quality.

In practice, this means it can be a good idea to avoid rooms close to big roads with heavy traffic, rooms with loud ventilation or noisy radiators, rooms with household appliances (refrigerators, freezers), buzzing fluorescent ceiling lights etc. The quieter the room is, the better the experience will be for the user.

- Good air quality, smell and temperature

Fresh air is an important key characteristic that separates outdoor nature environments from indoor environments. If you have the possibility, it can be a good idea to prepare the room you will sit in before starting the intervention by opening a window and letting in fresh oxygenated air and letting out unwanted indoor smells. It goes without saying that this only works if the outdoor air quality is good enough. This is another reason why you should try to avoid rooms close to busy roads.

For maximum viewer immersion, it’s also good to think about the room temperature in relation to the virtual nature environment you want to use. For example, if you want to sit in a snowy winter setting you can choose to ventilate the room longer than if you plan to sit in a sunny summer environment.

- Appropriate lighting

Sitting in strong direct sunlight might not be optimal as light can leak into the headset leading to unwanted reflections. Sitting in a very dark room might interfere with the headsets position tracking. If the room gets too dark, the headset will show a warning message to the user. Most other lighting is totally fine. Regular ceiling lights or soft ambient light from a window, for example, works well.

7.3 Viewing Position and Furniture

The choice of viewing position is of course a matter of personal preference, but we recommend to mainly use a seated or semi-reclined viewing position. This could be in a chair, armchair, sofa etc. There are several reasons for this:

- The virtual nature environments are mostly recorded with a camera height roughly matching a seated position or slightly lower. Therefore, a seated viewing position will feel more realistic than standing up.

- The NATUREACH application is easy to use in a seated position. To exit an environment and go back to the main menu, you need to look straight down. If you lie flat on a bed, this is hard to do. If you are working with a patient that needs to lie down due to health reasons, we recommend that you help them exit environments by pressing the B-button on the hand controller.
- Lying down flat on the bed can be uncomfortable due to the design of the VR headset. It also limits the viewer to mostly looking up at the sky or to the sides.

With that said, don't let this recommendation restrict the user experience. It can make the virtual nature intervention more immersive and less stale if you sometimes change your viewing position. You can look behind you, lay down on your back and look at the clouds in the sky, stand up briefly to stretch out your legs etc. Just make sure to not walk around the room as this can pose a safety risk.

When it comes to picking furniture, we encourage experimentation to see what works best for you! An armchair can be very comfortable and relaxing, a sofa makes it easier to alternate between looking at the horizon and looking up at the clouds in the sky, sitting on a soft carpet on the floor can give a more grounded experience and sitting on a rotating office chair makes it super easy to look in different directions. If you want to use a bed, it's often best to make it as upright as possible by adjusting the angle of the bed or adding pillows.

7.4 Sound Volume

The sound levels of all environments are professionally adjusted to sound good at their default level, which is 50% of the max volume of our specific VR headset's (Pico4E) using the NATUREACH application. This assumes a user that sits in a silent room. Some virtual nature environments are higher in volume, some are much lower. This is done on purpose to keep it realistic. In real life, a stormy sea is always going to sound louder than a foggy forest. We have tried to keep some of that difference. If you have hearing loss, or are forced to sit in a noisy room, we recommend raising the volume to a comfortable level and keeping it there consistently for all environments.

That said, sound is always a highly subjective experience. If you find an environment to be too low or high in volume for your liking, you are of course welcome to adjust the volume! If that is the case, please keep the following in mind:

- Give it a chance first! As stated earlier, some environments are purposely designed to be quite silent. They are meant to reduce stress levels and put you in a calm state of mind. Try staying in the environment for a couple of minutes and let your ears and mind adapt.
- As stated earlier, raising volume too much on a very silent video can reduce sound quality by amplifying background noise. Raising to 80% rather than 100% can often result in a better experience.
- Many environments have birdsong. Those sounds are often quite high frequency. As we age, we naturally lose the ability to hear the highest frequencies. If you wish to hear more birdsong, raising the volume might therefore not always help as this doesn't change the frequency. This also means that different users will often have radically different experiences of the same environment.

