VIVEKANAND COLLEGE FOR ADVANCED COMPUTER AND INFORMATION SCIENCE

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SEMINAR REPORT

ON

EYE TRIBE

AS A PARTIAL REQUIREMENT FOR THE DEGREE

OF

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What is The Eye Tribe?

The **Eye Tribe software** enables **eye** control on mobile devices, allowing **hands-free** navigation of websites and apps, including **eye** activated login, enhanced gaming experiences and cloud based user engagement analytics. Within a couple of years they were renowned as the world leading research group in low cost **eye tracking**.

The Eye Tribe intends to become the leading provider of eye control technology for mass market consumer devices by licensing the technology to manufacturers.

It all started seven years ago where the four founders met at the IT University of Copenhagen. The ambition was to make eye tracking available for everyone at an affordable price.

After finishing their PhD's the four founders bought the IP from the University and formed The Eye Tribe Company during their participation in the European StartupBootcamp accelerator program in 2011.

History:

Sune Alstrup john (CEO), Javier San Agustin, Martin Tall (CTO), and Henrik Skovsgaard are the four founders of the company started in 2011. The four men met in 2006 at the IT University of Copenhagen.

The four quickly found their ambition to create eye-tracking technology at an affordable cost, and soon took the rights and ownership for their ideas from the university where they were working and created their start-up company.

The men named the company "Senseye", until later changing their name to "The Eye Tribe". The company started to take off in 2011 when The Eye

Tribe participated in the European Startup Bootcamp accelerator program. After the StartupBootcamp, The company started to make its mark and become more well known, earning a spot in the “Cool Vendors in Human-Machine Interface, 2012” report by Gartner Inc. among five other companies. Later in 2012, The Eye Tribe received US$2.3 million from the Danish National Advanced Technology Foundation and another million from private European investors.

The Eye Tribe is also leading a USD 4.4 million government-funded project, making it the major project for developing eye tracking for hand-held devices. On December 12 2016 The Eye Tribe sent an email to its customer list, informing them that they "decided to go in a different direction with their technology and stopped development of their products." On 29 December Facebook bought the company for its Oculus division in order to incorporate the technology in Vr gaming.

Technology

As of October 2013, The Eye Tribe was getting ready to send out the first shipments of their eye tracking technology. The Eye Tribe has broken the record for smallest eye tracker device in the world, measuring in at 20 × 1.9 × 1.9 cm. Also, the eye tracker does not require a separate power source, making it even more portable.

The device uses a USB 3.0 connection, which allows it to run with most computers and tablets. The Eye Tribe is compatible with Microsoft Windows 7 or newer and OS X, but the company is in the process of working on support for other major platforms, such as Android. They are selling the device to developers with a simple software development kit using C++, C# and Java programming platforms.

Components

The main components of the Eye Tribe tracker are:

- Camera
- High-resolution infrared LED

Which can easily be set up in a cell phone or mobile device.

The Eye Tribe's device uses a camera to track the user's eye movement. The camera tracks even the most minuscule of movements of the users' pupils, by taking the images and running them through computer-vision algorithms.

The algorithms read "on-screen gaze coordinates" and help the software to then determine where on the screen the user is looking.

The algorithms also work with the hardware, camera sensor and light, to enhance the users' experiences in many different kinds of light settings and environment, although the device works best indoors.

Before using the eye tracking device, a calibration is needed in order for the device to find a user's pupils and identify unique eye characteristics needed to help enhance the accuracy of tracking one's gaze.

The tracker has an average accuracy of about 0.5 degree of visual angle and can identify and follow the movement of an eye with sub millimetre precision, which is around the size of a fingertip.

Parameters	Features
Sampling rate :	30 Hz and 60 Hz mode
Accuracy :	0.5° (average)
Spatial resolution :	0.1° (RMS)
Latency :	< 20 ms at 60 Hz
Calibration :	5, 9, 12 points
Operating range :	45 cm – 75 cm
Tracking area :	40 cm × 30 cm at 65 cm distance
Screen sizes :	Up to 24 inches
API/SDK :	C++, C# and Java included
Data output :	Binocular gaze data
Dimensions :	(W/H/D) 20 × 1.9 × 1.9 cm (7.9 × 0.75 × 0.75 inches)
Weight :	70 g
Connection :	USB 3.0 Superspeed

CH: - 2. Eye Tracking

Eye Tracking

Eye tracking, or gaze tracking, is a technology that consists in calculating the eye gaze point of a user as he or she looks around.

A device equipped with an eye tracker enables users to use their eye gaze as an input modality that can be combined with other input devices like mouse, keyboard, touch and gestures, referred as active applications. Furthermore, eye gaze data collected with an eye tracker can be employed to improve the design of a website or a magazine cover, which are described more thoroughly later on as passive applications. Applications that can benefit from eye tracking include games, OS navigation, e-books, market research studies, and usability testing.

The Eye Tribe Tracker is an eye tracking system that can calculate the location where a person is looking by means of information extracted from person's face and eyes. The eye gaze coordinates are calculated with respect to a screen the person is looking at, and are represented by a pair of (x, y) coordinates given on the screen coordinate system. A typical scenario is represented in Figure 1.

