

EyePort User Manual

[Last Revised 15 December 2023]

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Under the Supervision of
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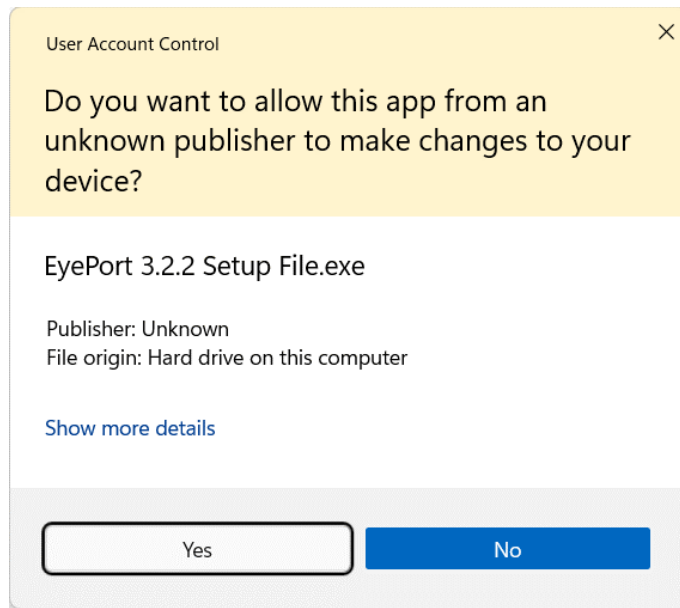
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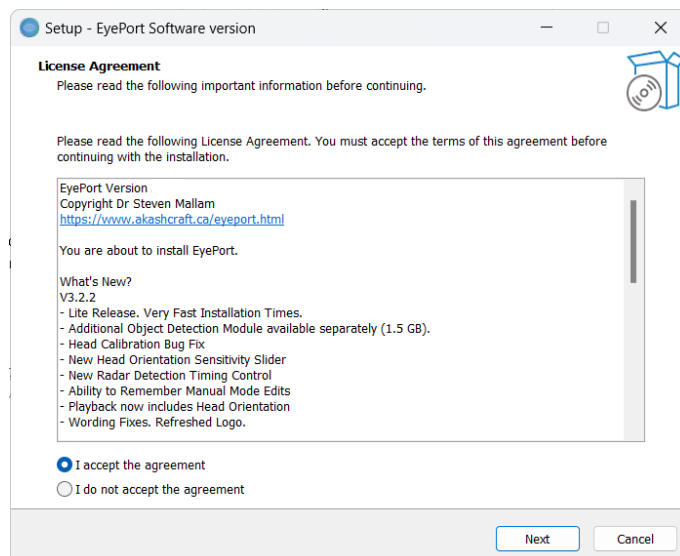
INSTALLATION

To install EyePort, double-click the (.exe) file that you downloaded from the official source. Then click 'Yes' on the UAC Prompt.

Name	Date modified	Type
 EyePort 3.3.3 Setup File.exe	11/12/2023 4:56 PM	Application
 EyePort Object Detection Module Setup File.exe	11/12/2023 5:06 PM	Application



Accept the license agreement and click Next. Follow through the setup wizard and click finish when done. You can open EyePort from your Start Menu.



QUICK START

This section will guide you through recording a session quickly. Later sections discuss the analyze and export pages. Please make sure you read the entire manual to obtain the best results from the glasses.

Overview

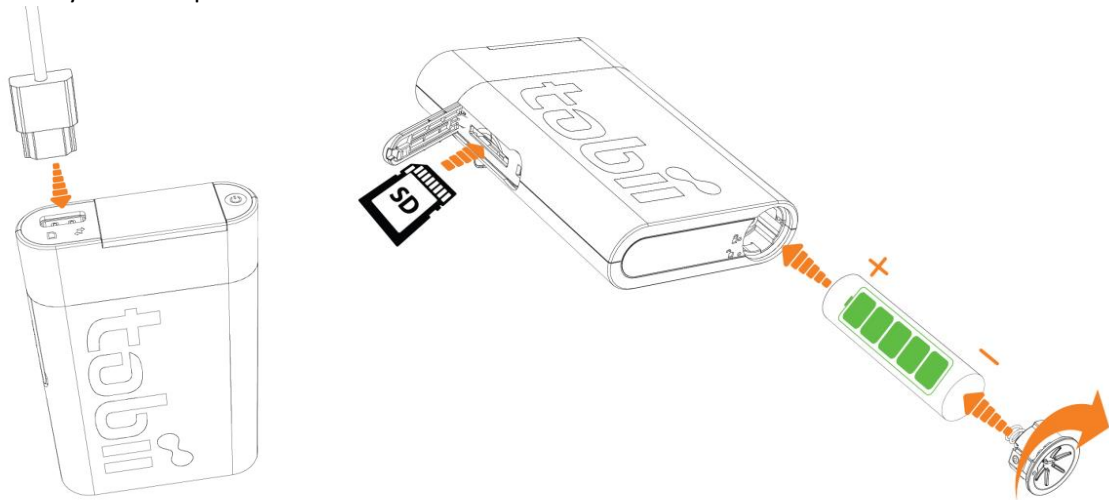
The screenshot shows the EyePort software interface with several callout boxes pointing to different elements:

- Export Page**: Points to the 'Export Data' button in the left sidebar.
- Playback Page**: Points to the 'Playback Data' button in the left sidebar.
- Analyze Page**: Points to the 'Analyze Data' button in the left sidebar.
- Record Page**: Points to the 'Record Data' button in the left sidebar.
- Settings Page**: Points to the 'Settings' button in the left sidebar.
- Close EyePort**: Points to the 'Close EyePort' button in the left sidebar.
- Opens this User Manual**: Points to the 'User Manual' button in the main content area.
- Hide Welcome Page on Startup**: Points to the 'Do not show this page again on startup' checkbox.
- Glass Controls**: Points to the 'Pop Live View' toggle and 'Record Now' button in the 'Record Data' section.
- Glass Status**: Points to the battery level (69%) and time (1h 9m) indicators in the 'Record Data' section.
- Live Preview**: Points to the 'Record Data' button in the left sidebar.
- Opens this User Manual**: Points to the 'User Manual' button in the left sidebar.