The sound level can be adjusted using the volume buttons on the headset. The location of the buttons can be seen in the chapter on Headset Functionality.

7.5 Before your First Virtual Nature Intervention

Before doing the first intervention, it can be good for the user to do a short test. This is especially good for people who are new to VR.

- Put on the VR headset and make sure it sits comfortably and tight on the head. The headset might have to do what's called an automatic IPD adjustment. This calibrates the headset to suit your eyes.
- If you normally wear eyeglasses for nearsightedness, you should keep them on while using the VR headset as this will give you a sharper image. (The exception is during the IPD adjustment). Make sure to use the "glasses spacer" if you wear eyeglasses.
- When you put on the VR headset you should end up in the NATUREACH menu. Enter one of the nature environments by looking at it its image in the menu for 8 seconds. While inside the environment, look around and familiarize yourself with the experience. Exit the environment by looking straight down.

7.6 VR Quirks

One common difference in VR compared to the real world is that when you look down you don't see your own body. For some people, this can lead to a sense of being higher up than you actually are. One thing that might help you get a better sense of the real distance to the ground is to look at surrounding objects and analyze your height in relation to them.

Another thing that might happen is that tall things close to you, for example trees, appear larger than in the real world. This effect can vary from person to person.

The main reason we bring these things up is to inform you that it's perfectly normal and not a technical issue with your specific headset that you need to worry about.

7.7 Virtual Nature Intervention Step-by-step Guide

The interventions will of course not look the same for every user group, but these basic steps can be a good starting point.

1. Choose which virtual nature environment to use. You can see all available environments by putting on the VR headset and looking at the images in the NATUREACH application's video menu. Some users may find it easier to instead look at a list of available environments printed on a piece of paper. How you do it is entirely up to you and/or your clients.
2. Fill in a diary/paper form or online form (Client code, headset code, mood survey or stress-energy survey etc. relevant for the client group) (if needed with help).
3. Prepare for the intervention by calming down your body and mind. Sit or lay down and breathe calmly for a while.
4. Put on the VR headset and enter the chosen environment.
5. Spend time in the same environment for the amount of time agreed upon. Different groups have decided on different times. It can be a good idea to set an alarm for your preferred time before you start.
6. Take off the VR headset and fill in a diary/paper form or online form (Client code, glasses code, mood survey or stress-energy survey etc.) (if needed with help)

7.8 Improving the Experience during Interventions

Being alone in a calm environment for long periods of time, it's easy for the mind to drift away and only focus on things beyond the current experience, to worry about yesterday's mistakes or prepare mentally for tomorrow. It might also make you a bit restless or anxious at times. Whether or not this happens to you, it can improve your experience to bring your focus back to the present by actively observing all the different aspects of the surrounding nature.

What do you see? Wind blowing in the grass, insects climbing a nearby tree, clouds moving in the sky, waves crashing on the shore? Do you hear any birds, if so, what kind? Imagine yourself being there. What would it smell like? What would it feel like?

Also try changing your perspectives. The best view is often straight ahead, but that doesn't mean there aren't other interesting perspectives. Lay down on your back and look at the treetops or clouds, turn around and explore what's behind you etc. And lastly, don't judge yourself when your mind starts to wander. It is perfectly normal and okay!

8 Screen Casting

Screen casting allows you to cast the Pico 4 VR headsets screen to an external device. This is especially helpful when using VR headsets with patients or instructing users on how the VR headset is used (for further instructions on how to assist patients during use see the chapter on Assisting a Person with the NATUREACH application). The Pico 4 has a built-in application for screen casting called Screencast. The application will stop screen casting after a few minutes of inactivity, so it is advised to start the screencast only immediately before use. Casting the VR headsets screen requires you to connect the VR headset and the device you want to cast the screen to the same network. For instructions on connecting the Pico 4 VR headset to a network see the chapter on how to Connect to a Network. The screen casting should work with any device that can connect to a network and has a browser. You can start screen casting by following these steps:

1. Connect the devices to the same network (see above).
2. Open the Library menu (see Figure 32).
3. Open the Screencast application (see Figure 32).