Use

The Eye Tribe Company is developing their eye tracking device in hopes that sometime in the near future many products, such as smart phones, tablets, and computers, will carry Eye Tribe's software. The company's goal is for their eye tracking technology to become a household item and a common feature on most devices.

From their demos, The Eye Tribe makes it clear that they hope their technology will become versatile, used for many things from games to working, from browsing the web to security. A game most often used in their demos is Fruit Ninja, an application on most smart phones (used in iPhones and androids). The game usually uses a touch screen to slice fruit, but with eye tribe technology, the gamer would just look at the screen and use their gaze to play. Eye Tribe is working with other application designers to integrate their technology into other games for pleasure.

The Eye Tribe Company often demonstrates how their software works in their demos by showing someone scrolling down a web page by just staring at the screen. It exemplifies how the device can be hands-free when needed, making it easy and quick

to read and browse the web. An example would be when you are watching a how-to video, you can pause it or rewind with your eyes, because your hands are too busy.

Uses another example of eye tracking is security. Users can set a gaze-operated password, where they would have to look at certain parts of the screen in order to unlock the device. Some would argue that this is a more efficient and secure way to lock their devices.

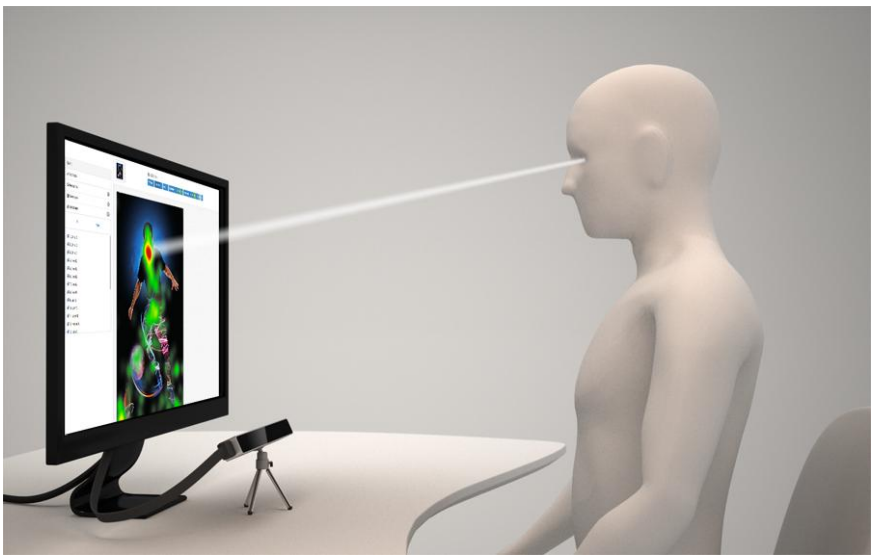


Figure 1. User in front of an eye tracker.

In order to track the user's eye movements and calculate the on-screen gaze coordinates, the Tracker must be placed below the screen and pointing at the user. Please check Getting Started guide for more information about setting up the hardware.

The user needs to be located within the Tracker's track box. The track box is defined as the volume in space where the user can theoretically be tracked by the system. The size of the track box depends on the frame rate, with a higher frame rate offering a smaller track box. The Eye Tribe SDK includes a Track box sample that illustrates how to indicate users their location with respect to the Tracker so they can adjust their position accordingly.

When the system is calibrated (see Calibration below), the eye tracking software calculates the user's eye gaze coordinates with an average accuracy of around 0.5 to 1º of visual angle. Assuming the user sits approximately 60 cm away from the screen/tracker, this accuracy corresponds to an on-screen average error of 0.5 to 1 cm.

Calibration

Prior to using an eye tracker the user needs to undergo a personal calibration process. The reason for this is that each person has different eye characteristics, and the eye tracking software needs to model these in order to estimate gaze accurately.

A typical user calibration process takes approximately 20 seconds to complete, and consists in a circular target that is displayed at different locations of the screen on a blank background during around 2 seconds each. The user needs to look at the target as this is displayed on the screen. Once all the calibration targets have been displayed on the screen the calibration process is completed. The system will start providing (x, y) coordinates of the user's gaze point through the API.

Once the calibration process is completed successfully, the Tracker should not be moved. If the Tracker is placed in a different location, the user will need to re-calibrate in order for the system to update the calibration parameters to match the new location of the Tracker.

Figure 2 shows the recommended calibration pattern used to calibrate The Eye Tribe Tracker. A minimum of 9 calibration locations covering most of the screen is recommended. Using more locations (e.g. 12 or 16) will improve the accuracy of the gaze coordinates computed by the system.

Figure 2. Temporary image showing the 9 calibration points

Use Cases

Eye tracking applications are divided into 2 categories: active and passive.

Active

An eye tracker enables users to use their eye movements as an input modality to control a device, an application, a game, etc. The user's eye gaze point can be combined with other input modalities like buttons, keyboards, mouse or touch, in order to create a more natural and engaging interaction.

Some examples of eye-controlled applications are provided here:

- Web browser or pdf reader that scrolls automatically as the user reads on the bottom part of the page.
- A maps application that pans when the user looks at the edges of the map. The map also zooms in and out where the user is looking.
- User interface on which icons can be activated by looking at them.
- When multiple windows are opened, the window the user is looking at keeps the focus.
- A first person shooter game where the user aims with the eyes and shoots with the mouse button.
- An adventure game where characters react to the player looking at them. For instance, if the player looks at a given character, this character will start talking to the player.
- An on-screen keyboard designed to enable people with severe motor disabilities to write text, send emails, participate in online chats, etc.

