Mirametrix S2 Eye Tracker

USER GUIDE

Version 2.3
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www.mirametrix.com

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1 S2 TECHNICAL SPECIFICATION

- Accuracy: <1º of visual angle
- Head Motion: 25x11x30 cm (Width x Height x Depth)
- Data Rate: 60 Hz
- Binocular Tracking: Yes
- Tracking Type: Bright Pupil
- Infrared Intensity: <1 mW per cm^2 (Exceeds IEC 60825 and NIOHS safety requirements)
- Data Server: Software based, source code included

2 INSTALLATION

2.1 Recommended System Configuration

- Windows XP SP2, Vista or Windows 7
- 1 GB of RAM
- Intel 2.0 GHz or greater (Dual core highly recommended)
- 15 – 22" LCD Monitor
- Available powered USB 2.0 port

2.2 Equipment Provided

- Mirametrix S2 Eye-tracking system
- Tripod stand
- USB 2.0 data cable
- 12V 0.5 Amp power supply
- System software available at www.mirametrix.com

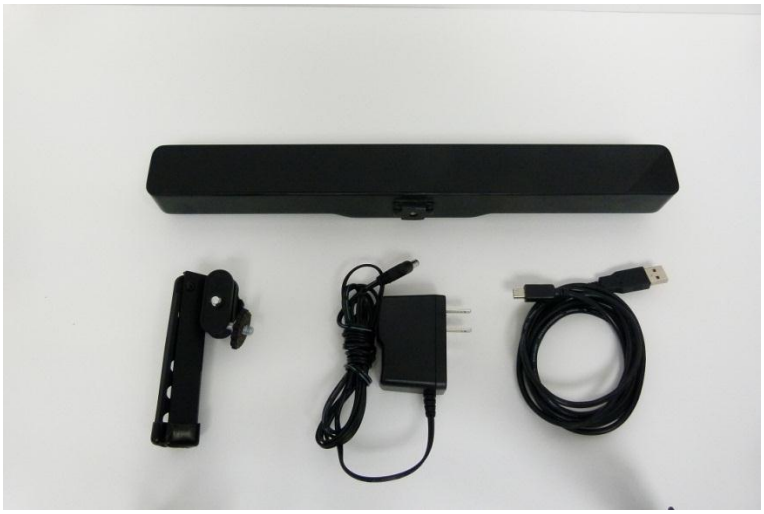

Figure 2-1: Mirametrix S2 eye tracker, power supply, USB cable, and tripod

Figure 2-2: Eye tracker with desktop screen

Figure 2-3: Eye tracker with laptop

2.3 System Placement

The Mirametrix S2 eye tracker should be located beneath the computer screen when used in a desktop environment as shown in Figure 2-2 or in front of the screen when used with a laptop shown in Figure 2-3. The eye tracker should be centered beneath the screen and as close to the lower edge of the screen as possible. Ensure the eye tracker is level using the universal joint adjustment on the tripod. For laptops an external keyboard and mouse provides better access to the computer around the eye-tracker.

For best performance the eye tracker should be approximately arms-length from the face of the user or approximately 65 cm. The S2 system should also be operated away from sources of infrared light such as incandescent light bulbs and external windows.

2.4 Software Installation

Using the latest system available on-line at www.mirametrix.com run the software installer. Do not connect the USB cable until the software has finished installing and the camera drivers installed. If the camera driver was not automatically installed correctly, follow the hardware installation guide when connecting the system:

- Click “Install from a list or specific location” and then click “Next”.
- Select “Don’t search. I will choose the driver to install” and “Next”.
- Click “Have Disk” and browse to C:\Program Files\Mirametrix\Tracker\driver, click “Open” then “OK”.
- Select the camera and click “Next”.
- You will be prompted to continue installation - click “Continue Anyway” then “Finish” to complete installation.

Installation is complete.

3 OPERATION

3.1 Basic Operation

The included Tracker software provides the eye-gaze tracking functionality for determining where the user is looking on the screen. The Tracker program can be found under the start menu at **Start ->Programs->Mirametrix->Tracker->Tracker**. The tracker runs in the system tray as shown in Figure 3-1. Double click the system tray icon to bring up the main menu as shown in Figure 3-2.

Figure 3-1: Tracker Icon

The main window of Tracker shows a real-time image from the camera, with the left and right eye identified. The left eye should be outlined with a green rectangle, while the right eye should be outlined with a red rectangle. Both eyes should have a small cross centered on the pupil, indicating proper operation. The depth estimate bar is also shown in the display image, where the center of the green region is the ideal head position. There are three buttons in the Mirametrix Tracker Software:

