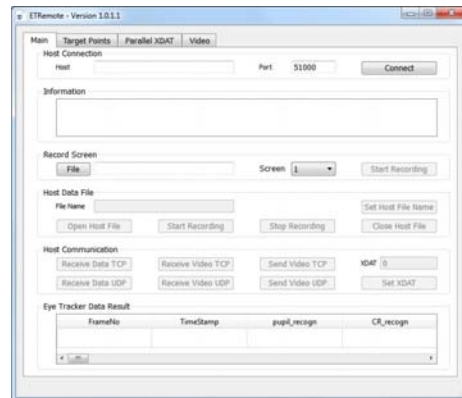


Eye Tracker Systems Manual

ETRemote for use with ETMobile

MANUAL VERSION 2.0

July, 2016



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1 General Description

An application called ETRemote, intended to run on an external Win7 PC, is supplied with the ETMobile (ETM) system. ETRemote can connect to the ETMobile via a local area network (LAN or wireless LAN) connection. It can receive and display data and video from the ETMobile system, control data recording on ETMobile, send XDAT values to ETMobile for recording along with gaze data, and record a screen video file on the external PC. The screen video, recorded as a wmv file with approximately 15 Hz update rate and 640 x 480 resolution, shows whatever is displayed on the external PC screen, and can be set to start and end synchronously with the beginning and end of data files recorded by the ETMobile PC. If the external PC is driving multiple screens, ETRemote can be set to record any one of these screens.

The ETM PC laptop, supplied with ETMobile systems, can be connected, with an HDMI cable, to an external monitor which can operate as “screen 2” of an extended display. The ETM PC second screen can be used as a subject stimulus screen, and can be recorded by ETRemote. In this case ETRemote would run on the ETM PC rather than on an external PC.

The network communication protocol used by ETRemote to interact with the ETM system is described in a separate manual (NetworkCommWithETMobile.pdf), and can be used by user created programs to interact with ETMobile systems.

Some typical applications for the ETRemote application are described below.

Example 1

It may be desirable for people other than the equipment operator (perhaps the customer for an advertising or usability study) to monitor real time results from a separate location. ETRemote can be used, via a LAN, on a PC in the remote location, to display the same image seen on the ETM PC by the equipment operator.

Example 2

Normally, if a test or experiment calls for a test subject to walk about, the ETM is set up so that the DTU communicates with the ETM PC via WiFi, and the subject need only carry the optics and the DTU, while the ETM PC remains with the equipment operator. However, in some environments this may be a problem either because the subject must travel too great a distance for good WiFi reception, or because the environment interferes with WiFi reception.

If the environment has a wireless LAN capability (E.g. a large store), and if it is not a problem for the ETM PC to stay with the test subject (for example, in a shopping cart being pushed by the subject), then the ETM PC and DTU can remain connected by a network cable, and ETRemote can be used to monitor performance and control data recording, via wireless LAN, from a stationary PC. Data and video will still be recorded on the ETM PC, and will not be affected by any WiFi transmission problems.

Example 3

If the optional ET3Space feature is being used, the system can record gaze position with respect to stationary surfaces in the environment. One of these surfaces can be a stimulus display monitor, driven by an external PC. If ETRemote is used to record the screen synchronously with ET3Space data, ETAnalysis can be used to superimpose gaze on the screen recording. Moving (or stationary) Areas of Interest can be defined on the screen recording, and gaze can be displayed and analyzed with respect to these areas. See the ET3Space manual for a description of the ET3Space feature (note that a head tracking system is required). See the ETAnalysis manual for a description data analysis using scene video files.

Example 4

If gaze data is collected as subjects view an external PC display, and if the data is to be analyzed using the optional Stim Track feature available with the ETAnalysis program, it is required that the external PC screen image be recorded on a video file that begins and ends at the same times as the data and video recorded by the ETM system. If the external PC is running Win7, this screen recording function can be provided by ETRemote. (See ETAnalysis manual for detailed description of Stim Tracking). If the primary surface of interest is a single stimulus display monitor, data analysis capabilities, with Stim Track, are similar to those for data collected with ET3Space. The difference is that an extra data processing step is needed, but an external head tracking device is not required as it is for ET3Space.