Passive

Eye tracking makes it possible to observe and evaluate human attention objectively and non-intrusively, enabling you to increase the impact of your visual designs and communication.

The Eye Tribe Tracker can be employed to collect eye gaze data when the user is presented with different stimuli. E.g. a website, a user interface, a commercial or a magazine cover. The data collected can then be analysed to improve the design and hence get a better response from customers.

Eye movements can be classified into fixations and saccades; fixations occur when we look at a given point, while saccades occur when we perform large eye movements. By combining fixation and saccade information from different users, it is possible to create a heat map of the regions of the stimuli that attracted most interest from the participants. Below is an example of a heat map of a printed ad.

Ch: 3 How to work

Overview

The Eye Tribe Tracker detects and tracks gaze coordinates allowing developers to create engaging new user experiences using eye control. The Tracker operates in the device field of view with high precision and frame rate.

The Tracker software is based upon an Open API design that allow client applications to communicate with the underlying Tracker Server to get gaze data. The communication relies on JSON messages asynchronously exchanged via TCP Sockets. Many clients may be connected to the server simultaneously. The relationship between client and server along with underlying dependencies is illustrated in Figure 1.

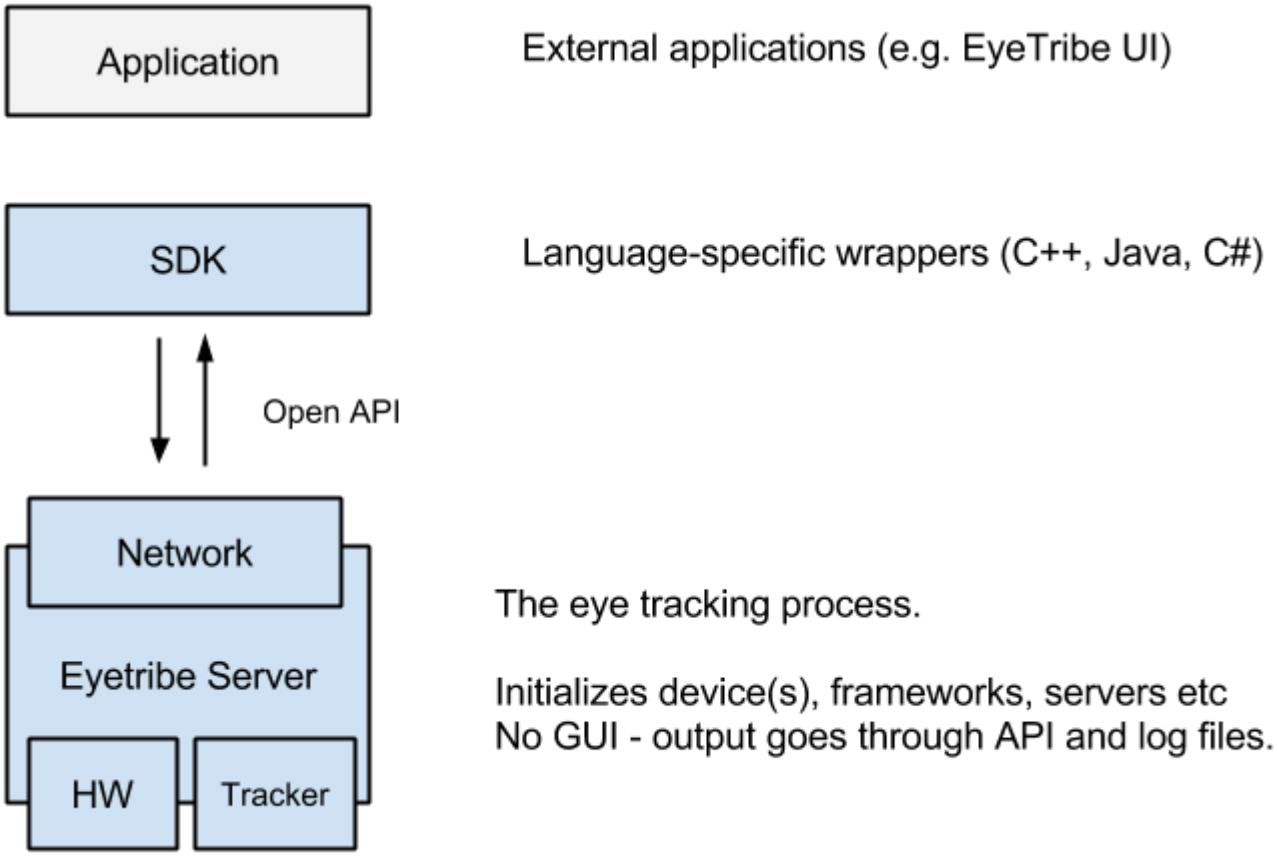


Figure 1. Architecture Overview

Any programming language capable of opening TCP Sockets and parsing JSON is theoretically able to connect to and interface with a running Tracker Server using the Tracker API. Find full documentation of the communication protocol in the Tracker API section.