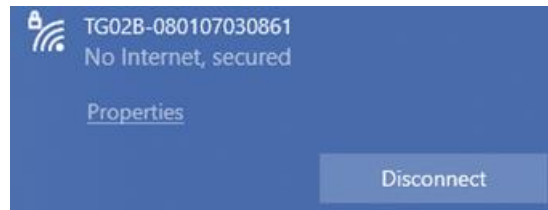
Connection Guide

EyePort can connect to TOBII Pro Glasses 3 using Wi-Fi only.

Connect the head unit with the provided HDMI cable to the recording pack. Ensure the battery is charged and you have spare batteries to work with. Please insert an SD Card into the slot as shown.



Turn on the recording unit of the glasses. After the green power button is lit, connect the glasses.



Wi-Fi – The network SSID of the glasses is the serial number of the glasses, as shown above. The passkey is **TobiiGlasses**.

Once recognized by your computer, click “Connect Glasses” on the Record Page in EyePort.



Do you need help? Check the troubleshooting section.

Calibration

You can calibrate the glasses before the record session if you wish. Although this step is optional, it is highly recommended that you calibrate your glasses after each session or user for the best results.

Ensure you have the calibration card in front of the user. Ask the user to keep looking at the card during the calibration process. Click “Calibrate Glasses” and dismiss the prompt to start calibration.



Successful Calibration:



If you get a successful calibration result, you may proceed to the next step of recording data. You can re-calibrate any number of times.

Failed Calibration:




If you get a failed calibration result, try the following steps:

- Ensure a snug fit on the user.
- Ask the user not to move during the calibration process.
- Try cleaning the glass shades with lens cleaner.
- Make sure the connection has not dropped.

[Record Data](#)

Click the "Record Now" button to start your session. When finished, click "Stop" to save the recording.



 **WARNING**
 It is important that the connection is not dropped, or the recording unit is not powered down when saving the recording. This may lead to corruption or loss of data.

Analyze Data

You must locate the recording folder on this page you want to analyze. It must contain the two compressed archive files (for gaze and IMU data) and one video file (called scenevideo.mp4).

The folder will be remembered for your convenience by default when you relaunch EyePort. If you do not want EyePort to remember the last loaded folder, you can turn this off in Basic Settings.

Here is an overview of the Analyze Data page.

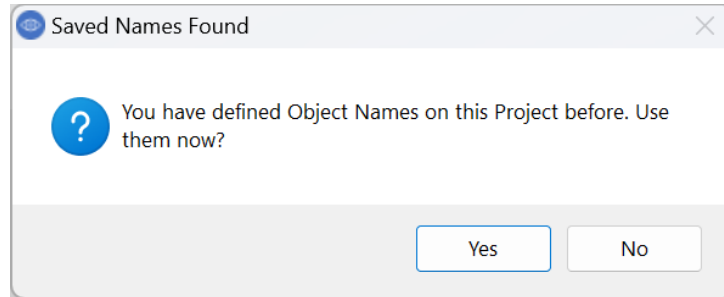
The screenshot shows the 'Analyze Data' page in EyePort. The interface includes a sidebar with navigation buttons: Record Data, Analyze Data, Playback Data, Export Data, and Settings. The main area is titled 'Analyze Data' and shows a 'Load SD Card Folder' section with a 'Load Folder' button and a 'Loaded' status. Below this is a 'Start Analysis' section with an 'Analyze Now' button. The 'Area of Interests' section displays three images labeled 'Laptop', 'Roof', and 'Laptop'. The 'Unique Area of Interests' section displays two images labeled 'Laptop' and 'Roof'. At the bottom, there are buttons for 'Edit Names', 'Detections', and 'Clear Page'. The 'Head Orientation Times' section shows three silhouettes with statistics: Head Up Time (6.05s, 24.61%), Head Level Time (18.53s, 75.39%), and Head Down Time (0s, 0.0%). Below this are two tables. The first table lists violations with columns for Start Time, End Time, Duration, and Description. The second table lists head orientation events with columns for No, Head Orientation, Start Time, End Time, and Duration. At the bottom, there are buttons for 'Show Graphs', 'Radar Violations', and 'Dead Man Switch', and a 'No-Go Zone Violations: 0' indicator.

Annotations:

- Opens this User Manual (points to User Manual button)
- Load Folder (points to Load Folder button)
- Loaded (points to Loaded status)
- Analyze Now (points to Analyze Now button)
- Areas of Interests (points to the three images in the Area of Interests section)
- Unique Areas of Interests (points to the two images in the Unique Area of Interests section)
- Basic Controls (points to Edit Names, Detections, and Clear Page buttons)
- Head Orientation Times (points to the Head Orientation Times section)
- Tables (points to the two data tables)
- Dead Man Switch (points to the Dead Man Switch button)
- Radar Violations (points to the Radar Violations button)
- More Graphs (points to the Show Graphs button)

1) Edit Names

If you are unhappy with the names of the detected Unique Areas of Interest. You can change the names using this button. You will be presented with entry fields beneath each image frame to enter your desired names manually. Once done, click Save Changes or press ENTER on your keyboard to commit the changes. EyePort can also remember the last name changes for future analysis. This way, you can restore them instantly. Simply click “Yes” when prompted.



