# tobii pro/spectrum



## Captures the fastest eye movements for extensive behavioral research

# Tobii Pro Spectrum

The Tobii Pro Spectrum is our most advanced eye tracking platform, designed for extensive studies into human behavior and the mechanics of the fastest eye movements. This powerful system ensures superior, reliable data quality and opens up new possibilities in fields like psychology, developmental studies, neuroscience, reading research, and ophthalmology.

## Data you can trust

The Pro Spectrum platform has been designed to ensure the highest data quality and reproducibility through evolving, patented eye tracking algorithms from Tobii, sophisticated hardware design, and premium hardware components. This system is extremely accurate and precise with unparalleled tracking robustness, which makes it possible to study a very large portion of the population in many real-life conditions.

- The 3-D eye model delivers superior gaze data, including wide gaze angles and all corners of the screen
- Two eye tracking cameras, both taking up to 600 images per second of both eyes
- Demonstrates extremely robust tracking capabilities, regardless of ethnicity, age, or corrective lenses
- Detects eyes instantly with minimal data loss during blinks or when subjects look away
- Maintains high accuracy, precision, and tracking robustness during subjects' head movements and in different lighting environments
- Allows precise synchronization of gaze information with data from other sources, such as EEG, GSR, or ECG
- Captures pupil data at the same sampling rate as the gaze data
- Provides eye images to allow researchers to understand what is affecting the data

## Freedom of movement

Pro Spectrum is a high-frequency system that provides saccadic event resolution, while still allowing for natural head movement.

This combination of capabilities allows researchers to deeply explore human behavior and cognitive processing, as well as the mechanics of the fastest eye movements (e.g. saccades, tremors, and micro-saccades ), without interfering with the natural behavior of the subject. With its ability to track freely-moving subjects, the Pro Spectrum easily facilitates research with children and other participants who would otherwise need a chinrest to control movement.

- Very high tolerance for both large and fast head movements in all directions
- Tracking resumes quickly if the subject moves in and out of the track box
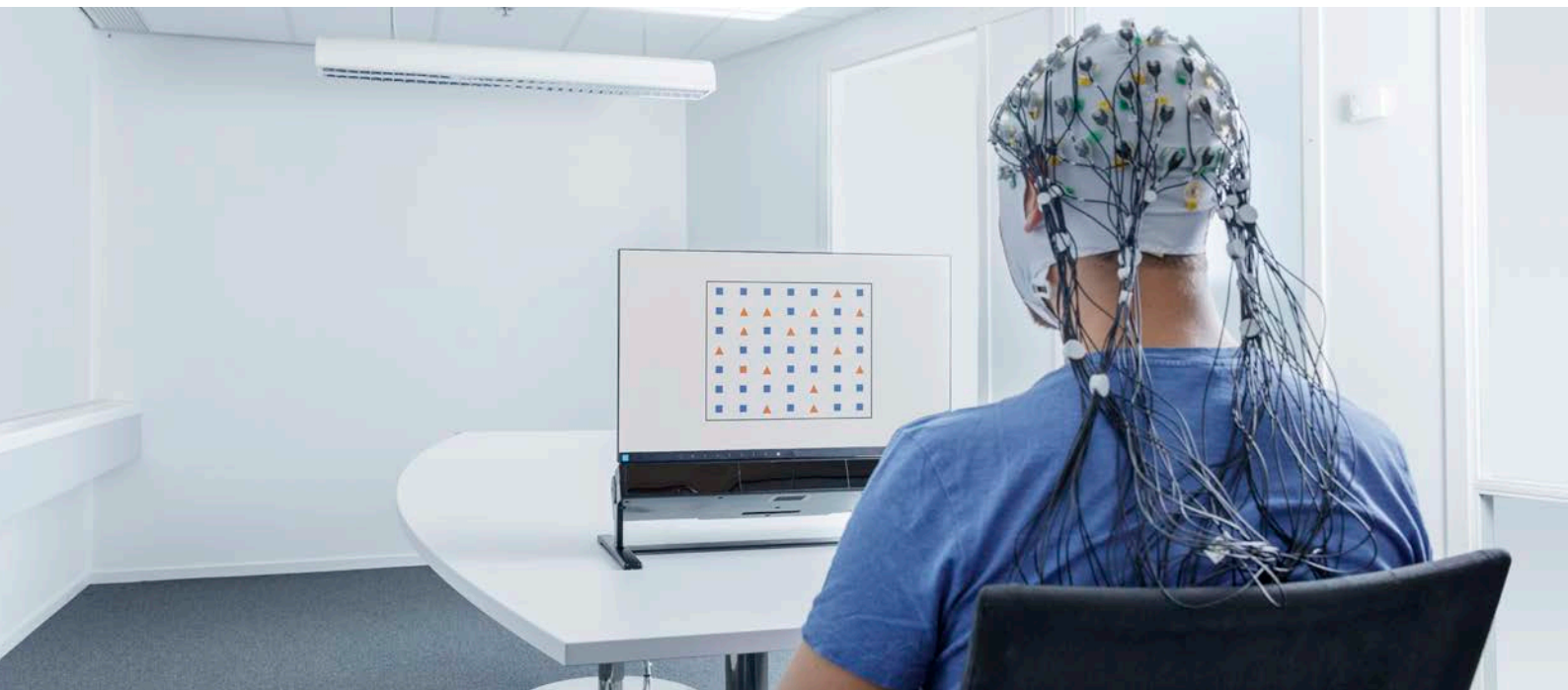
## Flexible setup and sync options

The Pro Spectrum provides exceptional flexibility, accommodating a wide array of research scenarios and study designs.

