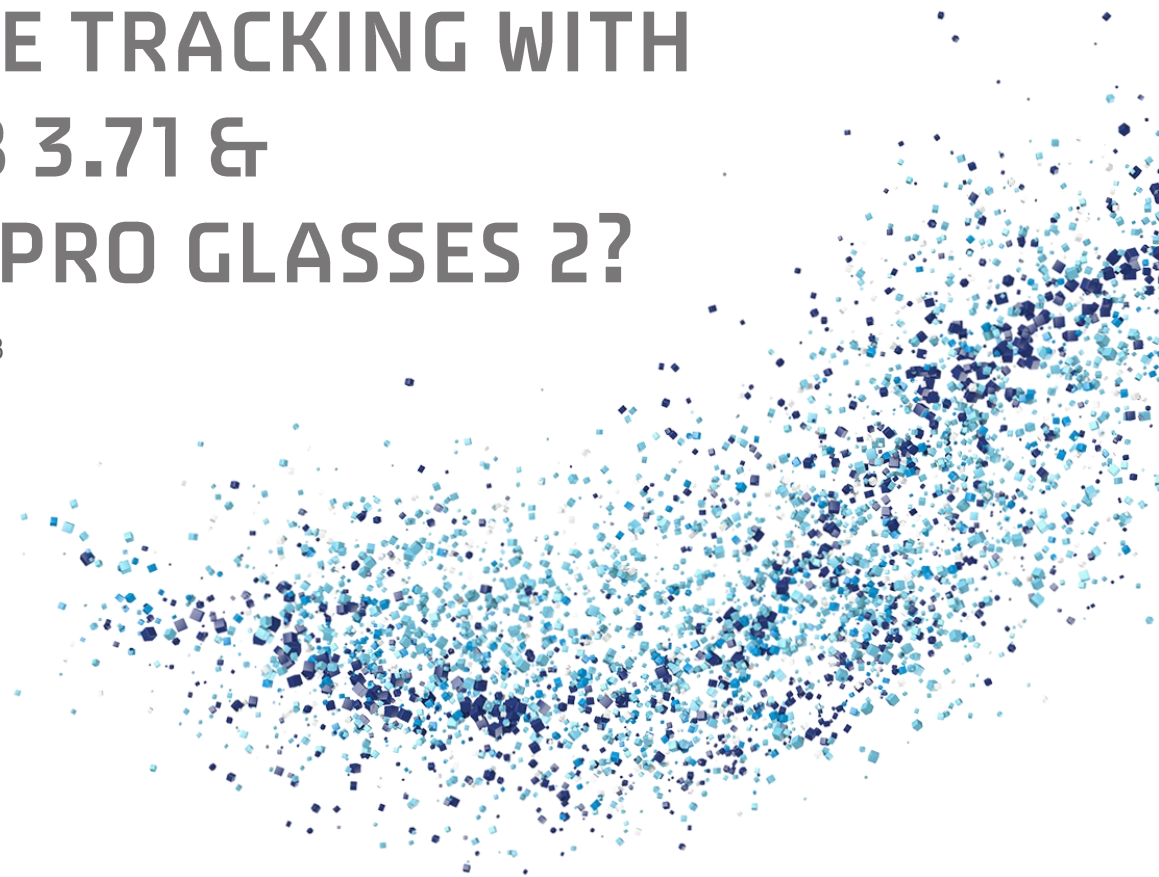


HOW TO...

