Tobii Pro VR Analytics

Product Description

1. Introduction

1.1. Overview

This document describes the features and functionality of Tobii Pro VR Analytics. It is an analysis software tool that integrates into new or existing Unity environments and enables collection and playback of eye tracking data. Once integrated it provides functionality for recording and analyzing a range of human behaviors, including automated visualizations and analytics for interaction, navigation and eye tracking data. Playback and analytics are available for both individual and combined, multi-participant sessions. The automated statistics ensure the rapid availability of results after recordings are completed.

> This document applies to Tobii Pro VR Analytics. This software is continuously being developed and refined. Please visit https://www.tobiipro.com/product-listing/vr-analytics/ for the most recent specifications for the software and for the latest version of this document

1.2. Compatible VR headsets

Tobii Pro VR Analytics has been designed to work with genuine eye-movement data, which requires a VR headset with integrated eye tracking from Tobii to access the gaze-based capabilities.

Tobii Pro VR Analytics supports the following VR headset:

- HTC Vive Pro Eye
- Tobii Pro VR Integration – Based on the HTC Vive HMD (not available for sale anymore)

1.3. Compatible Unity versions

Tobii Pro VR Analytics is continuously updated to work with the latest Unity version. To benefit from the latest functionality of Pro VR Analytics it is required that the latest compatible Unity version is used. Section 3 in this document describes how the Plug-in into Unity works and is good to read to understand if the Unity environment is compatible with Pro VR Analytics. Pro VR Analytics have been tested with the versions listed below.

Tobii Pro VR Analytics version 1.2 supports:
- Unity version 2018.2.0f2

- Unity version 2018.3.11f1

- Unity version 2018.4.0f1 LTS

- Unity version 2019.1.2f1

1.4. License models

Pro VR Analytics is available in two different license models: a perpetual-based license model and a subscription-based license model.

- The subscription license is available as one-year contracts and gives access to the latest software versions as soon as they become available during the contract period.
- The perpetual license gives access to the software and includes one year of free upgrades. After the first year, an annual upgrade contract is required to keep your software updated.

When acquiring a license for Pro VR Analytics a Unity package is provided and needs to be integrated into an existing or new Unity project. A license contains one headset activation (if not more

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are added) and you can create as many Unity environments as desired. Each of the created environments use the same license to record with the activated VR headset(s). To record with several VR headsets, it is required to add additional headset activations to your license (one for each recording VR headset), contact your Tobii Pro sales representative in such case. There is no limitation on how many recordings can be done in one environment or how many computers that can run the replay and analysis features.

1.5. Example use cases

Tobii Pro VR Analytics can be used for a broad range of research applications, such as:

- Market research
- Human behavior research
- Wayfinding research
- Training and performance optimization
- Medical research and testing
- UX and interface design

2. Functionality

The current capabilities of Tobii Pro VR Analytics are:

2.1. Record

- Calibrate participants (5-point calibration)
- Record eye movements (120Hz with Pro VR Integration – Based on HTC Vive and HTC Vive Pro Eye)
- Live view of gaze cursor during recording on external screen
- Toggleable live view of gaze cursor inside HMD
- Ability to enter participant name and gender for recordings

2.2. Replay and visualizations

- Replay of single participant recordings
- Replay of multiple participant recordings
- First-person camera view replay with gaze point visualization.
- Scene camera view of replay (if camera objects are available in the Unity project)
- Free moving replay camera
- Picture in Picture (PIP) dual-replay view
- Avatar representation of a participant's head position and orientation on playback
- Avatar color-coded to identify recording/user
- Avatar color-coded to represent gender of participant
- Heat map visualization of fixations rendered on the object surfaces in the Unity environment
- Opacity map visualization of fixations rendered on the object surfaces in the Unity environment
- Gaze Point with an adjustable size shown per participant in Scene camera view.
- Gaze Ray visualization shown per participant in Scene camera view
- Path map (breadcrumbs visualized on the Unity environment floor)
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2.3. Metrics

Eye tracking metrics for all objects in the environment – available in total after recording is complete or in real time as replay is progressing:

- Fixations (count)
- Fixations (total duration)
- Fixations (average duration)
- Time to First Fixation

When interaction is enabled, interaction measures and statistics for all objects in the environment are available in total after recording is complete or in real time as replay is progressing:

- Interactions (count)
- Interaction Time (total duration)
- Time to First Interaction
- Fixation to Interaction

All metrics are available in the Unity application or as a CSV export for offline processing in Excel etc.