NOTE: You can enter identical names for Unique Areas of Interest only in **Manual Mode**.

2) Detections

This button opens the detections folder. This folder is automatically created during Analysis. It contains cropped images of all **Areas of Interest**. These are later important for Unique Areas of Interest detection. You can change the size of these images in Advanced Settings.

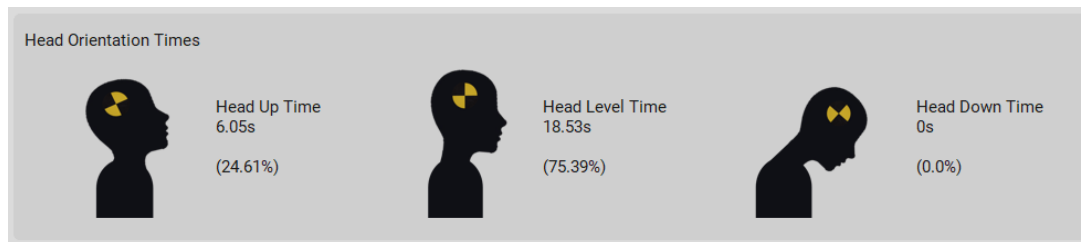


3) Clear Page

This button clears all results from the Analysis Page. Allowing you to analyze again or choose another project. Although, clicking the “Load Folder” button achieves the same result.

4) Head Orientation Times

EyePort calculates the three states of orientation using the gyroscope values tuned to detect a "jolt" in the Y axis. While the user’s head is transitioning from one state to another, this "jolt" is being detected. The head up/level/down times are presented in the format shown below.



To avoid false readings during the transition phase, the timers responsible to count the head up/level/down times are temporarily paused. They are resumed when the head reaches an "expected" next state and the gyroscope readings are settled close to 0 deg/s. There is an estimated loss of 2 seconds between head movements.

5) Show Graphs

This button allows you to view or save graphs of the analyzed data. A new window showing the Gaze Data, Duration and Areas of Interest in the form of scatter and bar graphs will be displayed.

6) Radar Violations

This section calculates radar violations. Every 30 seconds (default), the user must be looking at the radar screen for a few seconds and register it as an Area of Interest. Otherwise, a violation will be registered and shown when clicking the button. You can change the interval value in Basic Settings.

7) Dead Man Switch

This button states whether the dead man switch is active or not. The switch will be active if the user looks at an object for too long (45 seconds) and has no head movement. This demonstrates an application of eye tracking because this Boolean can be used to trigger emergency brakes on a vehicle rather than displaying a text here.

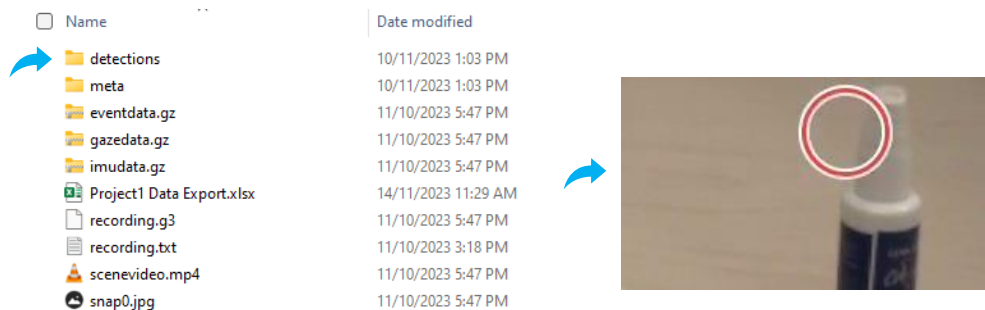
8) No Go Zones

This section shows Areas of Interest looked at by the user which are not allowed or prohibited to be looked at during the recording session. For example, you look at your cell phone on the bridge deck while performing critical navigation tasks. It works based on Image Similarity Measures.

How do I define No Go Zones?

This is important and is straightforward to do. First create and analyze a recording where the user only looks at the required object to be later identified as a No Go Zone.

After analyzing, go to the detections folder in the record folder. This is automatically created by EyePort in every analysis.





Grab the image you want and place it under EyePort/NoZones. To open this location, click the "Define No Go Zones" button under Basic Settings.


Define No Go Zones

Let us take a more detailed look at the Basic and Advanced Settings related to Analysis.



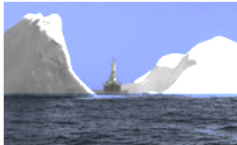

General Basic Advanced

Fixation Time  2.00 s ?


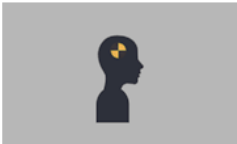

Radar Violation Interval  30 s ?

Dead Man Switch Delay  40 s ?

Automatic Object Detection

 Disabled  General  Ships and Icebergs  VISTA Diesel Engine

Head Orientation Calibration ?

 Head Up  Head Level  Head Down

Remember Last Project

Overwrite Old Exports


Ask for File Names before Exporting


Define No Go Zones

General Basic Advanced

Manual Mode

Detection Sensitivity Normal ?

Analysis Box Size  300 px ?

Head Orientation Sensitivity  20 deg/s ?

1) Fixation Time

This setting determines how long the user should look at an object to register it as an Area of Interest. The default value is 2 seconds of fixation time.

2) Radar Violation Interval

This setting defines the time interval EyePort needs to check to determine whether the participant has looked at radar at the correct intervals. The default value is 30 seconds.

3) Dead Man Switch Delay

This setting defines the time delay for activating the dead man switch when there is no head movement from the participant. The default value is 40 seconds.