**DO EYE TRACKING WITH
D-LAB 3.71 &
TOBII PRO GLASSES 2?**

Last Modified: 05.2023





CONTENTS

1.	Introduction	1
1.1.	Hardware & Software Requirements	1
1.2.	Related Manuals.....	1
1.3.	Get Help	1
1.4.	Installation & Update	1
2.	Prepare Study	2
3.	Record Eye-Tracking Data with Tobii Pro Glasses 2	3
3.1.	Connect Tobii Pro Glasses 2 to D-Lab 3.71 (PLAN MODE).....	3
3.2.	Record eye tracking data (MEASURE MODE).....	3
4.	Analyse Eye-Tracking Data with D-Lab 3.71 (ANALYSE MODE).....	4
4.1.	Import data from Tobii Recording Unit to D-Lab	4
4.2.	Automatic calculations of glance behaviour.....	5
4.3.	Visualize glance behaviour.....	5
5.	Export.....	6
6.	Troubleshooting Tobii Pro Glasses 2 in D-Lab 3.71.....	7
	Appendix A: Raw data from Tobii Pro Glasses 2.....	8

1. INTRODUCTION

With D-Lab 3.71, Tobii Pro Glasses 2 and Ergoneers Marker Technology, gaze behaviour can be calculated directly in the video of the scene camera.

1.1. Hardware & Software Requirements

D-Lab 3.71 or later with Eye Tracking Head Mounted license.

Computer according to Ergoneers [hardware specifications](#).

Tobii Pro Glasses 2, 50Hz or 100Hz from Tobii Pro.

1.2. Related Manuals

User manual for Tobii Pro Glasses 2 from Tobii Pro:

<https://go.tobii.com/Glasses2UM>

User's manual for D-Lab 3:

<https://ergoneers.com/faq-downloads/manuals/D-Lab-in-General/D-Lab-3.0-Manual.pdf>

Visual Quick Start Guide – Eye Tracking with D-Lab 3.71 & Tobii Pro Glasses 2:

https://ergoneers.com/faq-downloads/manuals/Tobii-Glasses-Pro-2/QSG_D-Lab-with-TobiiPro-Glasses-2_A4.pdf

1.3. Get Help

You can find answers to your questions as well as instructions and troubleshooting information on the Ergoneers FAQ site (<http://www.ergoneers.com/faq>) or by contacting our support team via email (support@ergoneers.com).

For issues regarding the Tobii Pro Glasses 2 or firmware updates, please refer to the [Tobii Pro Glasses 2 manual](#) or contact [Tobii Pro Support](#).

1.4. Installation & Update

Download the [latest D-Lab](#) version, double-click on the setup and follow the instructions on the screen.

Important: To enable Tobii Glasses 2 in D-Lab:

1. Go to the Resources folder within the D-Lab installation folder (default C:\Program Files\D-Lab\Resources).
2. Copy the file TobiiGlasses.txt to the Desktop.
3. Edit the copied file using Notepad – replace 0 with 1 and save the file.
4. Copy the saved file back to the Resources folder (step 1) and replace the existing file.

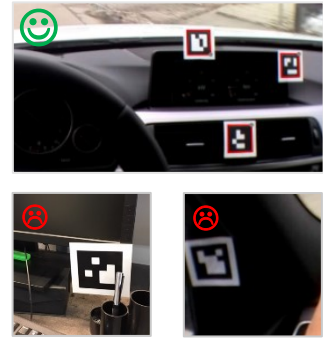
Updates and release notes are available on www.ergoneers.com/faq/. To update D-Lab, download the new setup and follow the instructions on the screen in the same way as during the first installation. It is recommended to backup existing D-Lab databases before updating to a new D-Lab Version. Find more information about backup D-Lab data on the Ergoneers FAQ page.

2. PREPARE STUDY

Arrange Markers

In order to automatically analyse the gaze behaviour of participants towards Areas of Interest (AOIs), markers need to be arranged in the scene. Markers are recognized by the software and can be used to define AOIs in the scene. The following rules apply to the usage of markers:

- Markers should be located about the same distance to the Eye-Tracker as the AOI that is linked to them
- One marker can be used to define one or more AOIs
- One or more markers can be used to define a single AOI
- When a marker is recognized in the scene-image, a red outline is displayed around it.



Markers can be used in different sizes, depending on the distance from the Eye Tracker.

Make sure that the markers are not kinked, partly hidden by objects, poorly illuminated or blurry because of reflections. It is recommended to do a test recording or check the marker detection live (online) before recording the actual experiment.

