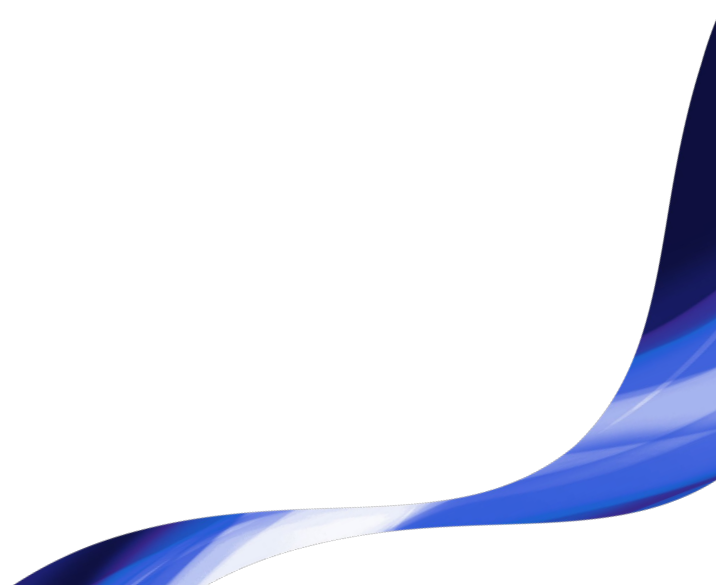




# Tobii Pro Spark

User Manual

November 2022





## Tobii Pro Spark User Manual

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November 2022  
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## 1 Introduction



*Figure 1. Tobii Pro Spark.*

Tobii Pro Spark is a compact, high-performance data collection solution that you can take into the field. Use Tobii Pro Spark when your research takes you to locations and to subjects that would otherwise be hard to bring to the lab. You can collect data in classrooms, hospitals, libraries, and other locations where your subjects are easier to recruit.

With sampling frequencies of up to 60 Hz, one eye tracking camera, and two pupil tracking modes (bright and dark pupil), Tobii Pro Spark enables you to adapt your data collection setup to different research populations and scenarios.

Use Tobii Pro Spark for studies on:

- Windows, macOS, and Linux laptop and desktop computers
- 27" (16:9) monitors, or smaller
- Real-world setups such as physical objects and social interactions (using the Tripod Stand)
- Projections, simulators, and larger screens (using the Tripod Stand)

Tobii Pro Spark is primarily designed for use in indoor office environments with adult participants.

### 1.1 Symbols used in this document



The Information symbol means something is important or needs special attention.



The Tip symbol denotes additional information that can make a process or function easier.



The Warning symbol means there is a possible risk of harm if the warning is ignored.

### 1.2 Tobii Pro Eye Tracker Manager

Tobii Pro Eye Tracker Manager is free software available on [Tobii Connect](#).



Tobii Pro Eye Tracker Manager helps you manage your screen-based Tobii eye tracker. It lets you see which eye tracker firmware and software versions you are running and facilitates updates (where applicable). It provides:

- Drivers and Firmware installation or updates
- Display setup
- Positioning guide
- User calibration
- Gaze visualization<sup>1</sup>



References in product documentation to Tobii Pro Eye Tracker Manager refer to the latest version available on [Tobii Connect](#).

<sup>1</sup>Gaze visualization in Tobii Pro Eye Tracker Manager lets you quickly evaluate the quality of the eye tracking data. The gaze visualization overlaps data only on the Tobii Pro Eye Tracker Manager screen while Tobii Pro Eye Tracker Manager is open.



## 2 System requirements

### 2.1 Tobii Pro Spark system requirements

|                          |   |
|--------------------------|---|
| <b>Operating system:</b> | Windows 10, Windows 11<br>macOS 10.15 Catalina and 12 Monterey<br>Linux Ubuntu 20.04  |
| <b>CPU:</b>              | 1 GHz, 2 cores  |
| <b>RAM:</b>              | 2 GB RAM memory*<br>*Software for eye tracking research may require higher RAM  |
| <b>Port:</b>             | USB port** Type-A or USB Type-C (with included adaptor)<br>**The average power consumption during usage is 2.0W, but the eye trackers power consumption can peak up to 5-6W depending on the use case. For example, when the illuminators first turn on, the consumption can briefly spike (a matter of milliseconds) at around 5-6W. The Tobii Pro Spark officially works with USB 2.0 BC1.2 which can handle spikes up to 7.5W. |

### 2.2 Additional software options

|  |  |
|--|--|
| Tobii Pro Lab<br><a href="https://www.tobii.com/products/software/data-analysis-tools/tobii-pro-lab">https://www.tobii.com/products/software/data-analysis-tools/tobii-pro-lab</a>   | Tobii Pro Lab is a comprehensive research software platform for eye tracking designed to meet the highest demands on different research scenarios with exact timing accuracy. This software offers an efficient workflow, making it easy to design experiments, record data, analyze and visualize eye tracking data, and to sync this data with other biometric data streams. |
| Tobii Pro SDK<br><a href="https://www.tobii.com/products/software/applications-and-developer-kits/tobii-pro-sdk/tobii-pro-sdk">https://www.tobii.com/products/software/applications-and-developer-kits/tobii-pro-sdk/tobii-pro-sdk</a> | Tobii Pro SDK offers a broad set of tools that makes it simple to develop a variety of niche applications or scripts across multiple platforms, using a wide range of programming languages. This SDK gives the researcher access to the full set of relevant gaze data streams, such as 3D eye coordinates, raw data, pupil data, etc.  |
| Third-party software   | This term refers to any application built on Pro SDK.  |

## 3 Safety Declaration

### 3.1 Mounting Warning



Tobii Pro Spark should be mounted according to Tobii's instructions for approved mounts.

The mounting bracket is designed to stick to a variety of displays, such as monitors and laptop screens. It is also designed to be removed cleanly. Failure to follow the recommended removal instructions can result in damage to both the monitor/laptop and the mounting bracket. Do not mount the eye tracker on monitors placed above the user, as it might fall.