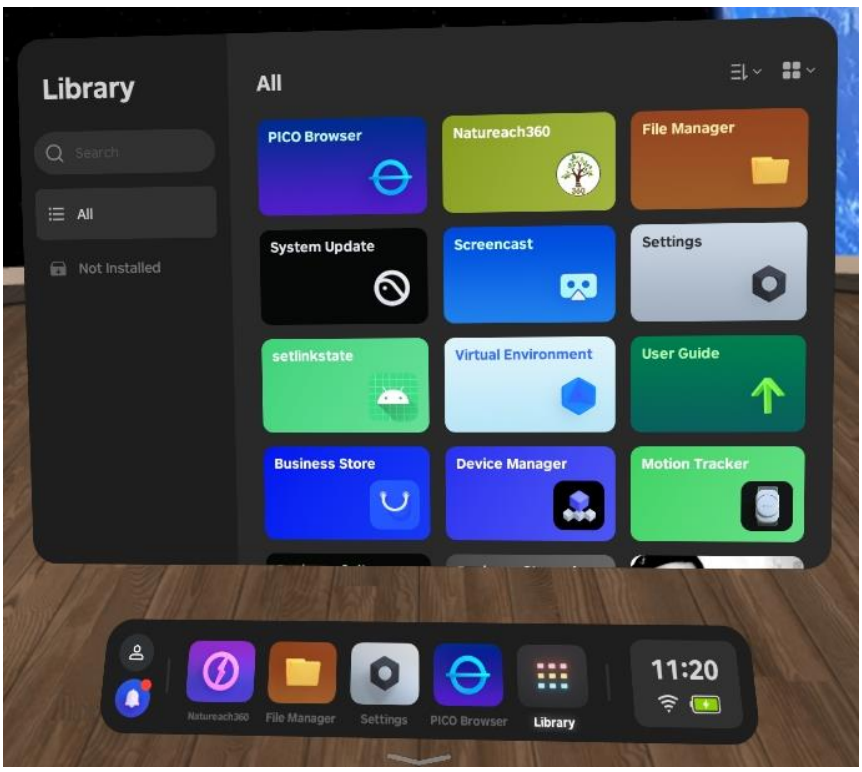

Figure 32 Screencast Application

4. Select the option to Cast to Browser (see Figure 33).

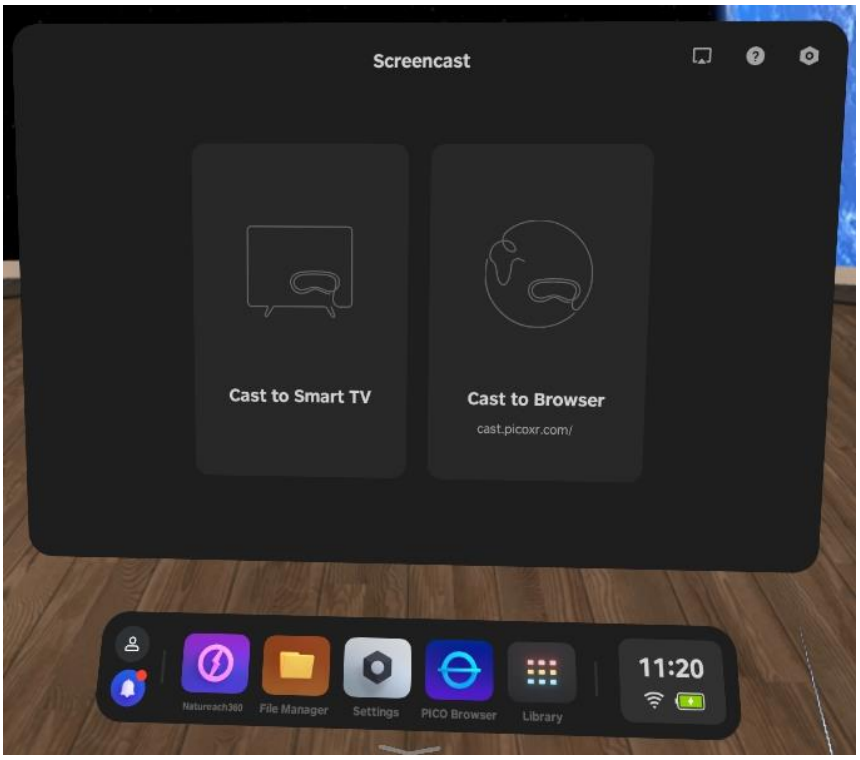

Figure 33 Cast to Browser

5. You should see a web address in the Screencast application (see Figure 34).