Define Tasks (Optional)

In the Task Definitions Window (Plan Mode) you can define Task-Triggers to mark events in the recording. These events can be triggered manually or automatically (via TCP/IP-commands) during the recording. There are two different kinds of Tasks:

Interval Tasks: Events that occur over a duration of time containing start and end times.

Single Tasks: Events that occur at a single moment within the recording containing only an event time.

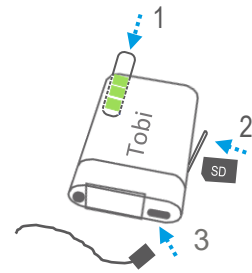
Please refer to the D-Lab Manual to learn more about Task Definitions.

3. RECORD EYE-TRACKING DATA WITH TOBII GLASSES 2

3.1. Connect Tobii Pro Glasses 2 to D-Lab 3.71 (PLAN MODE)

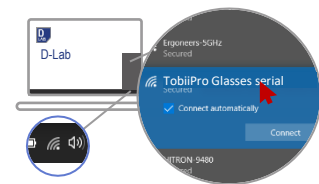
Prepare Tobii Pro Glasses 2 Recording Unit

- Insert a fully charged battery
- Insert the SD card
- Connect Tobii Pro Glasses 2 and Recording Unit with the HDMI cable
- Secure the cable in the clip



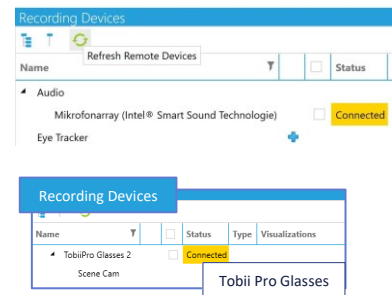
Connect laptop to Tobii Pro Glasses 2

- Press the power button on the Recording Unit
- Select "Tobii Pro Glasses 0xxxxxxx" in the laptop's WiFi settings
- Refer to Tobii Pro Glasses 2 Manual for Wifi Password



Start D-Lab and open a live view of the Tobii Pro Glasses 2

- Insert the license dongle into the computer and start D-Lab 3.71
- Create a new study
- From the Recording Devices window,
 - To find the Tobii Glasses on the network, click the "Refresh Remote Devices" button. The system will then search for Tobii Glasses on the network for 10 seconds.
 - Click the visualization button under "Tobii Pro Glasses" next to "Scene Cam"




3.2. Record eye tracking data (MEASURE MODE)

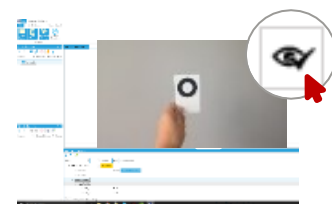
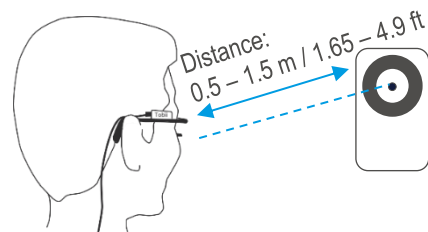
Create a subject

- Subjects can be created in the Study Explorer window.
- Recording cannot start until a Subject (Participant) has been created.

Calibrate Tobii Pro Glasses 2

It is necessary to calibrate the Eye tracker for each subject before recording data. This ensures that the gaze circle in the video matches the real gaze point of the subject. In order to calibrate the Eye Tracker:

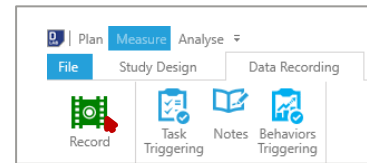
- Make sure the Participant wears the Eye Tracker.
- Switch to Measure mode and open the Tobii Pro Glasses visualization, if not already open.
- Hold the Tobii Calibration Card at about arm's length in front of the Participant (distance 0.5-1.5 m / 1.65-4.9 ft).
- While the subject fixates at the centre point of the calibration card, press the calibration button  in the Eye-Tracker visualization (top right corner).
- Wait until the confirmation window pops up to confirm if the calibration was successful.