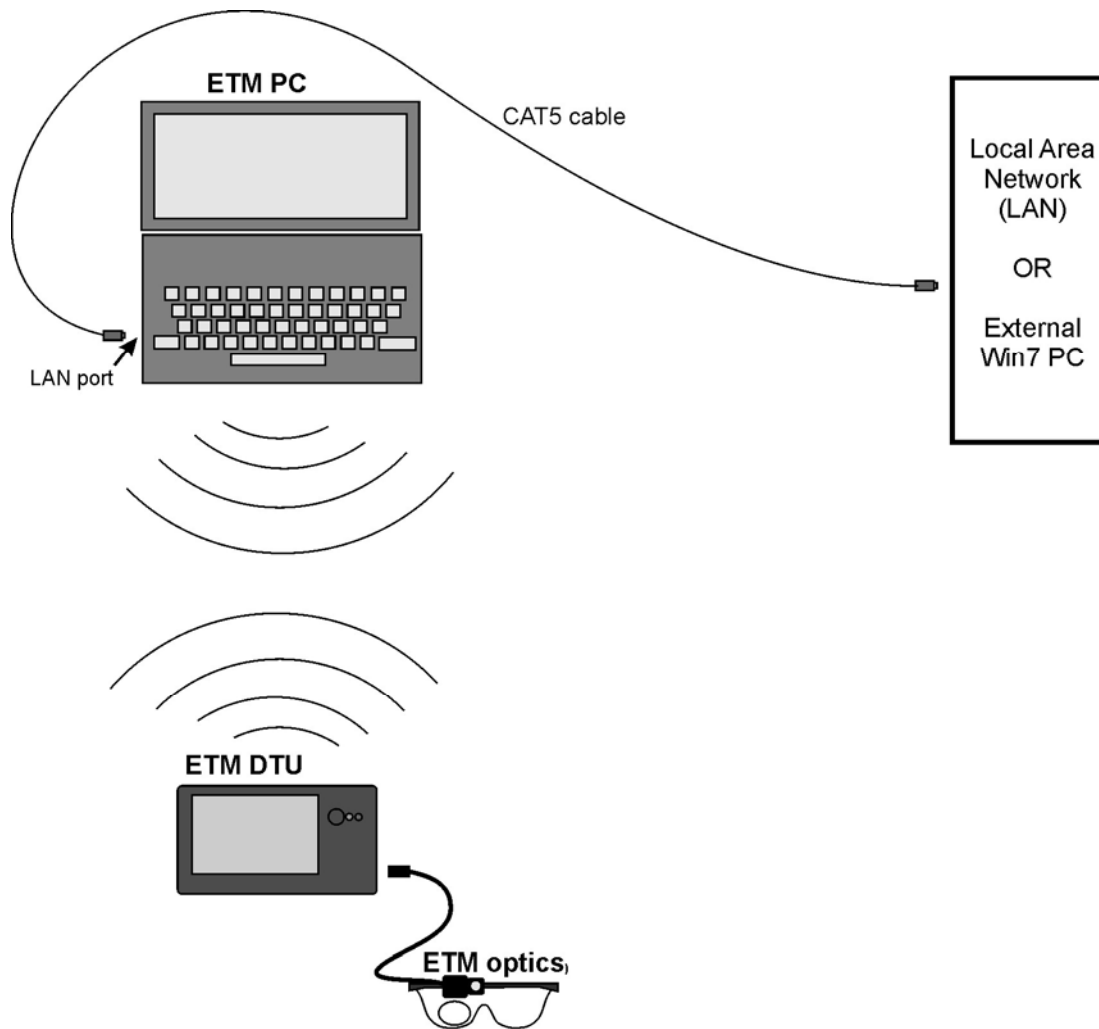
Example 5

If the primary surface of interest is a stimulus display monitor screen, as in examples 3 and 4, the ETM PC can drive a second screen rather than using an external PC. If either ET3Space feature or the Stim Track Analysis feature is used as described in examples 3 and 4, ETRemote, running on the ETM PC at the same time as the ETM application, can be used to synchronously record the stimulus screen. Data analysis possibilities are then the same as described in the previous two examples.