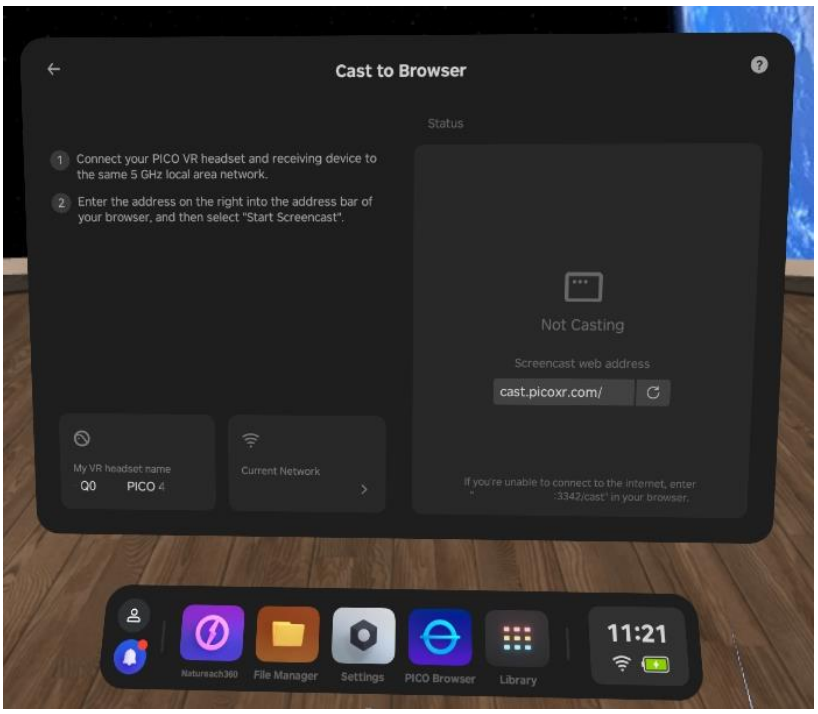

Figure 34 Screen Casting Address

6. Open a web browser on the device you want to cast the screen to. Write the address into the address bar of the browser.
7. On the website press the option to Start Screencast (see Figure 35).