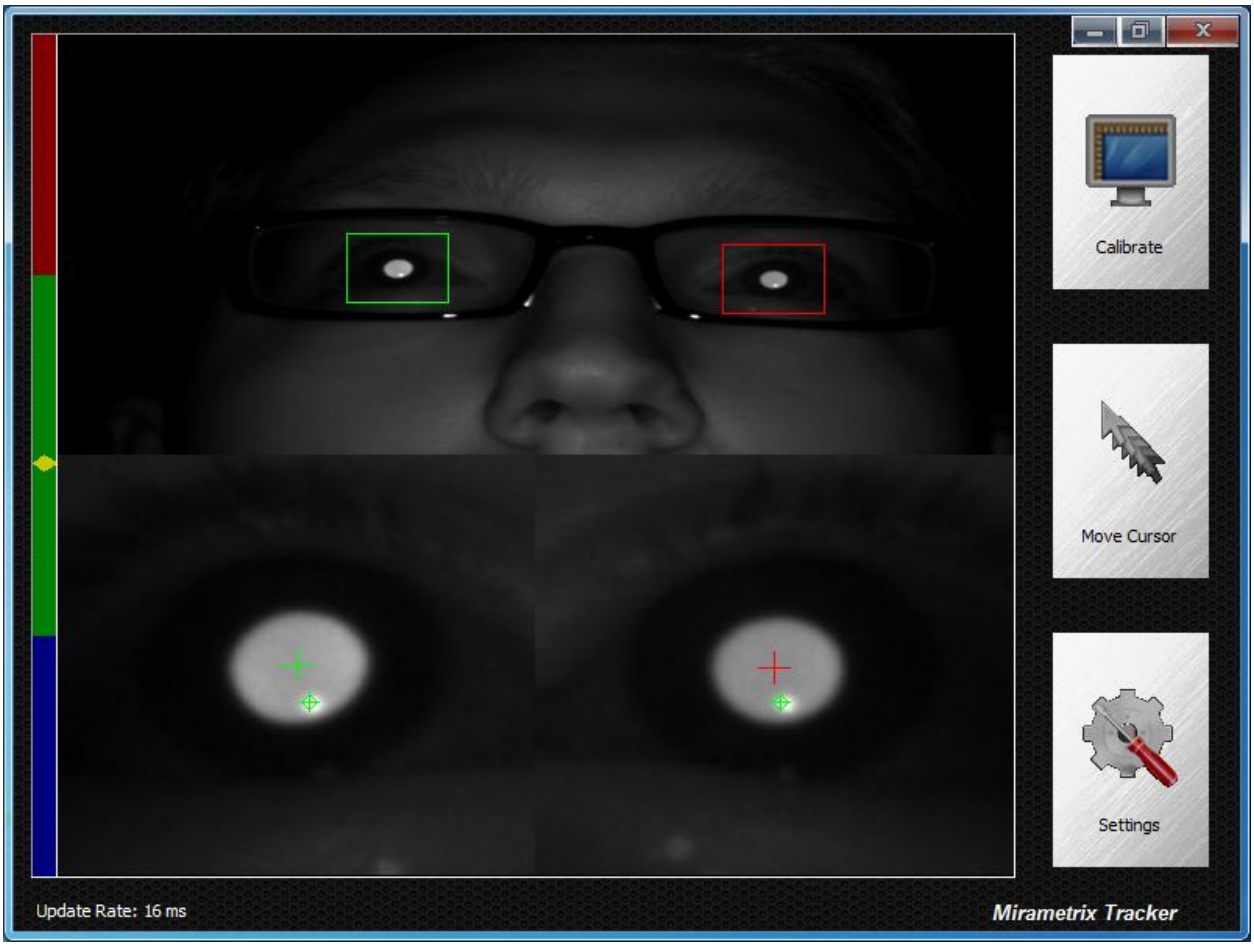

Figure 3-2: Tracker Main Window

- The *Calibrate* button begins the calibration procedure which is required for accurate eye tracking. Calibration is only required once per user, or after the eye tracking unit or screen is moved. Calibration involves looking at a sequence of nine points on the screen. Calibration data is automatically saved at the end of the calibration procedure. Press escape to hide results.
- *Move Cursor* button can be selected to link the mouse cursor position to the users point of gaze on the screen, providing visual feedback on where the user is looking.