### 3.2 Emergency Warning



This eye tracker is designed to be used for research purposes only. Due to the low, but possible risk of failure or distraction, the eye tracker should not be relied upon or used in dangerous or critical situations.

### 3.3 Epilepsy Warning



Some people with photosensitive epilepsy are susceptible to epileptic seizures or loss of consciousness when exposed to certain flashing lights or light patterns. This can happen even if the person has no medical history of epilepsy or has never had any epileptic seizures.

A person with photosensitive epilepsy is likely to experience similar problems with TV screens, certain arcade games, and flickering fluorescent bulbs. Such people may have a seizure while watching certain images or patterns on a monitor, or even when exposed to the light sources of an eye tracker. It is estimated that about 3-5% of people with epilepsy have this type of photosensitive epilepsy. Many people with photosensitive epilepsy experience an "aura" or feel odd sensations before the seizure occurs. If you feel odd during use, move your eyes away from the eye tracker.

### 3.4 Infrared Warning



When activated, the eye tracker emits pulsed infrared (IR) light. Certain medical devices are susceptible to disturbance by IR light and/or radiation. Do not use the eye tracker in the vicinity of such medical devices, as their accuracy or proper functionality could be inhibited. Do not stare into the LED lights at a close distance (<15cm).



## 3.5 Magnetic Field Warning



This eye tracker contains magnets. Magnetic fields may interfere with the function of cardiac pacemakers and implantable cardioverter defibrillators. Maintain a minimum distance of 6 inches (15 cm) between the eye tracker and your heart device.

## 3.6 Child Safety



An eye tracker is an advanced computer system and electronic device. As such, it is composed of numerous separate, assembled parts. In the hands of a child, some of these parts can become separated from the device, presenting a potential choking hazard or other danger to the child.

Young children should not have access to, nor use of the device or its accessories without parental or guardian supervision.

## 3.7 Electricity



Do not open the casing of the eye tracker, as doing so could expose you to potentially hazardous electrical voltage. The device contains no user-serviceable parts. Non-compliance will result in loss of warranty! Contact Tobii Customer Care if your eye tracker is not working properly.

## 3.8 Environment



This eye tracker is designed for use in dry indoor environments. Avoid any exposure to direct sunlight as this will affect eye tracking quality and longer exposure can overheat the equipment. Avoid exposure to any liquids, gels, moisture, rain, sweat or other damp materials and environments. Do not use the eye tracker near water – the device is not water resistant. Keep the eye tracker in a clean and dust free environment. When using the equipment take adequate precautions against dust and dirt. Do not place or use the equipment in places that are subject to extreme temperatures and humidity, such as on top of and or near a heating element, in a hot or damp room, or in a hot automobile.

## 3.9 Electricity



Only use accessories provided by or approved by Tobii AB.

## 3.10 Third party



Use of a Tobii eye tracker beyond its intended use or together with third-party software or hardware that changes the intended use is a risk. Tobii AB does not take any responsibility for the consequences of such use.

## 4 Compliance Declaration

### 4.1 EU Compliance

#### CE Statement

**CE** Tobii Pro Spark is CE-marked, certifying compliance with the essential requirements for health, safety, and environmental protection requirements for the European Single Market. Tobii Pro Spark complies with the following directives:

- 2014/30/EU (EMC) - Electromagnetic Compatibility Directive.
- 2011/65/EU (RoHS) and (EU)2015/863 - Restriction of Hazardous Substances Directive.

#### Other EU Directives and Regulations

Tobii AB and Tobii Pro Spark comply with the essential requirements of the following EU directives and regulations:

- 2012/19/EU (WEEE) - Waste Electrical and Electronic Equipment Directive.
- 1907/2006 EC (REACH) - Registration, Evaluation, Authorization and Restriction of Chemicals.

Furthermore, Tobii AB complies with applicable parts of the Directive 94/62/EC on packaging and packaging waste.

#### Manufacturer Contact Information

Tobii AB  
Karlsrovägen 2D  
S-182 53 Danderyd, Sweden

### 4.2 UKCA Compliance

**UK** Tobii Pro Spark is UKCA-marked, certifying compliance with the essential requirements for health, safety, and environmental protection requirements for the GB market. Tobii Pro Spark complies with the following Statutory Instruments:

- The Electromagnetic Compatibility Regulations 2016. UK Statutory Instruments 2016 No. 1091.
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012. UK Statutory Instruments 2012 No. 3032.

#### Other UK Legislation

Tobii AB and Tobii Pro Spark comply with the essential requirements of the UK regulations regarding WEEE, REACH, packaging, and packaging waste.



## UK Importer Contact Information

Tobii UK Limited  
1st Floor, Advantage House, 87 Castle Street  
RG1 7SN Reading, United Kingdom

### 4.3 FCC Interference Statement

Tobii Pro Spark has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. Tobii Pro Spark generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If Tobii Pro Spark does cause harmful interference to radio or television reception, which can be determined by turning Tobii Pro Spark off and on, the user is encouraged to try to correct the interference using one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between Tobii Pro Spark and the receiver.
- Connect Tobii Pro Spark into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications not expressly approved by Tobii AB could void the user's authority to operate Tobii Pro Spark under FCC rules.


## U.S. Responsible Party Contact Information

Tobii Technology, Inc.  
12007 Sunrise Valley Dr # 400, Reston  
VA 20191, USA

### 4.4 ISED Statement

This Class B digital apparatus complies with Canadian ICES-003.  
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

### 4.5 Australia and New Zealand Compliance

-  Tobii Pro Spark is registered in the Australian National Equipment Registration System.

Tobii Pro Spark is RCM-marked which signifies compliance with the Australian and New Zealand product safety requirement for electrical and electronic equipment according to EESS and radio communication and electromagnetic compatibility according to ACMA.