Gaze Data

Eye tracking data is delivered over time in frames. The contents of each frame is summarized in the following and described in full detail in the Tracker API.

Tracking State

State of the eye and gaze tracking process. Indicates if a person is currently being tracking in the devices field of view as well as the associated level of detail.

Fixation

If the tracked gaze is current fixated, the frame will contain information hereof. See basics for an introduction to fixation.

Gaze Coordinates

Gaze coordinates are the point on screen that the user is currently looking. Gaze coordinates are defined as pixels in a top-left oriented 2D coordinate system and are available in both raw and smoothed forms. Note that gaze coordinates are only available in a calibrated setup (Calibration). See Figure 2 for visual illustration.

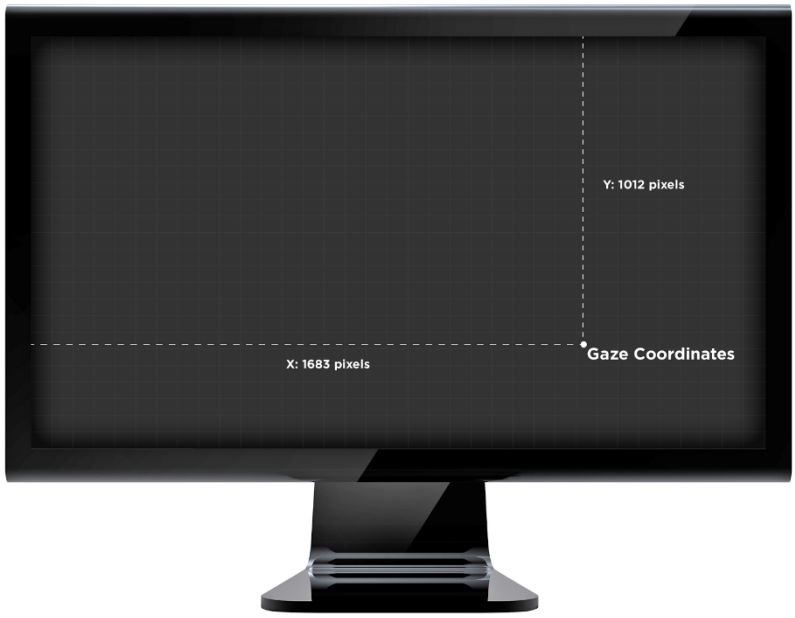


Figure 2. Gaze coordinates in pixels in top-left oriented 2D coordinates system

Pupil Coordinates

Pupil coordinates are the position of a tracked person's pupil relative to the Tracker sensor. Pupil coordinates are defined in normalized relative values in a top-left oriented 2D coordinate system. See Figure 3 for visual illustration.

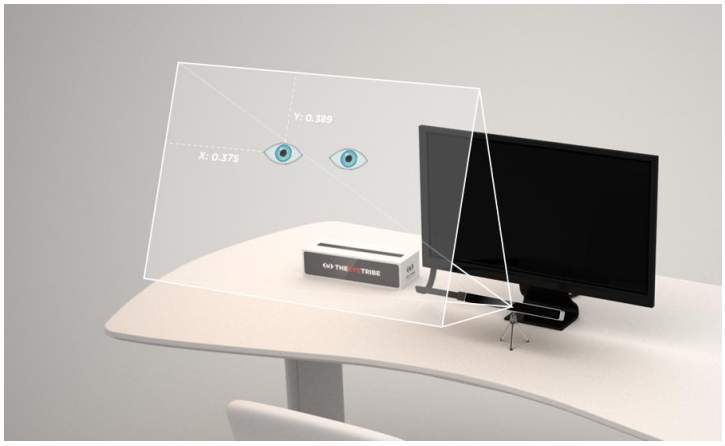


Figure 3. Pupil coordinates in normalized values relative to Tracker device

Client Implementations

Through the tracker API, clients are able to tweak the settings of the Tracker Server, perform the calibration process, and switch screens in a multi-screen setup and more. The Tracker API documentation explains all interfacing option in detail.

Heartbeats

A running Tracker Server with no connected clients will be in a dormant state and will not broadcast frames. The Tracker Server will be implicitly running as long as there are clients connected and these clients are sending stay-alive messages, aka. Heartbeats, within a server-defined interval. To disconnect, a client may explicitly close its socket connection or simply stop sending heartbeats. The getting frame data tutorial explains the process of sending heartbeats in detail.

Advanced

This section describes the advanced features of the Eye Tribe Server, e.g. how to connect to the server remotely, or how to change the TCP socket port, etc.

Configuring the Eye Tribe Server

The Eye Tribe Server can be configured manually to some degree by specifying command line arguments when starting the server. The Eye Tribe server can also be configured using a configuration file, see below for details.

The Eye Tribe Server configuration parameters

Running the server without any arguments will initialize the system using default values. These values have been chosen to be well suited for most users.

Specifying wrong or unsupported parameters will cause the server to fail and inform about the problem. The server will also provide a list of supported parameters. Using --help or -? Parameters will also show the list of supported server parameters.