Start recording

To start a recording:

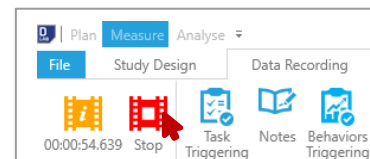
- Select a subject
- Activate the recording checkbox of each sensor you wish to record (in the Recording Devices window)
- Make sure the Tobii Glasses is checked for recording and click the green record button at the top left corner of the Data Recording tab.
- The pop-up window showing recording status can be closed or moved if necessary.



Stop recording

Recordings can only be stopped when the laptop is connected to the Tobii WiFi and live view can be displayed in D-Lab. (See note no.3).

Either click the Stop button in the pop-up window, or the Stop button at the top left corner of the Data Recording tab.



Features during recording

- **Trigger Tasks** (optional)
Open the Task Triggering window and click on one of the tasks to set the start trigger and click again when the task is completed to set the end trigger.
- **Take notes**
With the Notes function you can take notes during the experiment. The notes will get a timestamp as soon as the first letter is entered. Notes can later be adjusted to the correct time in the recording.
- **Free Movement**
The subject can move around freely and leave the WiFi range if needed. The live view of the scene camera will freeze when leaving the transmission range, but eye tracking data is stored on the Tobii Recording Unit directly. (See note no.3)

4. ANALYSE EYE TRACKING DATA WITH D-LAB 3.71 (ANALYSE MODE)

The Analyse mode is designed to visualize recorded data and calculate metrics for the glance behaviour towards Areas of Interest (AOIs). Metrics can be calculated based on the experimental design (Participants, Tasks, Entire Recording) and exported for further statistical analysis. All raw data of the experiment (e.g. x, y coordinates of the eye) is also available and can be reviewed directly in D-Lab or exported for further analysis.

Recorded Tobii data is stored directly on the Tobii Recording Unit and has to be imported in D-Lab before analysis can be started.

4.1. Import data from Tobii Recording Unit to D-Lab


Switch to Analysis Mode

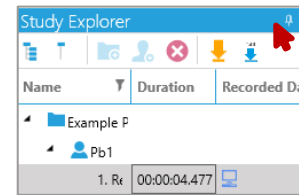
- Click on the tab "Analyse" in the top left corner of the D-Lab Window.

Remove SD card

- Press & hold the power button of the Recording Unit for 10s to turn it off (wait until light goes off).
- Remove the SD Card and insert it to the D-Lab laptop.

Download Tobii data in Study Explorer


- Click on the blue download arrow 
- Browse to the SD card and choose the file project.ttpg.
- Click Import
- Select one or more recordings and click Import again. (See note no.5)

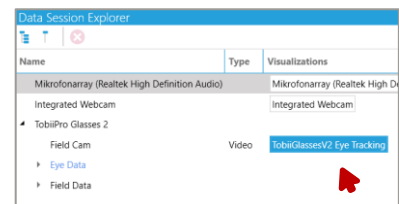


4.2. Automatic calculations of glance behaviour

With D-Lab and its Marker technology, Glances towards Areas of Interest can be calculated very easily and quickly, directly from the video.

AOI Definition


- Open an eye tracker visualization.
- Open the Tobii Pro Glasses 2 visualization via the Data Session Explorer.
- Click on the -Symbol of the Eye-Tracker Visualization to open the AOI Definition Options
- Define AOI as described in the D-Lab Manual



Calculate Glance towards defined AOIs

- Open the AOI Management Window (Data Analysis tab)
- Press "Calculate Glances".
- It is recommended to use the three filters "Eliminate Blinks", "Fill Gaps" and "Eliminate Fly Throughs" to get valid eye tracking data (for further information about the filters, please see D-Lab Manual).

Calculate Eye Tracking Statistics

- Open the Eye Tracking Statistics Window (Data Analysis Tab)
- From left to right select subjects, time period (tasks) and AOI for the calculation of the glance behaviour.
- Select the metrics you want to calculate from the right column. Click on  to get a short explanation of each metric.
- For further information about the calculation of the glance behaviour, please refer to the D-Lab Manual.