## 4.6 Japan Compliance

Tobii Pro Spark is VCCI-marked which signifies Tobii Pro Spark is compliant with emission (interference) standards in Japan.



この装置は、クラスB機器です。この装置は、住宅環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

VCCI - B

## 4.7 Korea Compliance



Tobii Pro Spark is KC-marked which signifies compliance with Korea's product safety requirements for electrical and electronic equipment.

Certificate number:

R-R-TBI-ET5

## 4.8 Safety Compliance

Tobii Pro Spark complies with the following standards:

- EN IEC 62471:2008, Photobiological safety of lamps and lamp systems.
- EN 62368-1:2014 +A11, Audio/video, information and communication technology equipment - Part 1: Safety requirements.
- IEC 62368-1:2014, Audio/video, information and communication technology equipment - Part 1: Safety requirements.

Including national deviations for Australia, New Zealand, United States, Canada and Japan.

- GB 4943.1-2011, Information technology equipment -Safety - Part 1: General requirements.

## 4.9 EMC Compliance

Tobii Pro Spark complies with the following standards:

- EN 55032:2015/A11, Electromagnetic compatibility of multimedia equipment - Emission requirements.
- EN 55035:2017/A11, Electromagnetic compatibility of multimedia equipment - Immunity requirements.
- FCC 47 CFR Part 15, Subpart B, Class B.
- ICES-003 Issue 7 Class B, Information Technology Equipment (including Digital Apparatus).
- CISPR32:2015, Electromagnetic compatibility of multimedia equipment - Emission requirements (International standard accepted in AS/NZS and Japan).
- KN32, Electromagnetic interference prevention test for multimedia equipment.
- KN35, Electromagnetic wave immunity test for multimedia devices.

## 4.10 RoHS Compliance

RoHS compliance for Tobii Pro Spark is achieved by following the standard:

- EN IEC 63000:2018, Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

## 4.11 Waste Disposal and Recycling

Tobii AB is committed to reducing the environmental impact of our products throughout their lifecycle, from manufacturing to use and disposal. We are a member of various compliance schemes for collection, recycling, and re-using of electronic waste, batteries, and packaging of our products.



Tobii Pro Spark is marked with the crossed-out wheeled bin symbol, which indicates that it must not be disposed of with household waste. You can return your used Tobii Pro Spark to one of the municipality's recycling centers free of charge.

For more information about the WEEE directive and recycling at Tobii, please visit:

[How we run our business](#)

or



## 5 Overview of Tobii Pro Spark

Tobii Pro Spark is the next generation of compact high-performance eye trackers from Tobii AB. It provides a flexible solution that supports different research scenarios and study designs.

Tobii Pro Spark has a slim design that integrates well with external monitors up to 27 inches and laptop screens. The eye tracker can also be mounted on a tripod and coupled with a scene camera so it can be used in study setups that use real-world stimuli such as physical objects or scenes.

Use Tobii Pro Spark for studies on:

- Laptop and desktop computers
- PC monitors, 27" (16:9) or less
- Real-world setups such as physical objects and social interactions (using the Tripod Stand)
- Larger screens, projections, simulators (using the Tripod Stand, available separately)

### 5.1 Tobii Pro Spark versions

Tobii Pro Spark is available in only one product version: 60 Hz.

### 5.2 How Tobii Pro Spark works

During tracking, Tobii eye trackers use infrared illuminators to generate reflection patterns on the corneas of the participant's eyes. These reflection patterns, together with other visual data about the participant, are collected by image sensors. Sophisticated image processing algorithms identify relevant features, including the eyes and the corneal reflection patterns.

Tobii Pro Spark is a mono camera system that cycles between dark and bright pupil tracking. Complex mathematics is used to calculate the 3D position of each eyeball along with the gaze point (where the participant is looking).

## 5.3 What is in the Pro Spark box



Figure 2. Tobii Pro Spark box and included items.

| # | Item   | Additional information  |
|---|--|---|
| 1 | Travel case  | Stores, protects, and carries Tobii Pro Spark eye tracker and the included accessories      |
| 2 | Tobii Pro Spark eye tracker                        | Used for eye tracking   |
| 3 | Flex mount   | Tobii eye tracker mounting kit for curved monitors or monitors that have very slim bezels   |
| 4 | USB Type-C male to Type-A female adapter plug      | Used when the computer has a USB Type-C port  |
| 5 | Cleaning cloth                                     | For cleaning the surface of the eye tracker   |
| 6 | Four mounting brackets with non-permanent adhesive | Attaches Tobii Pro Spark to the screen bezel  |
| 7 | USB extension cable                                | USB 2.0 Type-A extension cable (1m)   |
|   | Two cleaning wipes                                 | Removes any dust and grease in the area around the screen before attaching a mounting plate |
|   | Safety and Compliance Declaration                  | Printed versions of important regulatory information  |

## 5.4 How to use the USB Type-C male to Type-A female adapter

Tobii Pro Spark is connected to a computer via a standard USB Type-A interface.

If your computer has a USB Type-C interface, you can use the included USB Type-C male to Type-A female adapter.



*Figure 3. Tobii Pro Spark cable and adapter.*

## 5.5 Tobii accessories

Find out more about Tobii products and accessories on the [Tobii product page](#).



## 6 Set up your Tobii eye tracker

At the end of this setup, you will have a verified installation that is ready for use.

### 6.1 Download and install Tobii Pro Eye Tracker Manager

The first step is to get the free software, Tobii Pro Eye Tracker Manager on your computer. Setting up your eye tracker involves installing the necessary drivers and software on your computer. [Tobii Pro Eye Tracker Manager](#) makes this easy.



Your eye tracker does not need to be connected to the computer to install Tobii Pro Eye Tracker Manager.

1. Before starting, double-check the hardware and [system requirements](#). You should also check the requirements for your analysis software, for example, Tobii Pro Lab.
2. Download Tobii Pro Eye Tracker Manager on [Tobii Connect](#).
3. Open Tobii Pro Eye Tracker Manager and follow the prompts to finish installation.