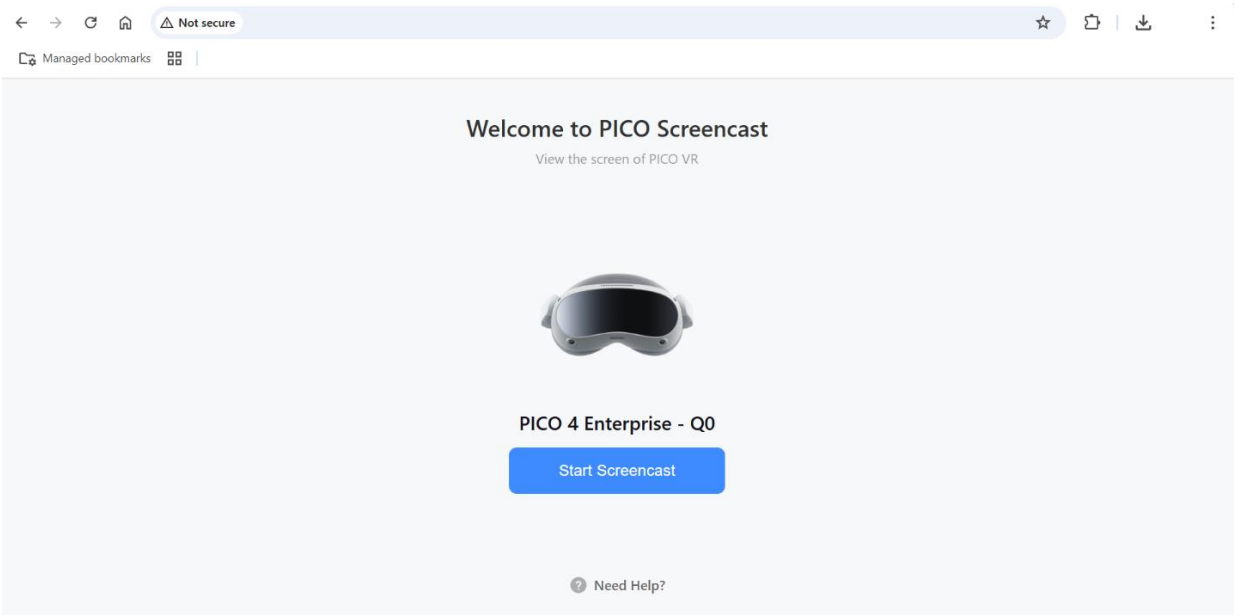

Figure 35 Start Screencast

8. You should see a pop-up on your Pico 4 VR headset. Select the option to Allow Screen casting to an External Device (see Figure 36).

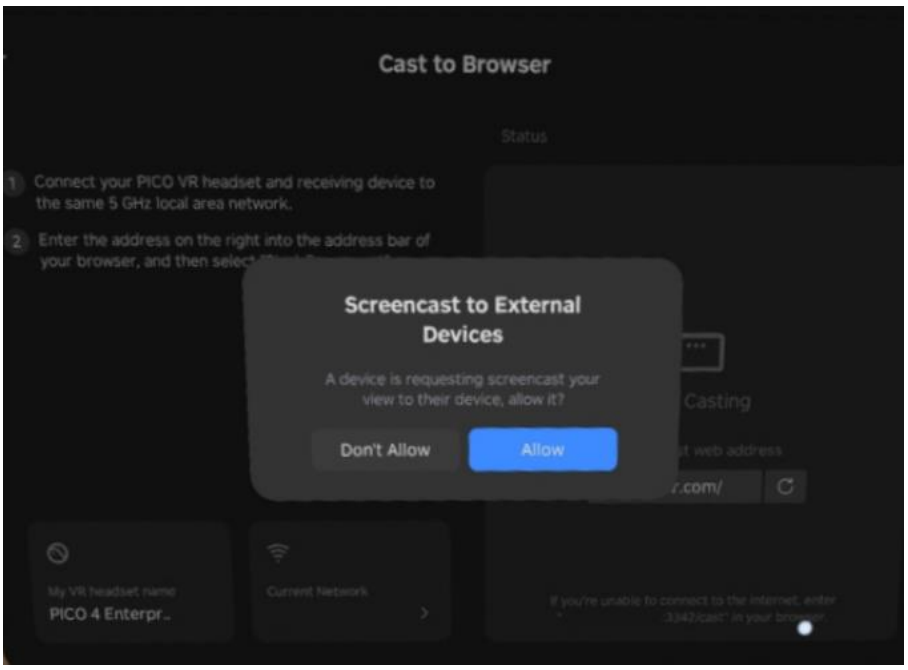

Figure 36 Screencast to External Device

9. The Pico 4 VR headsets screen should now be cast to the external device. You can quit casting the screen by either pressing the option to End Screencast in the browser on your external device or by navigating to the Screencast application on your Pico 4 VR headset and selecting the End option (see Figure 37).

Figure 37 End Screencast

9 Data Collection

9.1 Collecting Data

The NATUREACH Survey application can be accessed through this link. You can login using the provided Username and Password.

https://natureach.jansoftworks.fi/clients/index.php

9.2 How to Transfer Data from the VR Headset to your Computer

This is a step-by-step guide on how you can transfer user data from the NATUREACH application on your VR headset to your computer. To transfer all the data collected by the NATUREACH application follow the steps below:

1. Connect your Pico 4 VR headset to your computer with a USB-C cable. You should preferably use the cable that came with the VR headset, but any USB-C cable should work.
2. Open the File Explorer on your computer.
3. Navigate to the following directory: This PC\PICO 4 Enterprise\Internal shared storage\Android\data\com.VirtualDawn.Natureach360\files
4. There you will see a folder called Data. Open the folder.
5. The folder contains .csv files containing the user data. The file names indicate the date and time the data was collected. Select the files you want to transfer and copy them onto your computer.