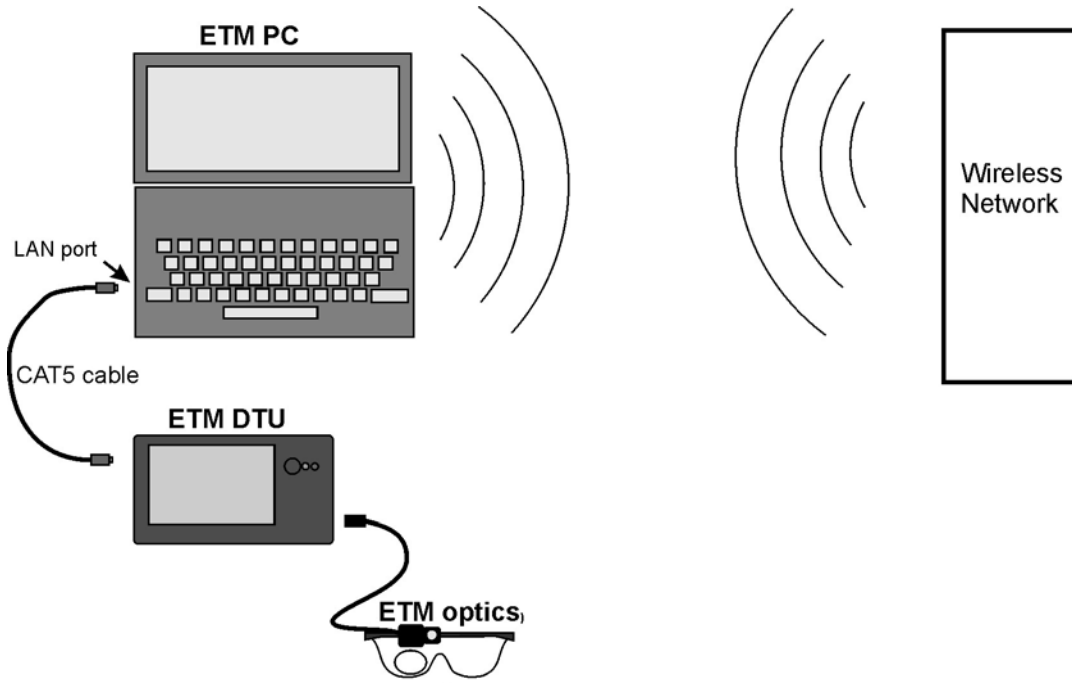
2 Installation and equipment configuration

Simply run the ETRemote installation program (iETRemote_x_x_x_x.exe, where “x.x.x.x” is the version number) on an external Win7 PC. No activation is required for ETRemote. Consult Argus Science for the latest ETRemote install program. If the ETM PC will drive a second monitor and ETRemote is to be used to make screen recordings from that monitor, then ETRemote must be installed on the ETM PC. (If the ETM system was manufactured after July, 2016, ETRemote should already be installed on the ETM PC; consult Argus Science if in doubt.)

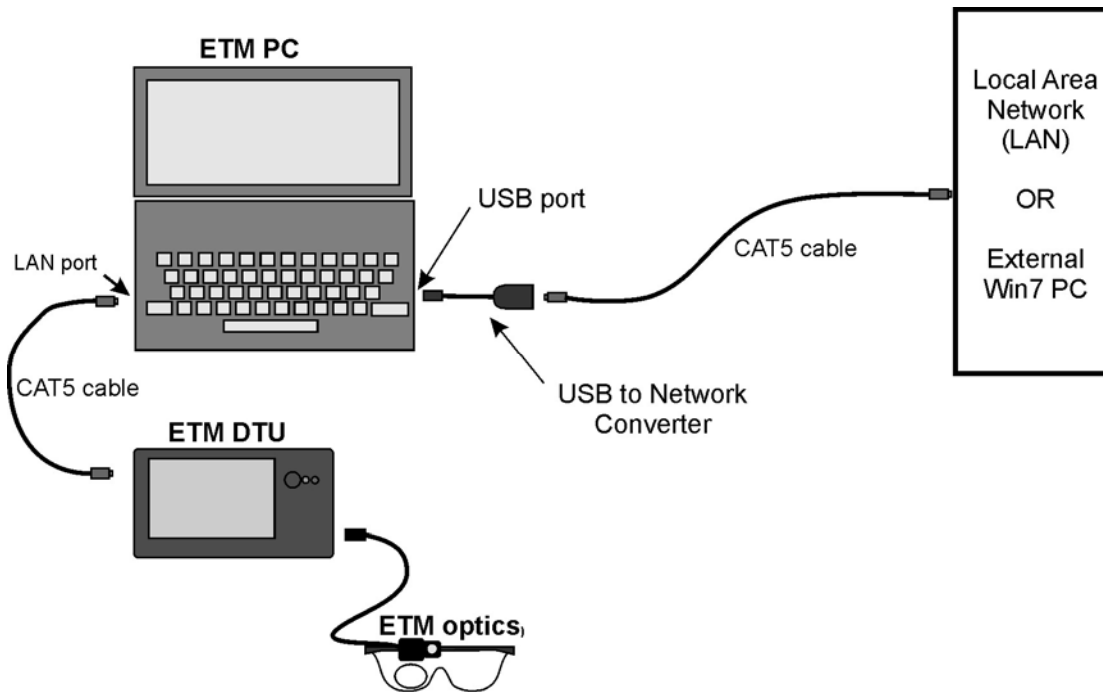
Configuration choices are illustrated by the following diagrams.