### 6.2 Install Tobii Pro Spark in Tobii Pro Eye Tracker Manager

Now it's time to make sure your computer can communicate with your eye tracker. This is necessary for downloading the proper driver updates.

1. Open Tobii Pro Eye Tracker Manager if it is not already open.
2. Connect Tobii Pro Spark's USB cable to a Type-A port in your computer or use the provided adaptor to connect to a Type-C port. Do not mount the eye tracker just yet to plug in the USB so you can make sure everything is working.
3. If your Tobii Pro Spark is connected to the USB port but does not appear in the list of connected eye trackers, select the plus (+) symbol in the upper right corner to install (or reinstall in some cases) the required drivers. Sometimes removing the USB and plugging it in again is necessary.
4. Select **Tobii Pro Spark** and select **Install**.
5. Follow the prompts in Tobii Pro Eye Tracker Manager to finish the installation.

### 6.3 Mount the eye tracker on a laptop or monitor

To ensure quality in eye tracking data, the Tobii Pro Spark hardware package includes several mounting brackets that can be affixed to a laptop or monitor. You can easily snap the eye tracker on and off the laptop using the magnetic mounting bracket. The mounting bracket sticks to the frame with a special adhesive that does not damage the underlying surface when the bracket is removed. For more information, read [Detach the eye tracker](#).



If the screen bezel is thinner than the height of the eye tracker, affix the mounting bracket as low as possible on the screen frame, or directly on the screen. DO not use this setup if you intend to show stimuli in the lower part of the screen, as they might be covered by the eye tracker.

For this we could recommend the Flex Mount, which is designed to fit most screen shapes and forms as you can adjust the angle of the Flex Mount to ensure that the eye tracker can always face you.



Some laptops are very thin and there is little space between the screen and the keyboard when the laptop is closed. We recommend that you check whether the laptop can close with the mounting bracket present before you attach it.

What to do:

1. Make sure the eye tracker is attached to the monitor and connected to your computer. Open Tobii Pro Eye Tracker Manager. You should be able to see and expand your eye tracker's "card" in Tobii Pro Eye Tracker Manager. The serial number of your eye tracker should match the number displayed.
2. You can leave your eye tracker USB cable connected with the eye tracker to the side (for example on the table) or you can disconnect it while you attach the mounting bracket.
3. If you plan to attach the eye tracker to a laptop, make sure the laptop can close with the magnetic mounting bracket attached. Some laptops have very little space when closed.



You can test whether you can close the laptop with the mounting bracket by placing the mounting bracket (with the backing paper still attached) on the keyboard side of the laptop and carefully closing the laptop lid. Watch for any potential interference between the screen, bracket, and keyboard.

4. Find the center of the screen and clean the bezel with one of the included cleaning wipes.
5. Peel the adhesive tape off the mounting bracket and mount it on the bezel so that your Tobii Pro Spark is as close to the bottom of the screen as possible without covering the screen. Press the bracket against the bezel for 30 seconds and wait one hour before attaching the eye tracker.



Figure 4. Mounting brackets with non-permanent adhesive.

6. Attach the eye tracker, making sure that it aligns properly with the mounting bracket. The magnet holds the eye tracker firmly in place when the slots are lined up correctly.
7. If it is not yet connected, plug in the eye tracker's USB cable to the correct USB port in your computer.
8. Move to the next step.

## 6.4 Display setup in Tobii Pro Eye Tracker Manager

Now the algorithms on the eye tracker need to understand where the eye tracker is in relation to the screen and map the gaze points accordingly.

1. Open Tobii Pro Eye Tracker Manager if it is not already running and select your eye tracker.
2. On the Overview tab, locate **Display Setup** and select the ellipsis icon to the right. On the drop-down menu, select **New**.
3. Select **Regular setup** and select **Next**.
4. If multiple screens are used, select the screen that has the Tobii Pro Spark attached to its bezel.
5. Enter the position of the eye tracker in relation to the screen. Use the radio buttons to select whether the eye tracker is positioned under or over the screen and enter the measurement in millimeters.
6. Align the dotted blue lines on the screen with the two outer white marks on the top of your Tobii Pro Spark.
7. Save your display by naming the setup and selecting **Save**.
8. To confirm that Tobii Pro Spark can detect your eyes, enable the Position Guide at the bottom left of Tobii Pro Eye Tracker Manager. Once activated, you should be able to see two "eyes" in a face contour.
9. Move to the next step. In the next section, you will test your setup by performing a calibration. For more information, read [Calibration](#).



You can always return to Tobii Pro Eye Tracker Manager and use it when you change computers or screens or want to recalibrate.

## 6.5 Calibration

When you are done configuring your eye tracker, you should run a calibration to test to see if the eye tracker is mapping the gaze points correctly to your display.

How to test your eye tracking setup in Tobii Pro Eye Tracker Manager:

1. Make sure the eye tracker is attached to the screen bezel and connected to your computer. Open Tobii Pro Eye Tracker Manager.
2. By now you should have also tested your setup as described in [Display setup in Tobii Pro Eye Tracker Manager](#).
3. Select **Calibrate** in Tobii Pro Eye Tracker Manager and follow the on-screen instructions.
4. Evaluate your calibration results. Large systematic errors i.e., a large distance between the average gaze point and the target gaze point may be indicative of a configuration error. No calibration feedback data on the targets located on the top of the screen may indicate that there is a mismatch between the screen size and eye tracker configuration. Select **Recalibrate** to improve an unsuccessful calibration (e.g., recalibrate points with missing data). Select **Use Calibration** when you are satisfied with the calibration.



You can toggle on and off Gaze Visualization in the upper left corner of the Calibration Results window (or on the Overview tab). This can be used to confirm the participant's calibration results.