10 Troubleshooting / FAQ

1. **Missing Exit button:** During our testing we have encountered an issue where sometimes the “Exit” button in the NATUREACH application is missing. This means you cannot leave the virtual nature environments by looking down at the Exit button. We do not currently know when or why this issue occurs, but it can be remedied by restarting the NATUREACH application.
2. **Sound volume feels too low:** More information about audio can be found in chapter 7.4.
3. **A video freezes:** If you experience a video stopping or freezing unexpectedly, try restarting the VR headset, if the problem persists, please report it to the VR support staff.
4. **Problem updating the NATUREACH application:** If you have problems installing or updating the application after following the instructions seen in the chapter on Downloading and Installing the NATUREACH application, please contact the VR support staff.
5. **The headset feels too heavy on the head.** Try to readjust the VR headset. The VR headset should be well balanced when put on properly. You can readjust the VR headset using the strap dial at the back and the top strap.
6. **The volume buttons do not allow to adjust volume.** Read chapter 5

11 Maintenance

11.1 Hygiene and storage

You can clean the headset with non-abrasive antibacterial wipes. Carefully wipe the face cushion, light blocker, and nose area – as well as the headset body, including the headband adjustment wheel and buttons. Do not use soap, harsh chemicals, cleaning solvents, liquids, or aerosols for cleaning the headset as they can cause damage to the device.

Wipe the lenses gently with a microfiber lens cloth. Clean the headset lenses very carefully due to their close contact with your eyes. Never put water or any chemicals on the lenses, only use the microfiber lens cloth.

Store Properly: When not in use, store the VR headset in a clean, dry environment away from dust and direct sunlight (see Figure 38). Use a protective case or cover to prevent damage and dust accumulation.

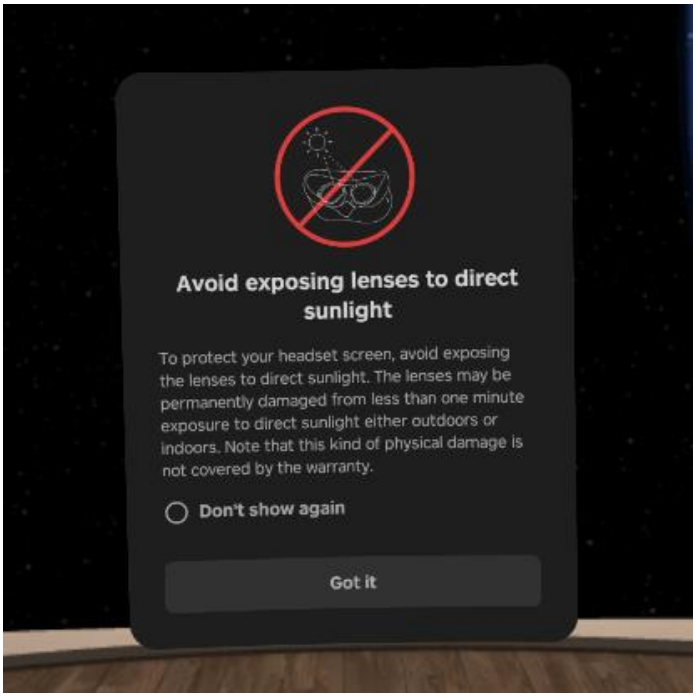

Figure 38 Avoid Exposing the VR Headset Lenses to Direct Sunlight

11.2 Charging

The Pico 4 VR headset has a battery life of approximately 3 hours. This means that the VR headset can be used for a maximum amount of 3 hours consecutively before running out of power. The batteries are also drained when the headset is left unused for extended periods of time.

Preferably, the VR headset should be charged periodically, for instance after each prolonged use or sometime before an intervention.

The controllers are using 4 replaceable AA batteries. Please replace the batteries if the controllers do not work.

