

EyeLinkServer

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Contents

1	Purpose	1
2	How it works	1
A	Commands	2
A.1	General Commands	2
A.2	Target Creation	2
A.3	Target Commands	3
A.4	EyeLink Specific Commands	3

1 Purpose

`EyeLinkServer.exe` for the EyeLink eye tracker

`iRecServer.exe` for the iRec eye tracker

These servers are intended to be controlled by a client application. They also provide information for that application. They monitor the gaze locations of a subject by means of EyeLink eye tracker. Any number of client applications can read the current eye position from the servers through “shared memory”. They can also monitor target regions on the subject’s screen and create events whenever the gaze position enters or leaves such a region.

Events are also generated when blinks are detected by EyeLink. Optionally the server can be configured to generate “leave” events when blinks are detected (this may simplify the client’s event handling logic).

The servers communicate with the eye trackers through a dedicated Ethernet link. Communication with the client is through a pipe and various kernel32 events.

2 How it works

Coordinates: (0,0) is the center of the screen. Positive values going to the right and up respectively. The auto reset event named `EyeServerDone` is signaled after server startup

and when a "stop" command finishes (with EyeLink this may take some time when an .edf file is transferred).

The regions are drawn in the server's main window and if EyeLink is in idle mode when the target is created, also on the EyeLink computer's screen.

shared memory name and structure

A Commands

Commands are sent through the named kernel32 pipe `EyeServerPipe`.

A.1 General Commands

[00 0 0] stop recording. EyeLink specific: If a file was specified in the start command, a file selection dialog will open. You may specify a destination for the .edf or abort the dialog (then the .edf will not be copied).

[00 0 0 filename] stop recording (and copy .edf to the specified file).

[00 0 1 width height] set screen size. With EyeLink this command is not needed if the .INI files contain valid entries.

[00 0 2] start eye tracking. Withe EyeLink the recording is started without .edf

[00 0 3] remove transformation

[00 0 3 x0 y0 x1 y1] set coefficients (single precision floating point) for a linear transformation

[00 0 3 x0 y0 x1 y1 x2 y2] set coefficients (single precision floating point) for a quadratic transformation

[00 0 3 x0 y0 x1 y1 x2 y2 x3 y3 x4 y4 x5 y5] set coefficients (single precision floating point) for a mixed term quadratic transformation:

$$\begin{aligned}x' &= x_0 + x_1 \cdot x + x_2 \cdot y + x_3 \cdot xy + x_4 \cdot x^2 + x_5 \cdot y^2 \\y' &= y_0 + y_1 \cdot x + y_2 \cdot y + y_3 \cdot xy + y_4 \cdot x^2 + y_5 \cdot y^2\end{aligned}$$

A.2 Target Creation

Each target creates two named manual reset kernel32 event objects: `nameIn` and `nameOut`. These events are set when the eye position enters or leaves the target region. In general the other event is reset at the same time. This behaviour can be switched off through a command (see below).

You have to read the key of the newly created target as a 16 bit unsigned integer after issuing this command.

If these commands are issued while the tracker is in offline mode (not recording) then the target regions are also drawn on the tracker's screen.

[00 1 x y r name] create a circular target with radius **r** at position (x,y). **x**, **y**, **r** are single precision floating point values.

A.3 Target Commands

[kk 0] remove target.

[kk 1] force target to generate **Out** events on blinks.

[kk 2] disable the exclusive signaling mode for the target.

[kk 3 flagBits] set the flag bits for the target.

1 signal **StimServerEndDeferredMode** event when the eye position enters the target region.

2 signal **StimServerEndDeferredMode** event when the eye position leaves the target region.

A.4 EyeLink Specific Commands

[00 0 2 filename] start recording. The **filename** has to be specified with the extension (**.edf**) included. Note that this specifies the name of the file on the remote EyeLink computer. The filename is restricted to 8 characters (plus extension). Consider to always use the same filename. This will prevent the remote disk from filling up over time.

[00 0 4 message] pass **message** to EyeLink to be stored into the **edf** file.

[00 0 5] switch to sample mode. This command has to be executed before recording is started. *Sample mode needs extensive resources compared to the normal mode (fixation update).*

[00 0 6] enable saccade detection. This command has to be executed before recording is started.

[00 0 7] signal the next EyeLink start saccade event by setting the kernel32 events **StartSacc** (auto reset) and **StimServerEndDeferredMode** (manual reset).

A.5 iRec Specific Commands

[00 0 8 number] sends a 32 bit number to the (iRec) UDP port.