This system can be used with the provided screen or with the eye tracker alone, enabling both on-screen and real-world stimuli, such as physical objects or people. Multiple sampling rate options accommodate everything from fixation-based research to studies with more intense requirements on data granularity and time-based measurements.

The TTL port and precise timing enable seamless synchronization capabilities with external biometric data sources, providing a holistic view of behavior.

- 8-bit TTL port receiving sync events from external systems
- Easily removable 24" screen

## Simple, ingenious design

Pro Spectrum's simple setup, configuration, and automation allow you to add advanced eye tracking to your research with little effort. Researchers at all levels of expertise can use the system without needing extensive training.

The eye tracker comes fully assembled in the supplied travel case and doesn't require manual configuration such as the setup of cameras, lenses, etc. Researchers can rely on quick, stable calibrations of subjects and productively track the subjects they have attained for their study.

- Software for the stand-alone configuration accommodates studies that involve real-world stimuli
- VESA mounting available for fixed table or wall installation
- Handle allows for smooth adjustment when accommodating subjects of different heights

## Software options

The Pro Spectrum works with Tobii Pro Lab, a versatile biometric software platform 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.

The 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. The Pro SDK gives researchers access to the full set of eye movement data streams relevant to their research, such as 3-D eye coordinates, raw data, pupil data, etc.

The Pro SDK is complemented by the Eye Tracker Manager application that facilitates the configuration of the eye tracker, e.g. setting the sampling rate or configuring the display area.

## Transparent product quality methods

The Pro Spectrum's high data quality has been confirmed through extensive testing. We use well-documented test methods that span from systematic variations of the environmental conditions to a general assessment of the eye tracker performance with a large population of individuals.

Consistent reproducibility in studies is guaranteed with quality control procedures throughout the entire production process, including camera focus and the calibration of each unit. Multiple product certifications ensure that quality and user safety requirements are met.

# Technical Specifications

## Eye tracking specifications

| | |
|---|---|
| Eye tracking technique | Binocular bright and dark pupil tracking. Two cameras capture stereo images of both eyes for the accurate measurement of eye gaze and eye position in 3D space, as well as pupil diameter. |
| Sampling frequency | 60, 120, 150, 300 or 600 Hz (max. frequency depends on product version) |
| Accuracy* | Approx. 0.4° at 65 cm |
| Precision* | Approx. 0.1° at 65 cm |
| Freedom of head movement | Width x height: 34 cm x 26 cm (13.5'' x 10'') at 65 cm |
| Total system latency | Less than 5 ms at 600 Hz |
| Blink recovery time | 1 frame (immediate) |
| Data output (for each eye) | Timestamp<br>Gaze origin<br>Gaze point<br>Pupil diameter |
| Eye image data stream | Approx. 30 Hz |
| TTL input stream | 8–bit timestamped data (256 event codes) |
| Tracker and client time synchronization | Integrated synchronization between the eye tracker time domain and the client computer time domain, with an accuracy of 100 μs. |

## Eye tracker

| | |
|---|---|
| Dimensions | 55 cm x 18 cm x 6 cm (22'' x 7'' x 2'') |
| Weight | 5.1 kg (11.4 lbs.) |
| Eye tracker processing | Integrated |
| User camera mount | Standard 1/4'' thread |

## Monitor

| | |
|---|---|
| Screen size (diagonal) | 23.8'' |
| Weight | 3.8 kg (8.4 lbs.) (including mounting materials) |
| Aspect ratio | 16:9 |
| Resolution | 1920 x 1080 pixels |
| Response time | 5 ms (Gray-to-gray) |
| Connectors | DVI<br>VGA<br>HDMI<br>Display port<br>1 port for monitor control (USB 3.0)<br>2–port USB hub (USB 3.0)<br>C13 power connector<br>Audio input connector: 3.5 mm<br>Headphone jack: 3.5 mm |
| Built in speakers | 1.0 W + 1.0 W |

## Software compatibility

- Tobii Pro Lab
- Tobii Pro SDK
- Eye Tracker Manager
- Any application built on the Tobii Pro SDK

## Hardware versions

- 600 Hz
- 300 Hz
- 150 Hz

* Tobii Pro uses an extensive test method to measure and report performance and quality of data. These accuracy and precision numbers are preliminary. Final numbers will be published when available.

Tobii Pro provides eye tracking research solutions and services designed to deepen understanding of human behavior. Headquartered in Sweden, with local teams active on six continents, we help business and science professionals to further their research.

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