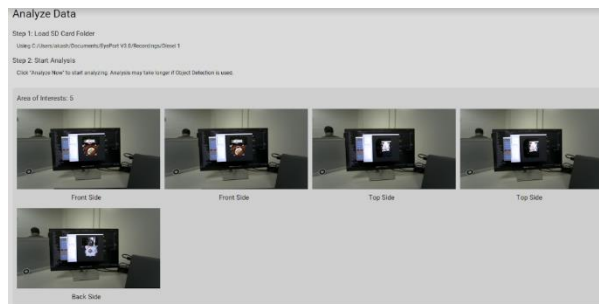
4) Automatic Object Detection

This setting allows you to configure the type of Object Detection to be used. If this feature is used, the analysis may take longer to complete. This is because every image frame will be analyzed for objects detection which is CPU intensive.

The General option configures EyePort to look for everyday objects (Cellphones, Laptops, Bottles, Cats, Dogs, People, etc.).

The Ships and Icebergs option configures EyePort to only look for ships and icebergs.

The VISTA Diesel Engine option configures EyePort to only detect the six sides of the VISTA Diesel Engine as illustrated below.



You can save time in the analysis by choosing Disabled. In that case, any identified Areas of Interest will be labelled with generic names (Object 1, Object 2, Object 3, and so on). The default option is General Objects.

**INFORMATION**

This section will be disabled on LITE version of EyePort. Since Version 3.2.2, EyePort comes with an additional resource pack to be installed separately. This will enable the Object Detection features of EyePort.

5) Head Orientation Calibration

This setting defines how the participant had started the recording. EyePort needs to know if the participant head was up/level/down. The default value is Head Level.

6) Remember Loaded Folder

This setting allows you to set whether EyePort should load the previously loaded folder again upon relaunch. If the folder is moved, renamed, or deleted when relaunching EyePort, you will be asked to load the files again. This setting is checked by default.

7) Manual Mode (Advanced)

If this feature is turned on, all Areas of Interest will be marked as Unique Objects. You can edit their names and determine which objects were unique manually. You can do this by labelling two objects with the same name. It is very useful if your record session data contains unrestrained movement. This setting is unchecked by default.

NOTE: You can enter names only once per analysis. If you need to rename them, click the Analyze button again.

8) Detection Sensitivity (Advanced)

This setting helps you adjust the sensitivity by which the Unique Areas of interest are identified. This is essentially a matching tolerance between various Areas of Interest which are compared using image colour and structural information. The default sensitivity is Normal.

Setting a **HIGH** sensitivity increases the matching tolerance. This will increase the number of Unique AOIs. However, this may falsely mark the same object as different objects.

Setting a **LOW** sensitivity decreases the tolerance circle radius. This will decrease the number of Unique AOIs. However, this may falsely mark different objects as the same.

9) Analysis Box Size (Advanced)

This setting helps you adjust the size of cropped images as seen in the detections folder. It works in conjunction with the detection sensitivity control but is more dominant and effective in terms of the results. Imagine a square box around the gaze point.

Setting a **HIGH** side length will increase the number of Unique AOIs. However, this may falsely mark the same object as different objects.

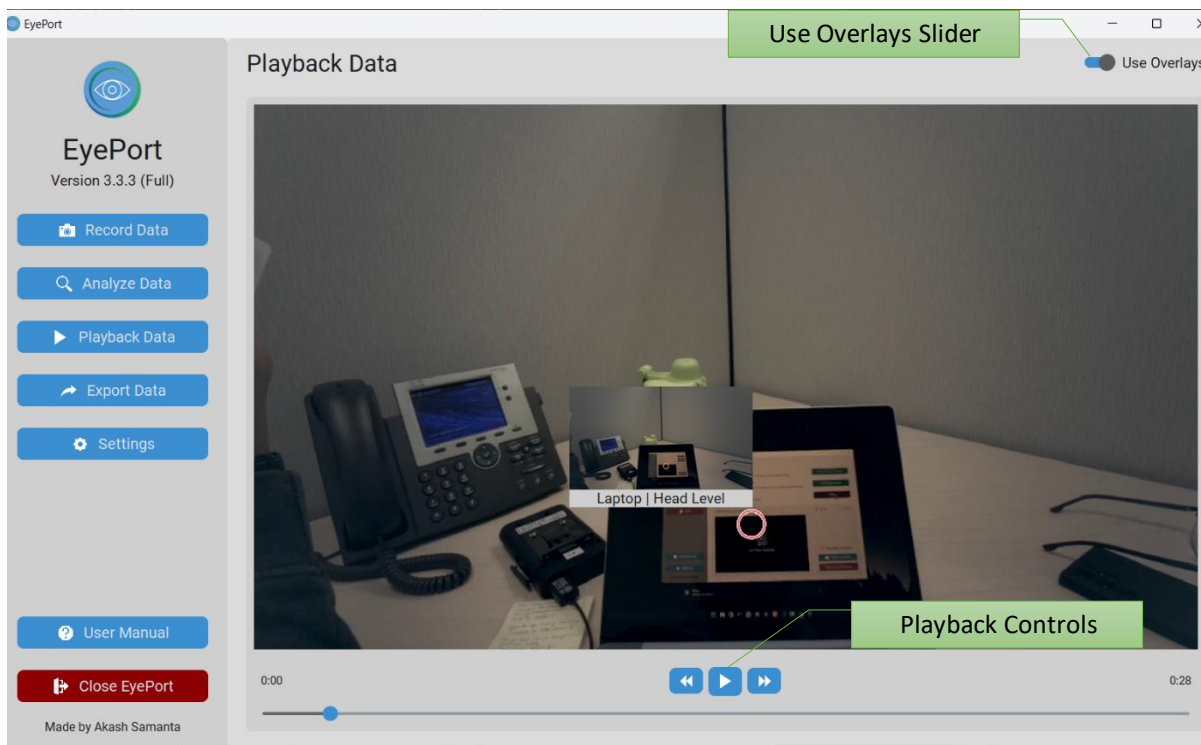
Setting a **LOW** side length radius will decrease the number of Unique AOIs. However, this may falsely mark different objects in close proximity as the same object.