Configuring socket port

The default TCP socket port that the Eye Tribe Server listens to incoming client requests is 6555. The default port can be modified to cater for special user-defined behaviour and environment, for instance when port 6555 is already utilized for another service. Setting the socket port manually is done using the --port=<into> parameter. Value must be in the range from 1024 to 65535. An error will be reported during initialization of the server was not able to bind to the port (e.g. if the port is in use by another application).

Allowing remote connections

By default the server only accepts local connections (same computer/IP). If you want to allow clients from other IP addresses to connect to the server you must specify the --remote=<bool> parameter with the value of true. Only true and false are accepted values.

Configuring device number

The Eye Tribe server only supports operating one tracking device at a time. Up to 8 supported devices can be present in the system, and any one of these can be utilized by the tracker. The parameter --device=<into> can be used to instruct the Eye Tribe Server to utilize a different device than the first, default, device. Setting the device number manually is constrained to a number between 0 and 7. The Eye Tribe Server will report an error upon initialization if the device is either not supported or not present.

Changing frame rate

The Eye Tribe Server supports two frame rate modes: 30 and 60 frames per second (fps). The default frame rate is 30 fps. Running in 30 fps will allow for a larger tracking box, whereas the 60 fps mode in nature will be faster but allow for smaller head movements. To set the framerate manually use the --framerate=<into> parameter where the value is constrained to either be 30 or 60 frames per second.

Only 30 and 60 are valid values. If other values are specified an error will be reported upon initialization of the Eye Tribe Server.

Loading a specific confit file

The Eye Tribe server can also be launched and instructed to load a specific configuration file. In this case only one argument must be provided as command line argument

Eye Tribe <config.cfg file>

The config.cfg argument indicates a valid configuration file. It can be provided using either a relative or an absolute path.

Multiple trackers and monitors

It is possible to have a system with multiple concurrent EyeTribe Servers, each operating on a dedicated Tracker and on a dedicated monitor. An instance of the EyeTribe Server must be spawned per Tracker device. Utilizing individual config files per server instance will be a practicable way of setting up such a system.

The client must be able to communicate with each EyeTribe Server on different TCP socket ports. The client must also remember to specify the active monitor screen to each EyeTribe Server instance, if different monitors are to be distributed between the different trackers. The user must avoid having several trackers active simultaneously due to interfering infrared illumination. A way to control this is to disconnect the client from the EyeTribe Server (e.g., by stopping sending heartbeats) when the eyes are no longer looking at the screen.

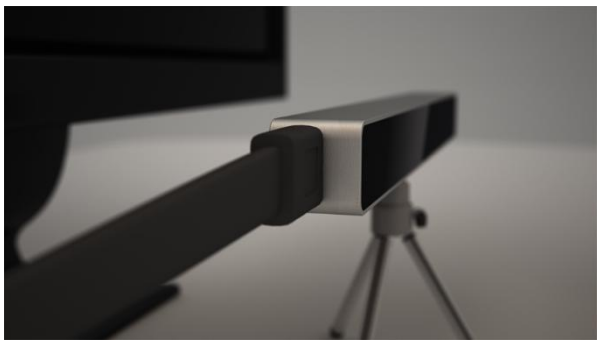
Ch: 4 Install and Use

Set up:

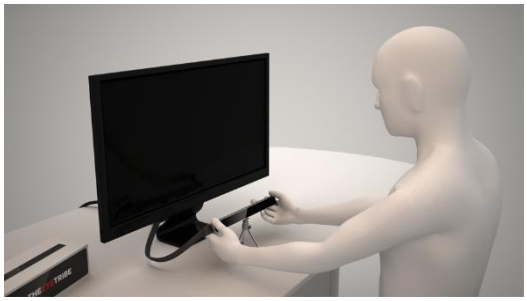
This section is an introduction how to set up your new Tracker to your computer, how to position it and how to get started with a simple calibration example.

STEP 1: Connect the tracker to your computer

Remove the Tracker, the USB 3 cable and the Tripod from the sales box. Remove the protective film from the front glass of the Tracker. Assemble the Tracker and the tripod. Make sure the tripod and the Tracker are screwed tightly together so the tracker does not move. Insert the USB 3 cable in the Tracker itself and connect it to a USB 3.0 SuperSpeed port on your computer. Important: make sure your SW drivers for your USB 3.0 port are installed correctly, otherwise your tracker will not work.



STEP 2: Place the tracker on a tripod below the monitor.



Position the Tracker mounted on the tripod on a flat horizontal surface below your monitor. It is important that the Tracker is cantered relative to the monitor. The monitor must be max 24”. Note the Tracker should not be positioned above or next to the monitor as the tracking will not function optimally. Also it is important that the Tracker is placed so that it does not move during operation as this will destroy the tracking.

STEP 3: Install the Tracker SW and Tracker UI

Download the Tracker SW from theeyetribe.com using your login from when you're purchased the device. Launch the application and install the SW. Start the Tracker Server. Do not close the application as the Tracker Server is needed for the eye tracking to work.

STEP 4: Position yourself correctly

Position yourself cantered in front of the monitor at a distance of 45 - 75 cm. Angle the Tracker to point at your face using the tripod. Double click the **EyeTribe UI** icon on your desktop**,** or under **C:\Program Files (x86)\EyeTribe\Client\EyeTribeUIWin.exe**, for a simple example of positioning yourself correctly and calibration of the system.