### 6.5.1 What calibration does

The human eye shows a natural individual variation in its shape and geometry. For example, the exact location of the fovea, the area responsible for the part of the visual field that we perceive in focus and full color, varies from individual to individual. Tobii eye trackers use an individual calibration procedure to optimize their gaze estimation algorithms (i.e., the 3D eye model) and account for this variation. The end result of this optimization is a fully customized and more accurate gaze point calculation. Additionally, some Tobii eye trackers use the calibration procedure to select the detection mode (e.g. dark or bright pupil tracking) that provides the most accurate data.

You can do basic calibration in Tobii Pro Tobii Pro Eye Tracker Manager. There is more functionality, including calibration validation, in Tobii Pro Lab.

For more information, read the articles on [eye tracker calibration](#) and on [how to calibrate and validate in Tobii Pro Lab](#).

## 6.6 Detach the eye tracker

To temporarily remove the eye tracker, gently pull it away from the magnetic mounting bracket and leave the bracket in place.



To permanently remove the mounting bracket, you must remove the non-permanent but strong adhesive that fastens your eye tracker mounting bracket to the screen bezel. Since it is fairly strong, you may not be able to take it away with only your fingers. If you want to remove it, we recommend using something very thin such as dental floss or a thin thread, a plastic guitar pick, or a credit card. Use this to slide between the mounting plate and the computer bezel (or whatever it is attached to). As you slide it behind the mounting plate, gently bend the mounting plate towards you so that it detaches.



The mounting bracket adhesive should be removed carefully. If placed over a manufacturer logo on the bezel, removing the mounting bracket could damage the logo.

You can purchase additional mounting plates. For more information contact your Tobii sales representative or authorized reseller for assistance.

## 7 Display Setups

### 7.1 Standard setup

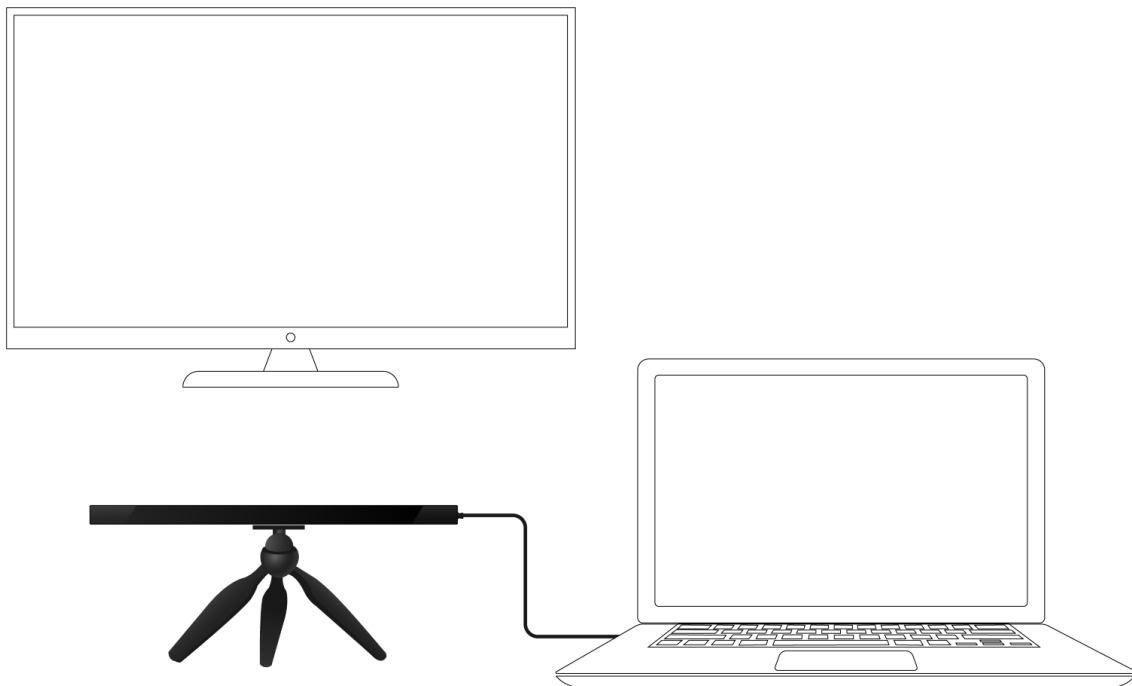
The standard setup for using Tobii Pro Spark is with a screen of maximum size 27". The eye tracker is attached below the screen whether it is a laptop screen or separate monitor. For more information, read [Display Setup in Tobii Pro Eye Tracker Manager](#).