10) Head Orientation Sensitivity (Advanced)

This setting defines the “jolt” during which the participant head movement should be captured to detect the head up/level/down state. The default value is 20 deg/s.

Playback Data

EyePort features an inbuilt player to show you what the user was looking at during a recording session. Here is the general layout of the player.



1) Use Overlays

This slider allows you to enable the overlays, as shown above. You may turn this off anytime.

2) Playback Controls

Use the playback controls to seek, play or pause the video.



INFORMATION

You can also use the spacebar to play/pause and the left/right arrow keys to seek the video.

Export Data

Once you are happy with your analyzed data, go to the export page. Here, you can export your data in the following formats. These formats are catered to aid DynaFRAM, a FRAM modelling software, and other general-purpose applications.

1) XLSX File

EyePort can generate an Excel File for general-purpose applications. This is the same table displayed under the Analyze Data Page.

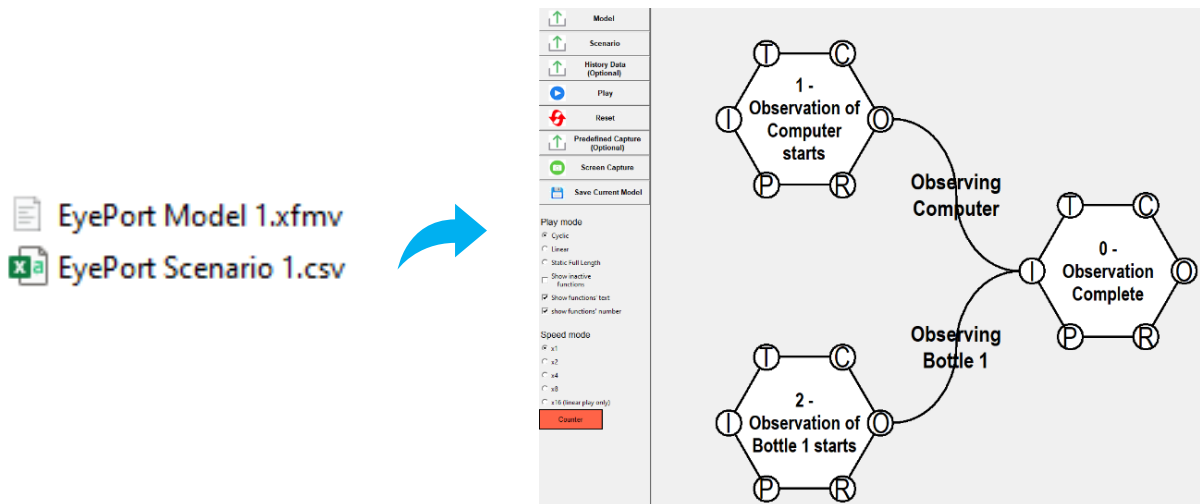
2) CSV File

This is the Scenario file for DynaFRAM, which contains data to help model files. You may open this file in Excel and cut and paste data according to your needs.