Use the sample eyes to position yourself accurately. A green colour indicates the right positioning. Once you are in the right position you can proceed to calibration. Follow the instructions on the screen to complete the calibration. Do not move your head during the calibration. Once the calibration is successful you get an indication of the quality of the calibration (1 to 5 stars). The higher the calibration ranking the higher precision of the eye tracking you can expect. Now you are ready to use the Tracker and it will provide gaze estimation coordinates to your own applications.

STEP 5: What to do if your eyes are not found?

- Check if the lights are on inside the box
- Check if the Tracker Server is running
- Unplug and plug the USB cable
- Try a different USB port
- Try without your glasses
- Make sure nothing is blocking the line of sight from the device / Make sure the device can see your eyes
- Avoid covering your face and eyes with masks, caps or long hair
- Some type of glasses might affect the performance of the system
- Avoid using the system in direct sunlight

EyeTribe UI

When you download and install the EyeTribe SDK, EyeTribe Server and EyeTribe UI are installed on your computer. This tutorial serves as a starting point to get you started with the EyeTribe UI for Windows.

Starting EyeTribe UI

EyeTribe UI application is started either from the icon on the desktop or from the TheEyeTribe folder located in your start menu inside All Programs. The software is by default installed in C:\Program Files (x86)\EyeTribe\. In this folder you will find two sub folders, Client and Server.

It is important that The EyeTribe Server is running if you wish to use EyeTribe UI or any other eye-controlled application.

The EyeTribe UI will automatically attempt to start the Server if it is not running already. The autostart requires you to be administrator of your system, otherwise you need to start the Server manually by double clicking the black EyeTribe Server icon. The icons for EyeTribe UI and EyeTribe Server are depicted in the images below.

Figure: EyeTribe UI (white) and EyeTribe Server (black) icons.

The EyeTribe UI provides a direct feedback of the current tracking state and allows you to change the default settings to accommodate your needs. The main window is depicted in the image below. All changes in EyeTribe UI are automatically stored when you close the application and will be reloaded next time you start it.

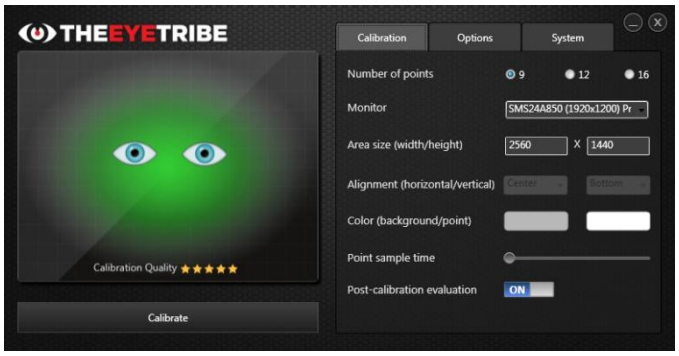


Figure: screenshot of EyeTribe UI user interface.

Demonstration Mode

The demonstrator is your first encounter with EyeTribe UI and will take you through the most important steps in setting up the Tracker, placing yourself in the optimal position and guiding you through your first calibration. You can navigate by clicking the left and right arrow buttons on the display or the left and right keys on your keyboard. The demonstration mode can be skipped by pressing the Escape key. The EyeTribe UI will continue to start in demonstration mode until you deactivate this feature either by unchecking the Show at start up on the first page in the demonstration mode or by unchecking Start in demo mode found under the Options tab in the EyeTribe UI. A screenshot of the first step in the demonstration mode can be seen in the image below.

Figure: the demonstration mode is your first encounter with the EyeTribe UI. The guide will take you through the basics of the SDK and your first calibration.

The Track box

On the left-hand side of the EyeTribe UI you find the track box window. The track box is a graphical representation of your position relative to the Tracker, and therefore it serves as a guide to determine whether you are within the tracking range of the system. Also, it is helpful to verify if the tracking is functional by providing a continuous feedback on the current tracking quality. It is important that you centre align the Tracker under your monitor and orient it towards your face for optimal tractability.

All trackable eye movements are reflected in the track box. This is done by showing zero, one or two eyes in the track box, and dependent on the tracking quality. If the tracking quality is acceptable both of your eyes appear inside the track box reflect your physical movements in real time. Moreover, changes in the background colour are used to indicate the current tracking quality. In case of non-optimal tracing, the eyes may flicker.

The background colour of the track box shimmers between green and red dependent on the tracking quality.

Tracker Error Message	Description

The image sequence below shows a series of different states that can be shown by the track box. The different cases extends to good tracking, limited tracking, no/bad tracking and an error message, respectively.

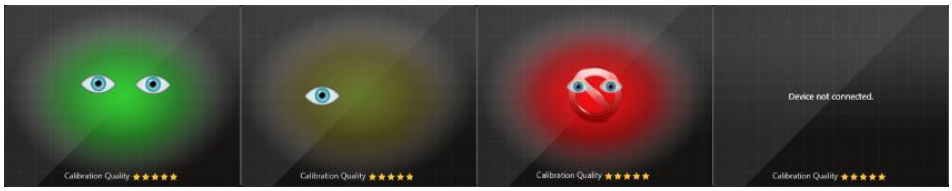


Figure: Four cases of tracking that show good, limited, bad tracking and an error message.