12 Legal Disclaimer for use of the VR headset

12.1 Health and Safety warnings

Virtual reality (VR) headset can be used by most people, but certain individuals may face challenges using VR headset comfortably or safely:

- Children: VR may affect developing vision, so you must be at least 13 or above to use the VR headset.
- People with medical conditions: Conditions like epilepsy, seizures, motion sickness, or vestibular disorders or other neurological conditions may cause discomfort or exacerbate symptoms when using VR.
- Pregnant women: Limited research suggests potential risks to the fetus, so pregnant women should consult healthcare providers.
- Those prone to motion sickness: VR experiences with rapid movements may induce discomfort due to a mismatch between visual cues and the body's vestibular system.
- People with disabilities: Visual impairments, mobility issues, or specific eye conditions may make using VR challenging. Individuals with certain eye conditions, such as strabismus (eye misalignment), amblyopia, or significant refractive errors, may experience difficulties in focusing or perceiving depth in VR environments
- Those with claustrophobia: The enclosed nature of VR experiences may exacerbate feelings of discomfort or anxiety.
- Some users may experience allergic skin reactions to the materials in this device. If you notice any irritation, stop using the device immediately and consult a medical professional.

If you start feeling dizzy or nauseous, remove the VR headset immediately and take a break from using it. Sit or lie down in a comfortable position until the symptoms subside.

Prolonged use of the Pico 4 VR headset may cause dizziness or eye fatigue. It is recommended that you take a break at least every 30 minutes. You may be able to relieve eye strain by watching distant objects. If your feel any discomfort, please stop using the product immediately.

If the VR headset is shared among multiple users, thoroughly clean and disinfect the device between each use. Maintain personal hygiene. Wash your hands (if possible) thoroughly before and after putting the headset on.

12.2 Risks and Safety Precautions

Do not use VR glasses while operating vehicles, heavy machinery, or performing tasks that require attention to the real world. Always ensure a safe and open area when using the device to avoid physical harm to yourself or others.

Please note that if you are following the instructions in this manual for Virtual Reality Nature based interventions, we describe how to disable the play boundary. The instructions for this step are depicted in the chapter Disable Play Boundary. This means that the headset will not display any warning messages when you move around. In our opinion, this leads to a better user experience but it means you need to be extra careful when using the VR headset. This

manual and the Virtual Reality Nature based interventions are intended to be used solely in stationary positions, such as while standing or sitting. Please be aware that you must remain stationary within your physical area. Moving outside of this area can lead to collisions with objects, walls, furniture, or other people in your surroundings. Such movements pose a risk of physical injury, property damage, or device damage. To prevent accidents or injuries, it's important not to move your position or take steps while the boundary is removed. Always be aware of your surroundings and the limitations of your physical space. Avoid reaching out beyond your play area or making sudden movements that could lead to accidents.

12.3 Liability

The user of VR headset should consider the health and safety warnings (12.1), risk and safety precautions (12.2) before using the VR headset. The user assumes all responsibility for their actions while using the VR headset. User assumes all risks associated with using the device, including personal injury, property damage, or other adverse effects. The provider of user intervention environments, medical staff, researcher, manufacturer, distributor or any other party is not liable for any accidents, injuries, or damages resulting from the misuse or disregard of safety instructions.

By adhering to these guidelines and exercising caution, you can enjoy immersive VR experience. Remember, your safety is paramount, so always prioritize caution and awareness when using VR technology.

You can find more information about safety, while using the Pico VR headsets here: https://www.picoxr.com/global/safety-center

13 Contact Information

If you encounter any issues or have any questions these are the people to turn to:

Martin Gärdemalm: Any questions regarding the videos or the video files. I am also happy to hear any feedback on the videos you might have along the way.
martin.gardemalm@slu.se
+4673-0589172

Joni Piispanen and Vaiva Stanisauskaite: Any questions regarding the NATUREACH application and any general technical questions regarding VR headset hardware (buttons, controllers, battery etc.). Also, any questions regarding connections between VR headsets and computers. Any feedback on the NATUREACH application can also go to Joni and Vaiva.
joni.piispanen@uwasa.fi

Vaiva.stanisauskaite@uwasa.fi

Johan Jirlén: General technical questions.
johan.jirlen@ltu.se