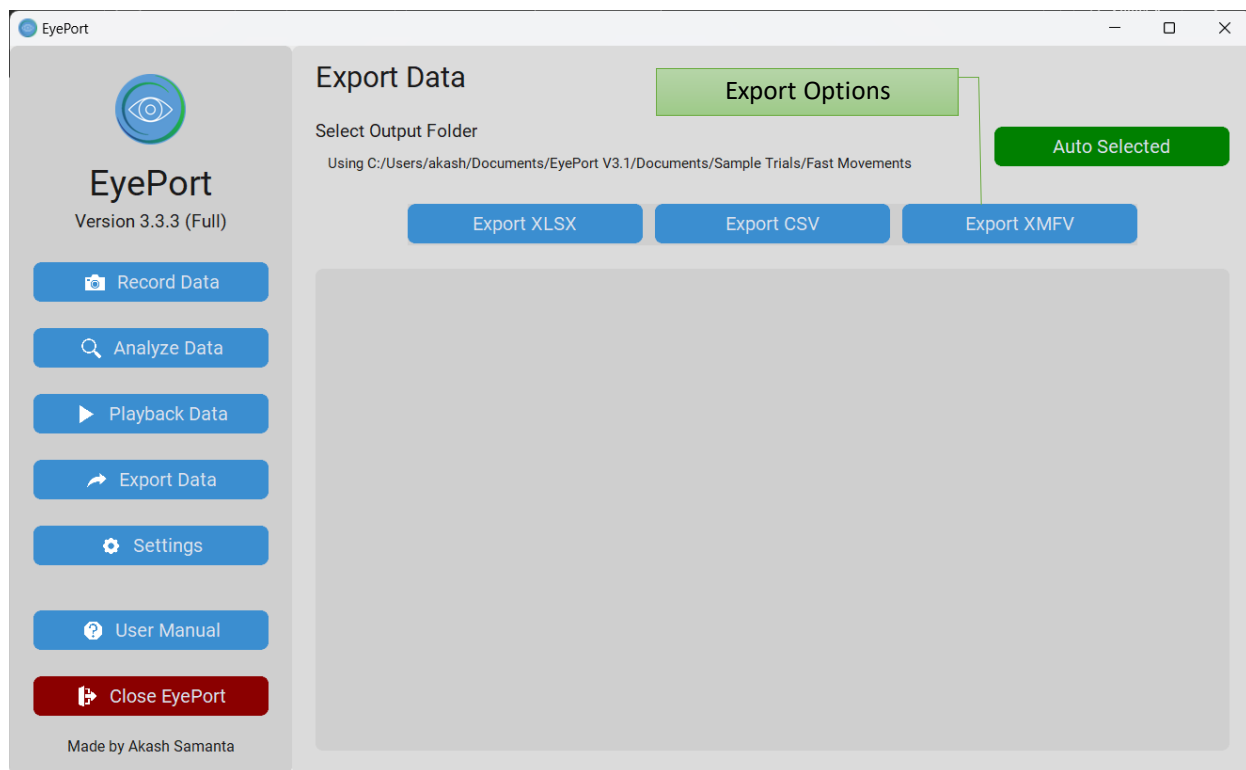
3) XFMV File

EyePort can also generate a partial model file for DynaFRAM to visualize. You can use this file with the scenario file to see your record session as a FRAM Model.

You may choose an export location folder to export your files. If you do not select one, EyePort will let you know where the files will be exported.



Here is an overview of the Export Page.



Successful Export:



If your export was successful, you can open Explorer and locate where the files were exported or open DynaFRAM using the buttons above. If DynaFRAM is not installed on your PC, EyePort will prompt you to download the installer from the website.

Failed Export:**Export Failed**

Show In Explorer

Open DynaFRAM

If your export was unsuccessful, this could be due to a Permission Error, as shown above. Some other applications, such as Excel, might be using files with the same name, and you have enabled Overwrite Old Exports in settings. In this case, EyePort does not have permission to overwrite the files. You could resolve this by closing any applications that might be using the files or unchecking Overwrite Old Exports to generate new files instead.

**ADVISORY**

If you get an error message that states an Unknown Error. Try exporting other files and see if the problem persists. If so, there might be a problem in the source code. Please contact the developer.

Let us take a more detailed look at the Export Settings.

Export Settings

- Overwrite Old Exports
- Ask for File Names before Exporting

1) Overwrite Old Exports

If this box is checked, older exported files will be over-written with newly exported files. This setting is unchecked by default.

**WARNING**

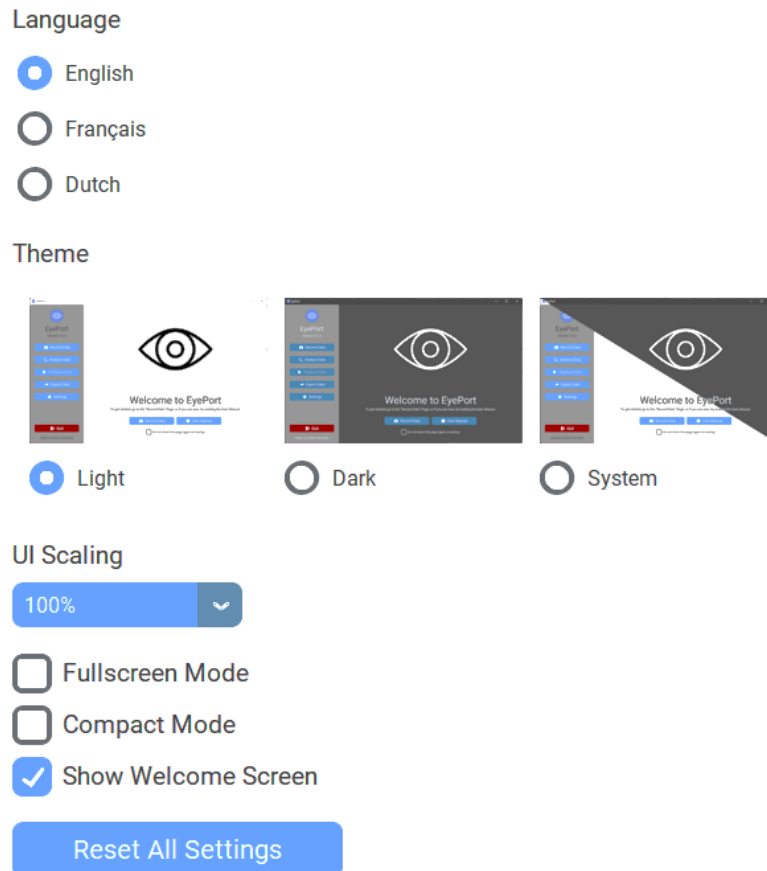
Once a file is over-written, it is impossible to recover them. If other applications are accessing files with same file names, then EyePort cannot overwrite the old exports files.

2) Ask for File Names before Exporting

This setting allows you to make EyePort prompt for file names before exporting. As long as you provide different file names to export, no files will be overwritten, regardless of the previous setting. This setting does not affect exporting images and is unchecked by default.

General Appearance

EyePort offers two settings for your preferences on the general appearance of the application. Since Version 3.1.2, EyePort is available in English, French, and Dutch. You can change the following settings:



1) Language

This setting allows you to change the application language. EyePort is available in English, French, and Dutch. Please note that some translations maybe incorrect in few places. The default language is English.

2) Theme

This setting allows you to show EyePort in light or dark mode. All UI elements will change to white (or lighter) or black (or darker), respectively. The default mode is Light mode.

3) UI Scaling

This setting allows you to scale all UI elements based on a certain percentage. EyePort will remember both your theme and UI scaling upon the next launch. The default scaling is 100%.