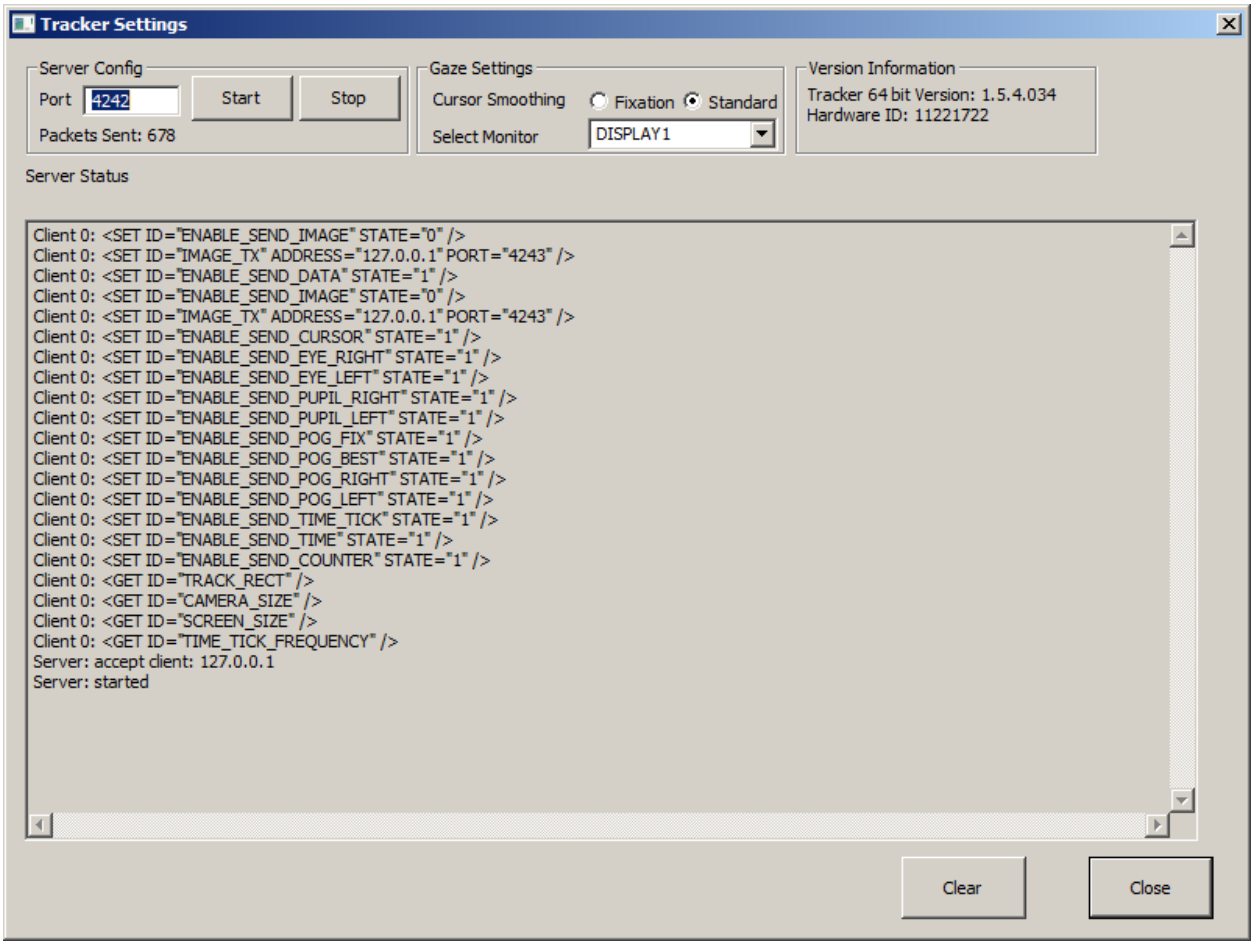

Figure 3-3: Tracker Configuration Window

- The *Settings* window is shown in **Error! Reference source not found.**
    - *Server Config* contains settings for remote operation that is performed through IP communication using XML data strings. The server port must be specified (defaults to 4242) and the server started before remote operations can take place.
        - The *Port* box allows you to select the port over which the tracker will broadcast data
        - The *Start* button turns on the TCP/IP server

        - The *Stop* button turns off the TCP/IP server
        - Remote operation is described further in the Mirametrix API guide. Example applications illustrating remote operation can be found in the installation directory.
    - *Gaze Settings*
        - Cursor Smoothing
            - The *Fixation* option processes the eye-gaze data to detect fixations and remove saccades when moving the mouse, resulting in a faster response.
            - The *Standard* option uses a simple moving window average to filter the eye-gaze data when moving the mouse, resulting in a smoother but slower response.
        - The *Select Monitor* option allows the tracker to be used on any screen on a multi-monitor system.
    - *Version Information* shows the tracker *Hardware ID* and the version of the Tracker software running.

4 TROUBLESHOOTING

4.1 The system is having difficulty tracking the eyes

Check the image of the users face from the main screen. The image of the users face can then be enlarged to determine why tracking is failing.

- Ensure that both of the users eyes are within the field of view of the camera.
- Ensure the users eyes are clearly in focus. The distance for best focus is approximately 65 cm or arm's-length from the user.
- Ensure that there is little ambient infrared light that may interfere with the system. Keep the system away from bright windows.
- If the user is wearing eyeglasses, tilt their head slightly back or alternatively tilt the eye tracker upwards to prevent reflections from interfering with the eye tracking.

4.2 The user image appears frozen or torn

The eye tracker requires most of the bandwidth and power of a USB hub and plugging other devices into the same hub may result in corruption of the image as it is transferred from the eye tracker to the computer. This corruption appears as frozen or torn images.

The eye tracker should ideally be connected directly to the computer with few other devices plugged into the same internal USB hub as the eye tracker. On some computers the front USB ports are on a separate hub from the rear USB ports. Lower bandwidth and power devices such as keyboards and mice are less of an issue, however external hard drives may be more problematic.

4.3 The point-of-gaze estimate is erratic near the edges of the screen.

The eye-tracker works best on 15-22'' screens. If the screen is too large, the tracker will have difficulty near the edges of the screen. Moving the screen further back, while still maintaining an arm's-length distance from the tracker to the user may reduce this problem.