### 7.2 Advanced setup

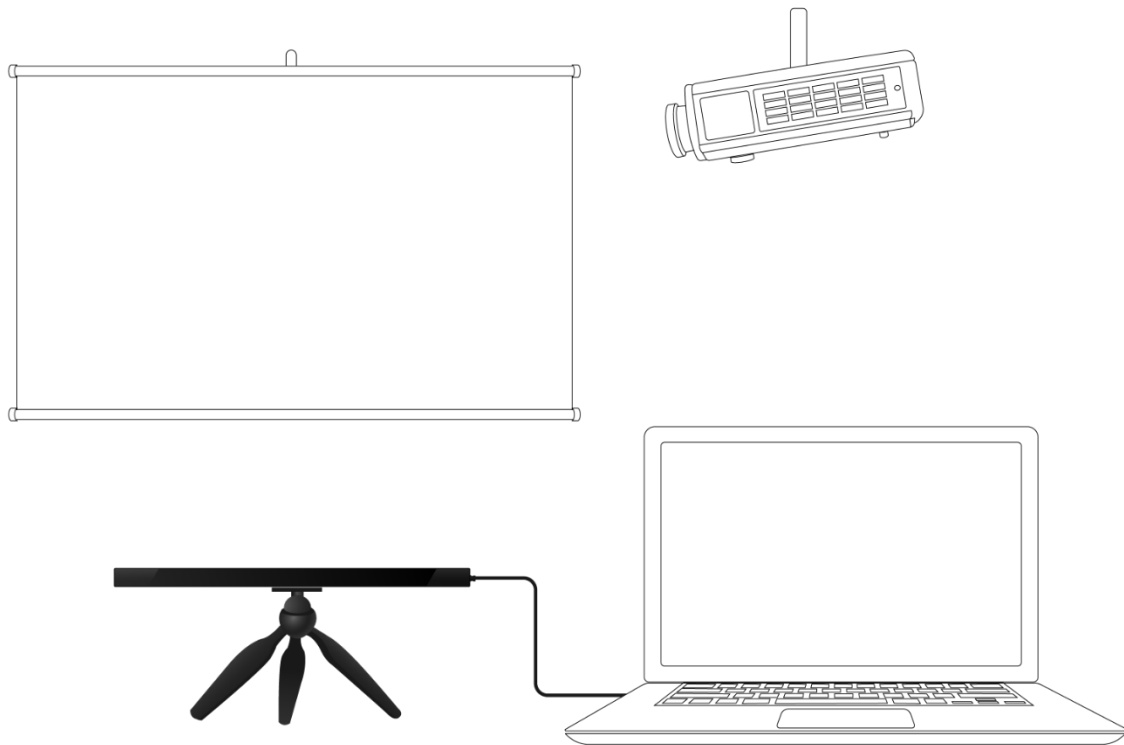
Advanced setups include using the Tripod Stand or other setups in which the eye tracker is not attached to the screen bezel.

### 7.3 Setup with Tobii Pro Tripod Stand

Tobii Pro Spark mounts directly onto the Tripod Stand. The Tripod Stand is ideal in test situations in which the subject is sitting at a table in front of a monitor or projected screen larger than 27". Using the Tripod Stand with Tobii Pro Spark is also useful in scene camera setups when studying physical objects and social interactions between people. For more information about the Tobii Pro Tripod Stand, visit the [Tobii product page](#).



*Figure 5. Tobii Pro Spark with the Tripod Stand and external, large-size monitor.*



*Figure 6. Tobii Pro Spark with the Tripod Stand and projected screen.*

How to set up Tobii Pro Spark with a large monitor or projector screen:

1. Select a suitable location and set up the monitor/screen.
2. Set up the monitor/screen and connect it to the laptop.
3. Mount the eye tracker on a separate tripod and connect it to the laptop. If the USB Type-A to Type-C adapter is needed, use it along with the AC power adapter.
4. Place the participant 50–80 cm from the eye tracker and use the **Position Guide** in Tobii Pro Eye Tracker Manager's Overview to ensure that the eye tracker can detect the participant's eyes.
5. Select **New** in the drop-down **Display Setup** menu.
6. Select **Advanced setup** and select **Next**.
7. Enter the width and height of your screen in millimeters. The width must be at least 10 mm. Select **Next**.
8. Enter the angle of your screen in degree and select **Next**.
9. Enter the height difference in millimeters between the top of the eye tracker and the bottom of your screen. Select **Next**.
10. Enter the position of the eye tracker in relation to the screen. Use the radio buttons to select whether the eye tracker is positioned under or over the screen and enter a measurement in millimeters.
11. Enter the angle of your eye tracker in degrees and select **Next**.
12. Save your display by naming the setup and selecting **Save**.

## 8 Start Experimenting

### 8.1 Start eye tracking

To see where the participant's focus is, open Tobii Pro Eye Tracker Manager and activate **Gaze Visualization** by toggling the switch on the Overview tab. A hazy blob appears on the screen, indicating where attention is focused. Use this functionality to verify that your eye tracker is running, that the display is correctly set up, and that your eye tracker is calibrated.

### 8.2 Tobii Pro Lab

Tobii Pro Lab provides a comprehensive platform for the recording and analysis of eye gaze data, which helps in the interpretation of human behavior, consumer responses, and psychology. Combining simple preparation for testing procedures and advanced tools for Visualization and analysis, eye-tracking data is easily processed for useful comparison, interpretation, and presentation. A broad range of studies are supported, from usability testing and market research, to psychology and oculomotor physiological experiments. Tobii Pro Lab's intuitive workflow, along with its advanced analysis tools, enables large and small studies in a timely and cost-efficient way without the need for extensive training.

In addition to offering powerful analysis tools, Tobii Pro Lab is also designed to work with other software commonly used for recording and analyzing data. This is done by synchronizing with recording software using TTL, as well as by enabling data exports in standardized formats, for example for Microsoft Excel, Matlab, and SPSS.

### 8.3 Keep your eye tracker software and display setup updated

From time to time, Tobii releases updates for an eye tracker's applicable driver and firmware in order to improve performance and/or introduce new functionalities. Please check the Tobii website regularly for news and information about updates about your eye tracker. We recommend that you leave updates and notifications in Tobii Pro Eye Tracker Manager activated. (They are activated by default and the sliders are colored blue.)

How to activate notifications and updates in Tobii Pro Eye Tracker Manager:

1. Expand the drop-down list at the top of Tobii Pro Eye Tracker Manager.
2. Toggle the switches for notifications. Blue means they are activated.
3. If a software update is available, the available update has a clickable link.
4. Select an interface language. The default is English.

### 8.4 Keep your display setup updated

Use Tobii Pro Eye Tracker Manager whenever you change computers or display setups.





All references to Tobii Pro Eye Tracker Manager assume that you are using the latest version of this free software.

## 8.5 Customer Care

Visit our customer portal [Tobii Connect](#) to get help with your Tobii eye tracker. On Tobii Connect, you can contact our Customer Care team, learn more about eye tracking through our articles, and find troubleshooting guides and FAQs. In addition, you can get to [Tobii Academy](#), our e-learning platform and hub for continuous learning.

For questions or problems with your product, contact your Tobii sales representative or authorized reseller for assistance. They are most familiar with your personal setup and can best help you with tips and product training.