**ADVISORY**

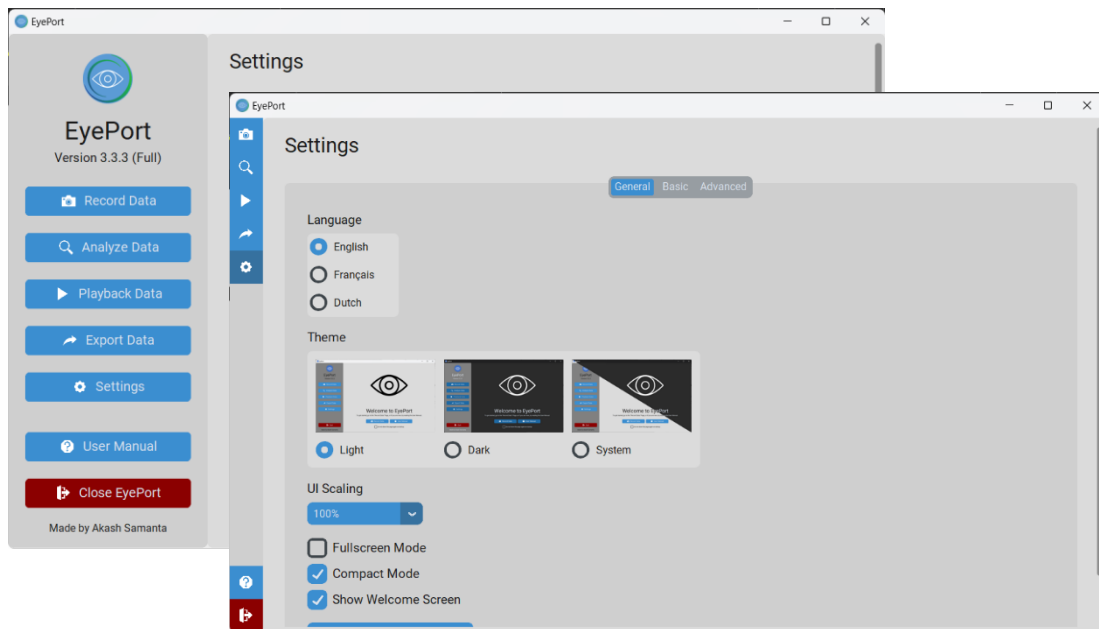
The System option matches your system theme. This option does not work on Linux. Setting a higher UI scale also raises the minimum screen resolution limit.

4) Fullscreen Mode

When enabled, EyePort will remember to start in Fullscreen mode so that you do not have to maximize the window every time. This setting is unchecked by default.

5) Compact Mode

When enabled, the side panel of EyePort is collapsed to smaller icons. This saves space on the interface allowing for more wider view of the page items. This setting is unchecked by default.

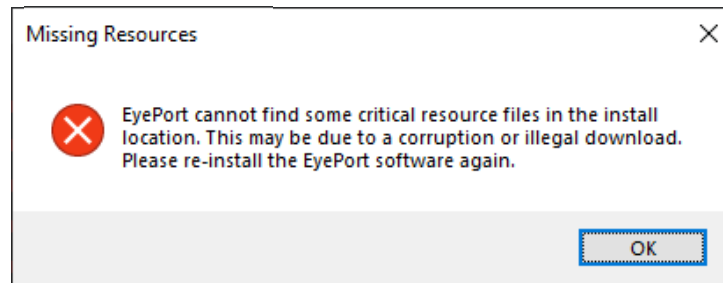
**6) Show Welcome Screen**

Setting to toggle visibility of the Welcome Screen of EyePort. This setting is checked by default.

Troubleshooting

This section helps resolve problems or errors (other than those covered earlier) you may encounter while using EyePort. For all of the issues listed below, follow the solutions provided. If these don't fix the issue, then there might be a problem in the source code. Contact the developer.

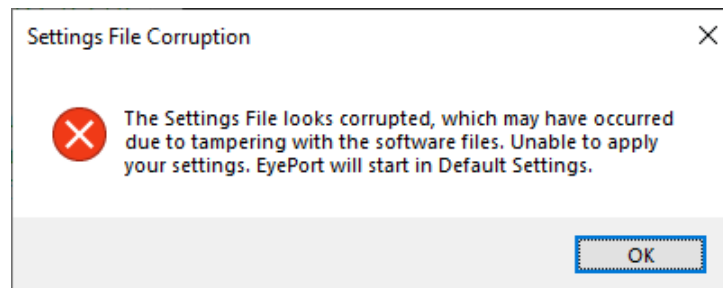
1) Missing Resources



Causes: Corruption of the Install Folder or Downloading EyePort from non-legitimate sources.

Solution: Please re-install the EyePort software again.

2) Settings File Corruption

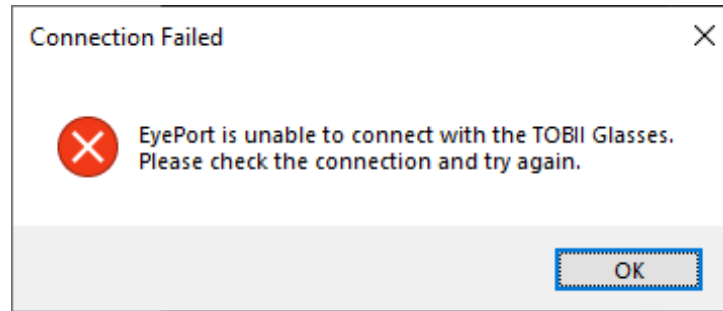


Causes: Corruption of the Install Folder or Tampering with the software files.

Solution:

EyePort will attempt to revert to the default settings. If this does not work, please re-install the EyePort software again.