3. Unity Plug-in description

Tobii Pro VR Analytics (VRA) is a plug-in solution that is imported into a Unity project to enable it with data recording, sessions replay and calculation of eye tracking and interaction metrics. In order to do this, VRA provides specific systems for parts of the functionality, including interactions and movements. The full Integration Manual for how Pro VR Analytics is integrated into a Unity project can be found on the Tobii Pro website, https://www.tobiipro.com/product-listing/vr-analytics/.

> ⚠️ If the provided interaction system are not used, all the functionality of the software will not be available in the Unity scene

3.1. Interaction system

VRA comes with its own interaction system. The interaction system is the system that works together with the Vive hand controllers and makes it possible for the participant to pick up objects in the environment. With the VRA interaction system, the participant can pick up objects and the objects snap back to their original positions as the participant lets go of the objects. Since VRA records the interactions performed with its own interaction system, it can replay those interactions.

VRA does not record interactions performed with a different interaction system and cannot replay nor get interaction metrics data for those interactions. If a different interaction system than the VRA interaction system is used, replaying interactions and interaction metrics will not work.

3.2. Movement system

VRA comes with its own movement system. The movement system is the system that works together with the Vive hand controllers that lets the participant move around the scene by using the trackpad to teleport or glide. VRA still supports having customer character control systems such as Steam VR.

3.3. Multiple scenes

VRA is designed to record and replay one scene at a time and thus, does not support multiple scene setups. If several scenes are needed in your project, the scenes shall be integrated one by one with VRA.

3.4. Dynamic scene data

VRA does not record any dynamic scene data other than participant actions. In other words, objects (other than the participant) moving, objects changing shape (mesh deformation) and sound playing in the scene etc. will not be recorded together with the participant. Such dynamic scene data will not be synced with participant recordings. Eye tracking metrics for objects that move or change shape will work.

3.5. Object spawning

Object spawning is not supported in VRA. Objects that are created dynamically and placed into the environment will not get eye tracking data.

3.6. Level of Detail

Level of Detail (LOD) is not supported in VRA. LOD is used to optimize rendering, so that objects that are far away from the camera are rendered with less detail than objects close to the camera. With LOD, multiple meshes can be used for an object depending on the distance to the camera. If LODs are used, heatmaps will not be rendered correctly. For multiple meshes to be treated as the same object in metrics the meshes belonging to the same object should have the same name.

4.   System requirements

Recording sessions with Tobii Pro VR Analytics are done with the Tobii Pro VR Integration and a compatible VR headset. To secure a smooth and immersive experience in VR, consistent performance and proper recording of sessions it is crucial to meet the computer systems requirements for the VR headset used.

Component	Recommended PC requirements for HTC Vive
Processor	Intel Core i5-4590/AMD FX 8350 equivalent or better
GPU	NVIDIA GeForce GTX 1060, AMD Radeon RX 480 equivalent or better
Memory	4 GB RAM or more
Video output	HDMI 1.4, DisplayPort 1.2 or newer
USB port	1x USB 2.0 or newer
Operating system	Windows 7 SP1, Windows 8.1 or later, Windows 10

You can also use the [HTC Vive Performance Test](#) to test if your computer is VR-ready.

To run <u>replay and analysis</u> with Pro VR Analytics a computer with lower specifications could still work, but it will be highly dependent on the environment.

> Depending on its size and complexity, each VR environment can require a different level of computer performance. Complex lighting/shading and photorealistic environments are more resource-intensive, while smaller, simpler environments can be run for analysis purposes on a computer with lower specifications

Appendix A. Scene Performance in VR

To carry out an effective study in VR, the environment should be immersive, which implies that it needs to run smoothly in VR. Optimize the scene so that it can run at a high frame rate within the VR headset before integrating with Tobii Pro VR Analytics. The largest performance hit comes with enabling the Unity project for VR. The computer needs to draw one camera for each eye, so it's basically twice as heavy to run a VR enabled scene compared to a one-camera Unity scene. Typically, fps drops by half when enabling VR. How large the performance impact from Tobii Pro VR Analytics is depends on the complexity of the scene, but it is small compared to enabling VR. We recommend that the environment should be running in at least 90 frames per second after integrating with Tobii Pro VR Analytics when running in the VR headset. Below, some basic tips for optimizing the scene are outlined:

- Real-time lighting is costly in terms of performance. Use it only when absolutely necessary. Many times, baking the light gives a good enough result.
- Decrease the resolution of textures and meshes in the scene.
- Use primitive shape colliders as much as possible and avoid mesh colliders, since they are performance heavy. On the other hand, for some objects in the scene, it might be necessary that the eye tracking rays hit a surface that follow the shape of the object precisely.
- Use a smaller number of objects in the scene.