When you see a full green background image and two eyes in the track box you are positioned correctly and tracking is good. If the background shimmers between red and green tracking is poor and you should try to reposition yourself or the device. No/bad tracking window is indicated by a red background plus a red not accessible symbol. When the no/bad tracking window appears the system is functional but the EyeTribe Server cannot find your eyes. Error messages can, as shown in the example, be a warning about missing connectivity to the Eye Tribe Tracker. Other warnings from the system are also communicated through the track box window (refer to Error Messages section below). For optimal tracking experience, try to maintain the position of your eyes in the centre of the track box. This may require you to readjust the Tracker but it is important that you sit as comfortable as possible. If you move the Tracker after calibrating or you sit at a different position you may need to perform a re-calibration.

Pro tip!

Reducing your movements and keeping your eyes in the centre of the track box will significantly improve your calibration results.

Error Messages

The tractor section is your guide to see if the system is functional. Essentially, it continuously shows the current health state of the Eye Tribe Tracker. If an error is

Detected by the system the message is printed in the track box's window. Currently, the error messages printed in the track box expand to the messages shown in the table below:

Device not connected	The tracker is not detected. Connect or, disconnect and re connect, your tracker.
Device connected to a USB2.0 port	The tracker is detected but it is not working due to unsupported USB host. Download and install supported drivers for your USB3 manufacturer and try again.
A firmware updated is required	The tracker is detected but it is not working due to wrong/unsupported firmware.
No data coming out of the sensor	The tracker is detected but cannot receive any stream of data.

Calibration

Directly below the track box you find the calibrate button. When you click the Calibrate button you will take through a calibration process. The process requires you to look at a series of calibration targets distributed evenly throughout the screen. Each target will appear one-by-one and they are visible for a predefined time period. The process usually takes about 20 seconds to complete. For more information about the calibration process, refer to Calibration section under each specific language.

The calibration process is user specific and ensures optimal use of The Eye Tribe Tracker. The calibration process usually takes about 20 seconds to complete.

A calibration can be aborted either by pressing the Escape key or by double click or double tab on the calibration area with a mouse or touch interface. The properties of the calibration can be changed under the Calibration tab.

Evaluation View

The evaluation window is presented immediately after a completed calibration and provides an indication of the quality of the calibration (see image below). This is done by presenting a series of gaze-sensitive targets that react when looked upon.

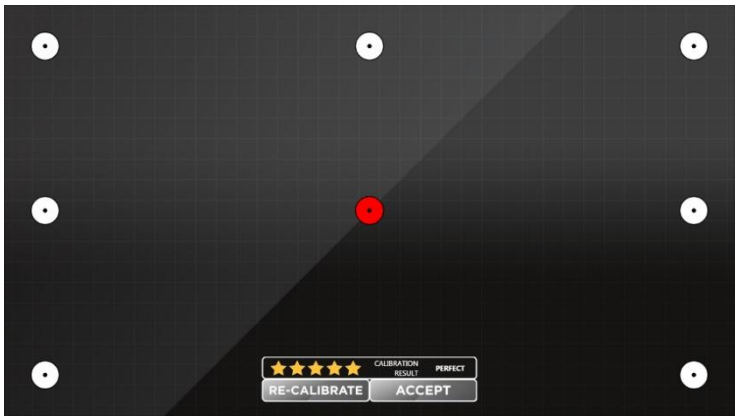


Figure: The EyeTribe UI evaluation window.

The action panel is located in the lower bottom of the evaluation window and consists of a rating control and two options to either re-calibrate in order to improve your calibration or accept your current calibration. The rating control provides a quantifiable measure of the current accuracy of your calibration. The five-star ratings and the corresponding messages are coupled in the following manner:

Message	**Description**
Perfect	This is an optimal calibration result. No recalibration is needed. (< 0.5°).
Good	This calibration result is well-suited for eye tracking (< 0.7°).
Moderate	This calibration result is acceptable but you should try to improve your result with a re-calibration (< 1°).
Poor	This is not an optimal calibration result. You should try to improve your result by re-calibrating (< 1.5°).
Re Calibrate	Your current calibration result is no good for eye tracking. Re-calibrate after verifying that you have good tracking.
Un Calibrated	You are not calibrated. If you see this after a calibration you need to restart EyeTribe UI.

As stated earlier, the evaluation window appears after each completed calibration. If you want to disable this feature you can do so on the options tab. The UI will always show the latest calibration rating in the bottom-part of the trackbox in EyeTribe UI.

Calibration Tab

The Calibration tab allows users to control and change the properties of the calibration through the following options:

Number of points

Are used to indicate the number of evenly distributed points displayed during the calibration routine. The panel allows you to choose between 9, 12 and 16 points. The default number of calibration points is 9 but it is not uncommon to increase the number for higher accuracy.

Monitor selection

Allows you to select your preferred monitor under which you have placed your Eye Tribe Tracker. Any detected monitor is shown in the dropdown list with its device name and maximum resolution.

Area size (width/height)

Shows the given width and height of the selected monitor in pixels. By specifying a lower width or height it is possible to run a calibration on a subsection of the screen, which may be helpful when using a large monitor.