3) Connection Failed

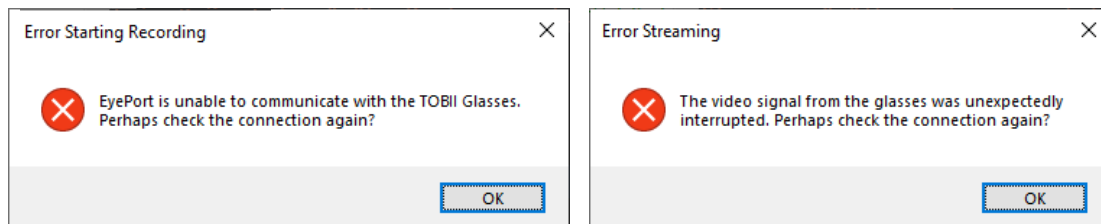


Causes: Clicking the Connect Button too many times or having a limited or no connection with the TOBII Glasses.

Solution:

Check if the connection is established and stable under Settings > Network & internet > Wi-Fi. It can help to restart your PC. Try updating your Wi-Fi drivers under Device Management. Set your Wi-Fi network as a non-metered connection.

4) Error Starting/Stopping Recording or Error Streaming

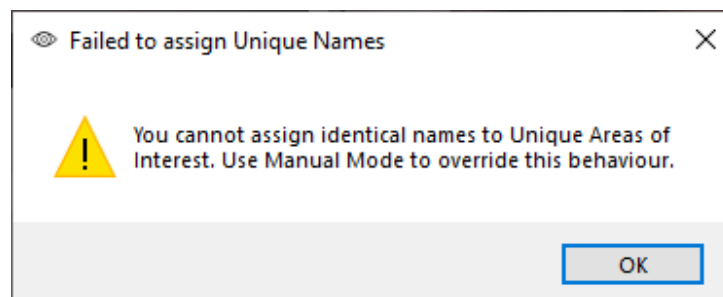


Causes: Having a limited or no connection with the TOBII Glasses.

Solution:

Check if the connection is established and stable under Settings > Network & internet > Wi-Fi. It can help to restart your PC. Try updating your Wi-Fi drivers under Device Management. Set your Wi-Fi network as a non-metered connection.

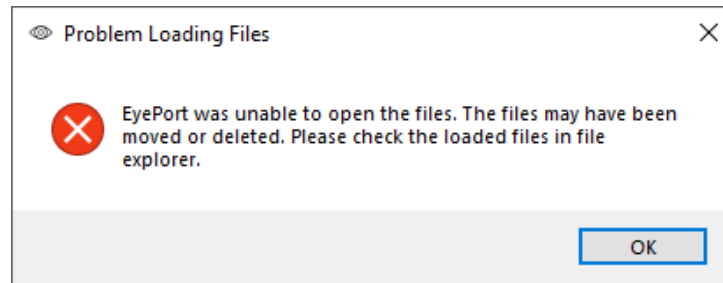
5) Failed to Assign Unique Names



Causes: Trying to assign the same name to Unique Areas of Interest in Automatic Mode

Solution: Please enter different names or enable **Manual Mode** in Settings.

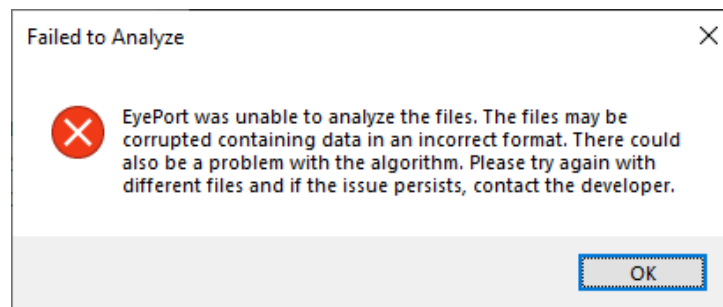
6) Problem Loading Files



Causes: Previously loaded files were moved, renamed, or deleted.

Solution: You will need to load new files.

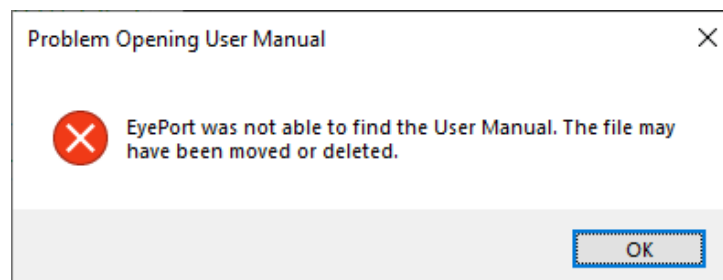
7) Failed to Analyze



Causes: Corruption of the loaded files or choosing files with an incorrect format. Problem with source code.

Solution: Try loading different files. If the issue persists, contact the developer.

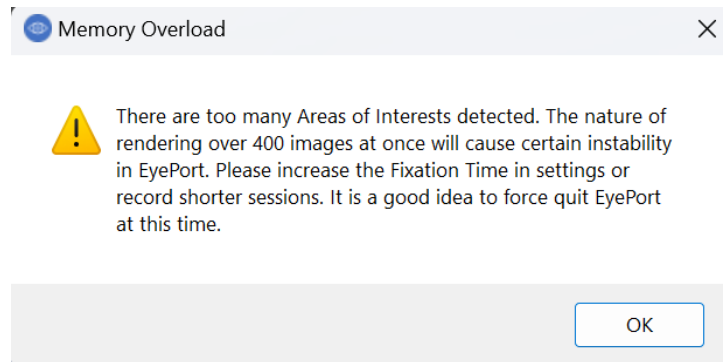
8) Problem Opening User Manual



Causes: Corruption of the Install Folder or Downloading EyePort from non-legitimate sources.

Solution: Please re-install the EyePort software again.

9) Memory Overload



Cause: Over 400 Areas of Interest. RAM Limitations of EyePort.

Solution: Increase Fixation Time or Record shorter sessions.