4.3. Visualize glance behaviour

D-Lab enables you not only to calculate glance behaviour metrics, but it also allows you to visualize the gaze behaviour as Heat-Map, Shadow-Map, Gaze-Path and Bee-Swarm.

- Open a Glance Visualization Window (Analyse-Mode → Screen Layout Tab) and drag & drop the Tobii Glasses 2 Eye Tracker to the empty visualization.
- Select the desired visualization method by checking the appropriate box on the right side of the window.
- Use the arrow on the top right corner to open the settings of the visualization method.
- Find more details about glance visualizations in the D-Lab Manual.

5. EXPORT

D-Lab provides different Export options.

Export entire study

It is possible to export the whole Study / Project in compressed format. This can be useful to backup data or to send data from one computer to another.

Go to “File → Export → Entire Study”, then select a Study, choose a location to save the file and click “Export”

Export raw data and glance calculations

In addition it is possible to export the raw data of all recorded sensors.

Go to “File → Export → Data”. All recorded raw gaze and pupil data will be available as well as the scene video with the gaze circle and glances toward AOIs. Data is exported as csv-file.

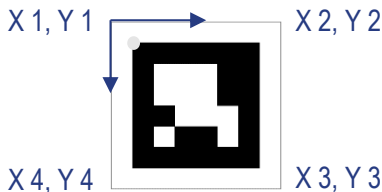
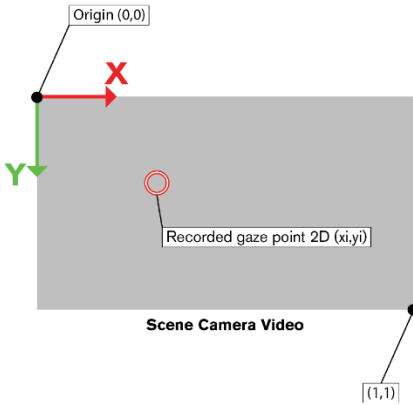
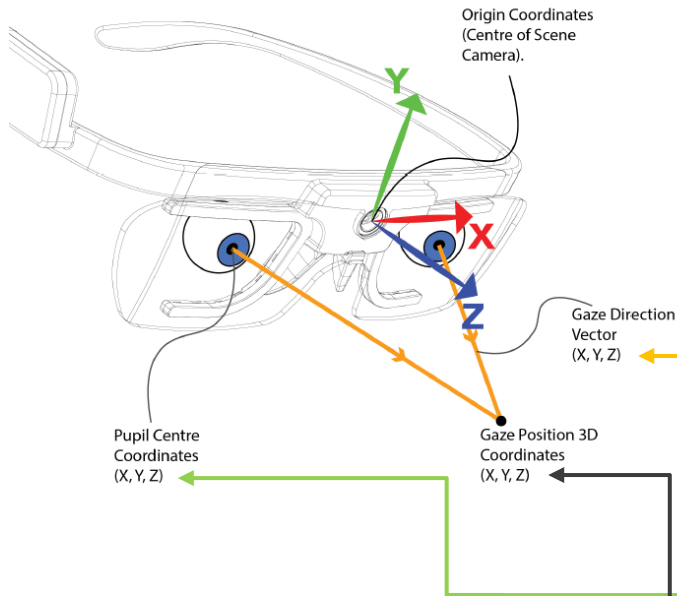
6. TROUBLE SHOOTING FOR TOBII GLASSES 2 IN D-LAB 3.71

Please refer to the D-Lab release notes on the Ergoneers FAQ page. They include information on bug fixes from past releases and known bugs with the current version. Additionally, we provide workarounds to troubleshoot unexpected behaviours.