Alignment (horizontal/vertical)

Allows to place the reduced calibration area horizontally and vertically. Horizontal alignment allows you to align the reduced calibration area in the following manner: Left, Center and Right, while vertical alignment allows you to align the reduced calibration area in the following manner: Top, Center and Bottom. The Alignment controls are enabled when the default Calibration Area Size is modified.

The image below shows an example of a reduced calibration area placed on the active monitor with horizontal and vertical alignment. The horizontal and vertical alignment is set to Center and Bottom, respectively. The calibration targets will only appear in the limited window and you cannot expect good calibration results outside the calibrated area.

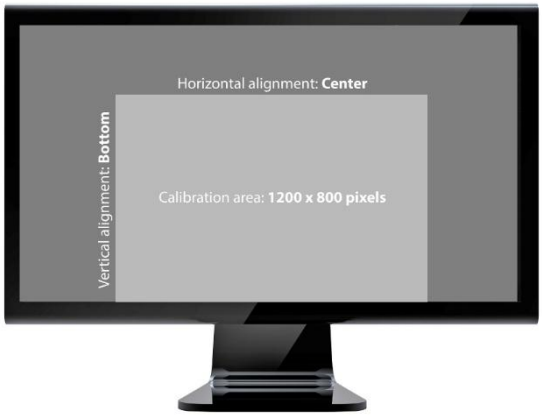


Figure: the image shows a reduced calibration area of 1200 x 800 pixels with horizontal alignment set to center and vertical alignment set to bottom.

Color (background/point)

The color selector allows you to change the background color and target color for your calibrations. The color selector allows you to configure an RGB value of your choice. The color selector is depicted in the image below.

Pro tip!

For best results the background color of the calibration should match the average color of the application that you would like to do eye tracking with.

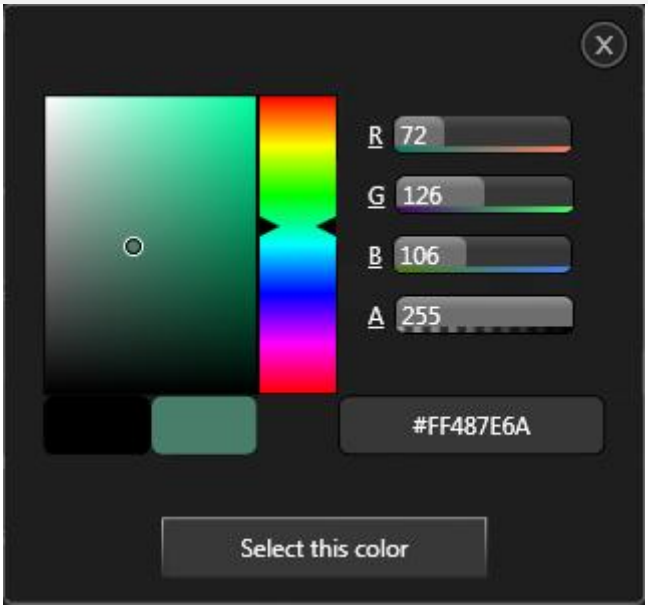


Figure: color selector in EyeTribe UI.

Point sample time

Allows you to change the display time for each target during the calibration process. For some users it helps to increase the sample time as it allows the user to fixate on

the target. You can choose a display time between 500 ms (half a second) up to 2000 ms (two seconds). A good starting point for the point sample time is about 750 ms.

Options Tab

The options tab allows users to control the following features provided by EyeTribe UI.

API console

The API Console is a tool that allows you to see and record the data received from the EyeTribe Server. For an in depth description of the frame object that contains gaze data, You can find out more about frame object under Category Tracker in the API Reference. Note that the server will only output gaze coordinates when a successful calibration has taken place.

Figure: The API Console displays the data send from and to the Eye Tribe Server.

Pro tip!

If you wish to inspect individual messages sent over the protocol you can always pause and resume the stream by hitting the Pause and Play button respectively. If a certain packet type is of interest you may filter the results by entering a string in the textbox.

If you wish to save the stream to file click the 'Record to file'-button. After activating this feature the console output is paused and redirected to a text file.

Figure: You can record the data to a text file if you are interested in offline data analysis.

Online API help

If you issue a click on the Go button for the API help EyeTribe UI launches your default browser to the online documentation, which is located at http://dev.theeyetribe.com/general/. In the online documentation you can navigate to any section of your interest. EyeTribe UI will continue to run in the background even though it may be covered by the default browser's window.

Start In Demo Mode

By default the software will start in demonstration mode unless you disable this feature. This checkbox allows you toggle this feature ON and OFF. The setting will be applied the next time EyeTribe UI is started.

Mouse Gaze Redirect

Once the system has been calibrated the EyeTribe UI allows you to redirect mouse cursor to the gaze position. A panel with a stop icon will appear as seen in the image below.

Figure: panel that indicates that mouse gaze redirection is enabled.

You can disable the mouse gaze redirection either by looking at the stop icon for half a second. If tracking is poor you can cover the sensor with your hand and manually click on the stop icon.

Mouse Stabilization

Mouse stabilization enables smoothing the gaze signal to reduce jitter, hence improving gaze control of a UI or the cursor.

- References

https://theeyetribe.com
https://theeyetribe.com/dev.theeyetribe.com/dev.theeyetribe.com/general/index.html