Read more about Tobii Services, our in-depth learning articles, and much more in section [Customer Care, Training, and Warranty](#).

## 9 Product Care

### 9.1 Operational environment

The recommended range for temperature and humidity during operations is:

- Temperature: 10°C to 35°C (50°F to 95°F)
- Humidity: 20% to 95% (no condensation on the device)

### 9.2 Transport and storage

Use the provided case when traveling with the eye tracker. For shipping and storage, use the original packing.

For transportation and storage, the recommended range for temperature and humidity for the device is as follows:

- Temperature: -40°C to 70°C (-40°F to 158°F)
- Humidity: 20% to 95% (no condensation on the device)



Tobii eye trackers are not waterproof or water resistant. The eye tracker should not be kept in excessively humid, damp, or wet conditions. Do not submerge the eye tracker in water or in any other liquid. Be careful not to spill liquids on the device.

### 9.3 Cleaning

- Before cleaning your Tobii eye tracker, unplug its USB cable and electrical cable if there is one.
- Use the included cleaning cloth and clean the eye tracker's front gently.
- Avoid getting moisture in openings on the device.
- Do not use window cleaners, household cleaners, aerosol sprays, solvents, alcohol, ammonia, or abrasives.



Scratches on the front surface of the eye tracker may impair its performance.

### 9.4 Disposing of the Eye Tracker

Do not dispose your eye tracker in general household or office garbage containers. Follow your local regulations for the proper disposal of electrical and electronic equipment.

### 9.5 Limitation of Liability

Except where prohibited by law, Tobii AB is not liable for any loss or damage arising from the use or misuse of a Tobii eye tracker or the mounting plate, whether direct, indirect,



special, incidental, or consequential, regardless of the legal theory asserted, including warranty, contract, negligence, or strict liability.



## 10 Technical Specifications

### 10.1 Eye Tracking Specifications

|   |   |
|---|---|
| Eye tracking technique                  | Video-based Pupil Center Corneal Reflection (PCCR) eye tracking with dark and bright pupil illumination modes. <sup>1</sup> One camera captures images of both eyes for accurate measurement of eye gaze and eye position in 3D space, as well as pupil diameter. |
| Sampling frequency                      | 60 Hz (default) or 33 Hz  |
| Precision                               | 0.26° RMS (ideal conditions <sup>2</sup> )  |
| Accuracy                                | 0.45° (ideal conditions)  |
| Binocular eye tracking                  | Yes   |
| Eye tracker latency                     | 1 frame (immediate)   |
| Blink recovery time                     | 1 frame (immediate)   |
| Gaze recovery time                      | 50 ms   |
| Data sample output <sup>3</sup>         | Timestamp<br>Gaze origin<br>Gaze point<br>Pupil diameter  |
| Eye openness data stream                | Not available   |
| Eye image data stream                   | Not available   |
| TTL input stream                        | Not available   |
| Tracker and client time synchronization | Integrated between the eye tracker time domain and the client computer time domain.   |

<sup>1</sup> Each data sample is based on a combination of images using both dark and bright pupil illumination.

<sup>2</sup> Using built in filtering

<sup>3</sup> For more information about output data and the supplementary data stream, read the [Tobii Pro SDK documentation](#).

### 10.2 Setup

|  |   |
|--|---|
| Head movement tolerance*                               | Good. One-camera system provides an accurate calculation of the data and a good level of precision. |
| Freedom of head movement*<br>(at 50 cm distance)       | Width x height: 20 cm x 20 cm (7.9" x 7.9")<br>(At least one eye tracked)                           |
| Freedom of head movement*<br>(at 65 to 80 cm distance) | Width x height: 35 cm x 35 cm (13.8" x 13.8")<br>(At least one eye tracked)                         |
| Operating distance (mounted on screen)                 | 45 to 95 cm (29" to 37") from the eye tracker   |
| Optimal screen size                                    | 27" (16:9 aspect ratio)   |

\* Describes the region in space where the participant can move their head and still have at least one eye within the eye tracker's field of view (track box) at the specific distance.



### 10.3 Software Compatibility

|                                      |   |
|--------------------------------------|---|
| Software and framework compatibility | Tobii Pro Lab<br>Tobii Pro Eye Tracker Manager<br>Tobii Pro SDK<br>Any application built on the Tobii Pro SDK |
| Operating system                     | Windows, macOS, Linux   |

### 10.4 Hardware Versions

Single product version: 60 HZ

### 10.5 Tobii Pro Spark Eye Tracker Specifications

|                      |   |
|----------------------|---|
| Dimensions           | 285 x 15 x 22 mm (11.2" x 0.59" x 0.47")  |
| Weight               | 97 g (3.4 oz.)  |
| Connectors           | USB 2.0 Type-A, 80 cm (31") cable<br>(USB Type-C male to Type-A female adapter included in the package) |
| Data processing      | 1 Tobii EyeChip™ ASIC with fully embedded data processing   |
| Eye tracking cameras | 1 x Tobii EyeSensor™ Modules  |



## Appendix A Customer Care, Training, and Warranty

### A1 Customer Care

If you need help, please contact Customer Care on [Tobii Connect](#). In order to receive assistance as quickly as possible, make sure you have access to your Tobii Pro device and, if possible, an Internet connection. You should also be able to supply the serial number of the device, which you will find on a sticker on the back or bottom of the device.

#### A1.1 Get help online

Many questions can be answered by visiting [Tobii Connect](#). It contains the latest information about contacting Customer Care, helpful articles and FAQs, links to downloads, and much more. Log in or register to see information about your account and to reach our Customer Care team.

### A2 Training and Education Services

If you are new to eye tracking or want to extend your knowledge about eye tracking research, find out about our interactive online sessions, onsite trainings, and consultations on [Training and Education Services](#). In addition, [Tobii Academy](#) is our hub for continuous learning. This e-learning portal is designed to make it easy to conduct eye tracking studies by delivering an experience suited to all types of learning styles in an online platform.