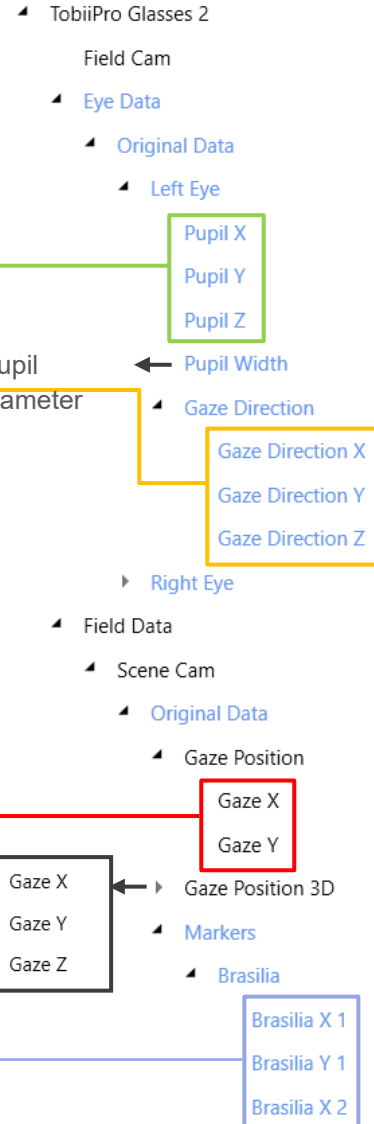
No.	Issue	Comment
1	Tobii Glasses are not detected in the Recording Devices window	<p>Make sure Tobii Glasses 2 are enabled in D-Lab:</p> <ol style="list-style-type: none"> 1. Close D-Lab 2. Go to the Resources folder within the D-Lab installation folder (default C:\Program Files\D-Lab\Resources). 3. Copy the file TobiiGlasses.txt to the Desktop. 4. Edit the copied file using Notepad – replace 0 with 1 and save the file. 5. Copy the saved file back to the Resources folder (step 1) and replace the existing file. 6. Launch D-Lab and click the “Refresh Remote Devices” button within Recording Devices.
2	Tobii visualization got stuck in initializing screen or in a black screen	Close the Tobii visualization and open again. In case this does not solve the problem, close D-Lab, turn off and on Windows WLAN connections and relaunch D-Lab.
3	Calibration not possible (button greyed out)	Insert SD Card in Recording Unit and restart Recording unit and D-Lab
4	D-Lab freezes and loses the recording status, when the Recording unit gets out of WiFi-Range. D-Lab & Tobii seem to not reconnect when Recording unit is back in WiFi range.	<p>Eye Tracking data will still be recorded correctly on the SD card. Only the live stream of the Eye Tracker is not available anymore as long as the Recording Unit is out of WiFi Range. D-Lab and Tobii Pro Glasses 2 will reconnect automatically when the Eye-Tracker WiFi is available again, and D-Lab will get out of the “frozen” state.</p> <p>The Tobii-Glasses will still be shown as “Connected” instead of “Recording” in D-Lab, although the connection is re-established.</p> <p>In case the live-Stream is not shown automatically, close and reopen the Tobii-Visualization.</p> <p>It is possible to stop the recording like usual and import data from the SD card.</p>
5	D-lab crashes when I Recording Unit is turned off.	First switch to Analyse Mode before turning off the Recording Unit. Remove the SD card only if the Recording Unit is turned off.
6	Import of Eye Tracking data to D-Lab takes long	The import takes approximately as long as the recorded time. Please do NOT abort the import.

APPENDIX A: RAW DATA FROM TOBII PRO GLASSES 2

Gaze direction coordinate system by Tobii Pro



Raw Data in Data Session Explorer



ERGONEERS GROUP
 GEWERBERING 16
 82544 EGLING
 GERMANY
 T +49.8171.21624-0
 F +49.8171.21624-11
 INFO@ERGONEERS.COM
 WWW.ERGONEERS.COM

ERGONEERS OF NORTH AMERICA, INC.
 111 SW 5TH AVE
 SUITE 3150
 PORTLAND, OR 97204, USA
 T +1.503.444.3430
 INFO@ERGONEERS.COM
 WWW.ERGONEERS.COM