

ViewPoint EyeTracker® for BIOPAC Eye Tracking Systems

PC-60 Scene Camera Option Users Guide

BIOPAC Eye Tracking Systems	Monocular	Binocular
Eye Track Sys: Fixed Head+Clamp	EYEFIXMONOCLAMP	EYEFIXBINOCLAMP
Eye Track with HMD1	EYETRAKHMD1MONO	EYETRAKHMD1BINO
Eye Track for HMD2	EYETRAKHMD2MONO	EYETRAKHMD2BINO
Eye Track for 3rd-Party HMD	EYETRAKHMD3RDMO	EYETRAKHMD3RDBI
Eye Track System: Fixed Head	EYEFIXMONO	EYEFIXBINO
Eye Frame Mounted Scene	EYEFRAMESCENEMO	EYEFRAMESCENEBI

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Introduction

The Scene Camera option allows ViewPoint EyeTracker® users to track gaze position on a real world scene video being captured from a head mounted scene camera.

This guide gives details of those features that are unique to the Scene Camera system. It is essential that you familiarize yourself with the ViewPoint PC-60 Users Guide to be able to get the most from your eye tracker.

Features

- Eye movement data recorded at 60Hz
- Monocular or binocular options available
- Gaze video overlay on head mounted color or black and white head mounted scene camera (up to 30 fps)
- Save scene movie with gaze overlay to hard drive for replay in ViewPoint
- Black and white 60 degree horizontal field of scene camera. **OR.**Color 70 degree horizontal field of scene camera.

Software included

ViewPoint EyeTracker® PC-60 software with Scene Camera option enabled.

Hardware Included

EyeFrame™ includes:

- 2 cameras, and lightweight precision eyewear.
- Video capture card (30Hz / 60Hz real-time selectable)
- All cables (power & two video channels)
- Transformer

Documentation

This document only gives details about features of the ViewPoint EyeTracker® that are specific to the SceneCamera option. It is essential that you read the ViewPoint EyeTracker® PDF users guide to be able to use the eye tracker successfully.

Installation

Refer to Chapter 3 in the ViewPoint PC-60 users guide for installation of the PC-60 software and frame grabber. The software assumes the following connections to the PCI frame grabber:

- Composite input #1 Eye A (monocular is Eye A)
 - Yellow male RCA plug
- Composite input #2 Eye B (if binocular option)
 - Red male RCA Plug
- Composite input #3 Scene Camera White male RCA plug
- Composite input #4 Not used
- White Sync connector
- Not used

Setup

1. Place the EyeFrame glasses on the subject and tighten the strap to minimize movement on the head.
2. Adjust the position of the EyeCamera to obtain an image of the eye where the pupil is in the center of the EyeCamera window when the subject is looking straight ahead.

IMPORTANT

Refer to Chapter 4 in the ViewPoint PC-60 users guide for descriptions of the eye camera image setup and thresholding of the eye image.

3. Select menu item: Stimuli > View Source > SceneCamera. This will cause the scene camera image to be displayed in the [GazeSpace](#) window. It also changes the calibration mode to snap and increment (refer to EyeSpace window advance settings) and causes the calibration stimulus point array to be displayed in the GazeSpace window. (refer to Controls window, DataDisplay tab, Calib Region gaze window check box)
4. Adjust the scene camera so that the center of the subjects straight ahead field of view is at the center of the image.
5. If necessary, adjust the brightness and contrast of the scene camera image using the controls window scene tab. Reduce brightness such that overlays are visible.

Calibration

Calibration is performed relative to the pixels of the CCD array, NOT the image content. This is analogous to calibrating relative to the CRT screen and NOT the image displayed on it. After ensuring successful eye image thresholding as described in the ViewPoint PC-60 users guide, perform the following calibration steps to provide position of gaze with respect to the scene camera image.

1. Ask the subject to stand or sit comfortably and to remain still for the duration of the calibration process. They do not need to look at the computer screen.
2. Position a pen or your finger in front of the subject so that the tip appears inside the [GazeSpace](#) window in the active (blue) calibration circle.
3. Ask the subject to move their eyes (keeping their head still so that the pen remains in the active calibration point) to look at the tip of your pen.
4. When you are sure that they are looking at the point (ask for verbal confirmation) select the [re-Present](#) button on the [EyeSpace](#) window. The asterisk on this button indicates "snap" presentation mode and the ++ indicates "Auto-increment". The F8 key can be used as a shortcut key for this button.
5. Repeat steps 2-4 with each active calibration point until you have completed the set.
6. Refer to the plot of the calibration data points in the [EyeSpace](#) window. Successful calibration will be indicated by a rectilinear and well-separated configuration of green dots corresponding to the locations of the pupil at the time of calibration point capture. Uniform curvature of the field of dots is acceptable.
7. Stray calibration data points can be identified and re-calibrated. Select the stray calibration point by left mouse clicking the point in the [EyeSpace](#) window. Alternatively the data point slider in the [EyeSpace](#) window allows the user to select stray calibration points to be recalibrated. The active data point is highlighted in the graphics well.

8. Repeat steps 2-4 for the stray calibration point. This exercise can be repeated with as many calibration data points as necessary. If the calibration points are not rectilinear, for example, there are lines crossing, then complete re-calibration is necessary.
9. A quick check of calibration accuracy may be done by asking the subject to look at particular points on the stimulus and using the [GazeSpace](#) window to verifying that the gaze point matches up with the points looked at.
10. A consistent offset in position can be corrected using the slip correction feature. Select a calibration data point in the middle of the group. Repeat steps 2-4 above but press the Slip-Correction button instead of the re-Present button. This automatically adjusts the calibration to compensate for the measured slip in the X and Y planes. Try to use at least 9 calibration points, 16 points usually provides very good calibration. It is good practice to integrate slip-correction into your experiments. The line of sight of the scene-camera is not exactly the same as that of the eye. This will cause a slight constant offset if the calibration point distance is different from the distance of the gaze point.

Recording and Playing Scene Movies

When scene camera option is enabled, a scene movie with gaze position overlays will be recorded whenever a data file is recorded. To play back a previously recorded eye movie select menu item: [Data > Play Scene Movie](#). The scene movie will show a red blob over the gaze point.

Movie Format

The default saveMovie_type is set to VPM (ViewPoint Movie format). Currently the AVI movies are not compressed and are limited to less than seven minutes. If longer movies are required, you must use VPM format.

Data Collection and Analysis

You can use the VPM_Viewer.exe program in the Data folder to play VPM movies. This program is still under development and we welcome your feedback.

The included DataAnalysis program will play recorded AVI movies with the gaze position overlaid.

Custom Projects & Suggestions

We are happy to discuss custom modification of the **Scene Camera** program and EyeFrame™ or any of our other software or hardware products. Our products are largely customer driven, so your insights and suggestions are important to us. Please report any problems as soon as possible, a work-around may be easy for you, but may not be so clear for another user.

Contact Information

Please visit our website frequently for updates and new product announcements. www.biopac.com > [eye tracking](#) or send email to: support@biopac.com.