### A3 Warranty information

Read more online about [Tobii Pro Care and Tobii's eye tracker warranty](#) (PDF download).

## Appendix B Limitations and Considerations

### B1 Intended Use



Tobii eye trackers are intended to be used in research activities about human behavior including eye movements, in a dry and dust free indoor environment. The product should only be used as described in this User Manual. Please read the User Manual and other supplied documentation thoroughly before using the product.

### B2 Light Conditions



Tobii recommends that eye tracking studies be performed in a controlled environment. Sunlight should be avoided since it contains high levels of infrared light which will interfere with the eye tracker system. Sunlight affects eye tracking performance severely and longer exposure can overheat the eye tracker. This eye tracker is not designed for exposure to (direct) sunlight. Eye tracking generally does not work in strong direct sunlight.

Shielding the eye tracker adequately from the sun may prevent sunlight from interfering with eye tracking.

### B3 Eye Lashes



Long eyelashes can be obstructive when the participant's eyes are less open, especially if the participant is wearing mascara. In rare cases, eyelashes may completely block the view of the participant's pupils, making eye tracking impossible.

### B4 Droopy Eyelids



Droopy eyelids or otherwise obstructive eyelids can block the view of the participant's pupils. In rare cases, such eyelids may completely block the view of the participant's pupils, making eye tracking impossible.

## Appendix C Glossary

|  |  |
|--|--|
| Accuracy   | The angular average distance from the actual gaze point to the one measured by the eye tracker.  |
| Binocular calibration                                      | The eye tracker collects data from both eyes at the same time and processes the data for each eye independently. The calibration is valid when it succeeds in collecting and processing data from both eyes.   |
| Binocular eye tracking                                     | Tracks and reports data for both left and right eye.   |
| Blink recovery time (time to tracking recovery for blinks) | When a participant blinks, the eye tracker loses the ability to track eye gaze because the eye is covered by the eyelid. If the pupil is occluded for only a short period (a few hundred milliseconds), the system will regain tracking immediately when the pupil becomes visible again, but only if the subject has maintained approximately the same head position during the blink. Data during blinks are only lost when the pupil is occluded, i.e., during the eye lid movement itself or when the eye is closed.   |
| Bright pupil tracking                                      | The process of capturing and processing eye images, with a set of illuminators that are placed close to the optical axis of the camera. This causes the pupil to appear lit up in the image (this is the same phenomenon that causes red eyes in photos). The eye tracking algorithms identify the pupil by searching for a bright elliptical form in the image.   |
| Dark pupil tracking  | <p>The process of capturing and processing eye images, with a set of illuminators that are located further from the optical axis of the camera.</p> <p>This causes the pupil to appear darker than the rest of the eye in the image. The eye tracking algorithms identify the pupil by searching for a dark elliptical form in the eye image.</p>  |
| Data sample output   | Type of data provided by the eye tracker.  |
| Freedom of head movement                                   | Describes the region in space where the participant may move their head and still have at least one eye within the eye tracker's field of view (track box).  |
| Gaze recovery time   | An eye tracker working in a natural user environment may occasionally lose track of the subject's eyes, e.g., when the subject completely turns away from the tracker. If a period of a few hundred millisecond elapses during which the eye tracker is unable to detect the eyes near where they were last detected, the eye tracker will start searching for the eyes within the entire head movement box. The stated measurement is the typical time to tracking recovery once the eyes return to the field of view of the cameras again, i.e., when the subject is within the track box limits, with the eyes open and facing the eye tracker. |



|   |   |
|---|---|
| Maximum gaze angle  | The maximum gaze angle for which the eye tracker can perform robust and accurate tracking on the eyes. The gaze angle is the angle ABC with A = center of the eye tracker (midpoint between the two eye tracking sensors), B = eye position (midpoint between the left and the right eye) and C = stimuli point.  |
| Maximum screen size   | The maximum screen size supported by the standard eye tracker setup (i.e., mounting the eye tracker directly on the screen).  |
| Operating distance  | The minimum and maximum distances between the subject's eyes and the surface covering the eye tracker sensors at which eye tracking can be done while maintaining robust tracking.  |
| Precision   | Describes the spatial angular variation between individual and consecutive gaze samples (Root Mean Square), calculated on raw data.   |
| Sampling frequency  | The number of data samples per second output for each eye. Expressed in Hz units, where 1 Hz = 1 sample per second.   |
| Total system latency  | The duration from the mid-point of the eye image exposure, to when a sample is available via the API on the client computer. This includes half of the image exposure time, image read-out and transfer time, processing time, and time to transfer the data sample to a client computer.   |
| Tracker and client time synchronization                         | The eye tracker and software client clocks can drift naturally during operation. To compensate for this, the Pro SDK will periodically ask the eye tracker about its current timestamp, noting the system timestamp when the request is sent and received. This data is then used to calculate how the system time corresponds to the device time.  |
| Video-based Pupil Center Corneal Reflection (PCCR) eye tracking | At the center of this technique is a hardware setup that consists of one or two video cameras and one or multiple sets of infrared-light illuminators. The cameras capture images of the eyes, and the illuminators produce reflections on its surface. These images are processed by algorithms that identify the pupil and the reflections caused by the illuminators. This information is then combined with different parameters from a 3D model of the eye and used to map the gaze onto the stimulus. |



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## Support for Your Tobii Pro Device

### Get Help Online

Visit [Tobii Connect](#) for help with your eye tracker. It contains concept articles, FAQs, troubleshooting, and tutorials, as well as how to contact Customer Care and a link to our e-learning platform Tobii Academy.

### Contact Your Solution Consultant or Reseller

For questions or problems with your product, contact your Tobii sales representative or authorized reseller for assistance. They are most familiar with your personal setup and can best help you with tips and product training.

Visit [tobii.com/contact](https://tobii.com/contact).