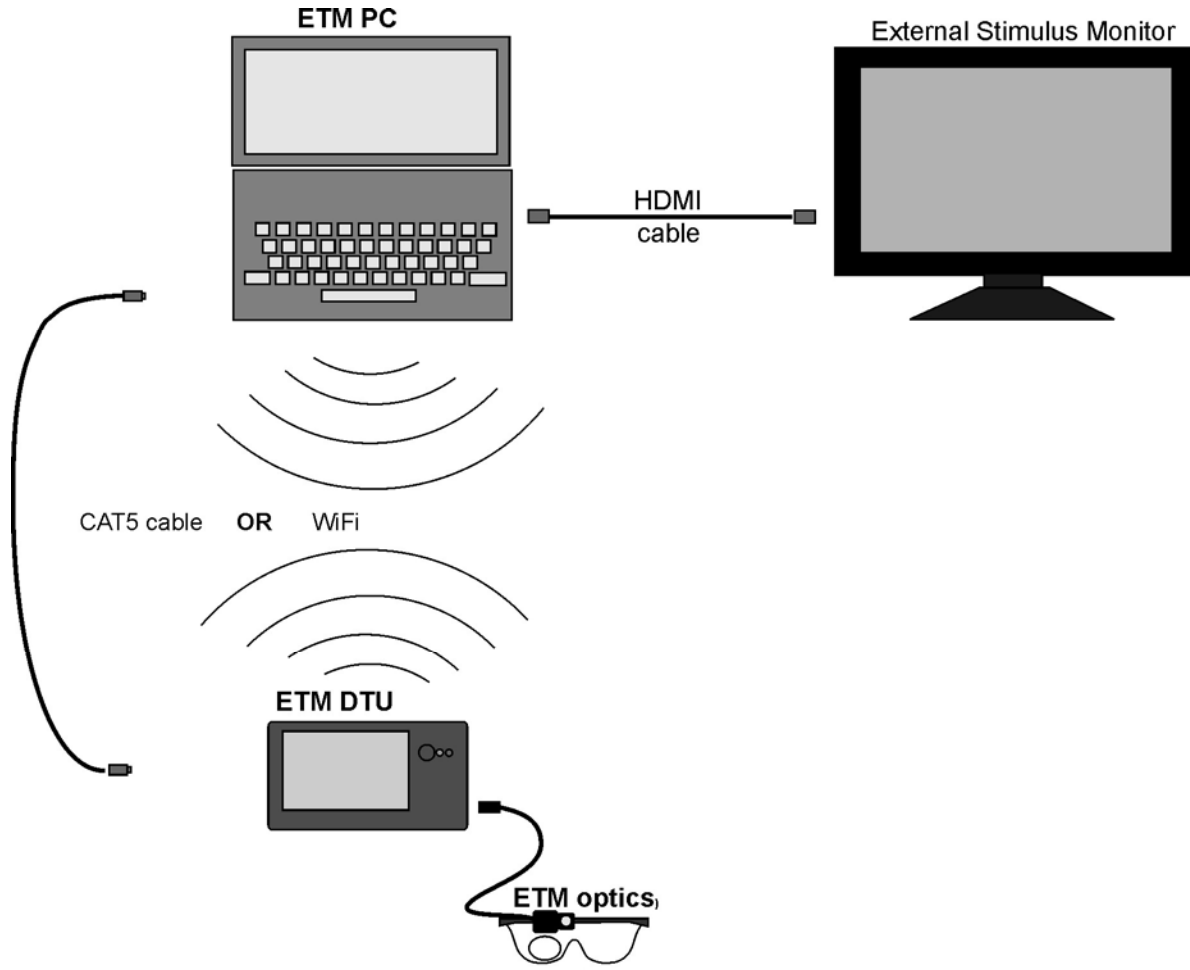
Configuration 1 – The ETM PC and DTU communicate via WiFi; a network cable connects ETM PC either directly to the network port on an external PC running ETRemote, or to a LAN that includes an external PC running ETRemote.



Configuration 2 – The ETM PC and DTU communicate via network cable, using the built in LAN port on the ETM PC; the ETM PC uses WiFi capability to connect to a Wireless Local Area Network that includes an external PC running ETRemote.

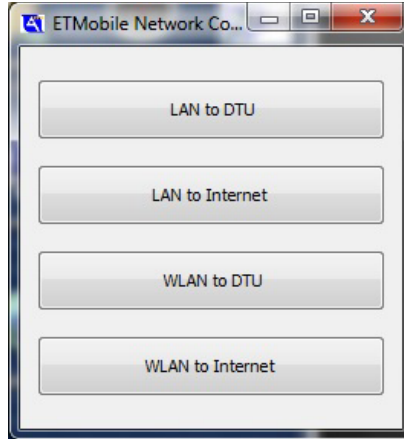


Configuration 3 – The ETM PC and DTU communicate via network cable, using the built in LAN port on the ETM PC; the ETM PC uses a USB to Network adapter to make a physical connection directly to the network port on an external PC running ETRemote, or to a LAN that includes an external PC running ETRemote.

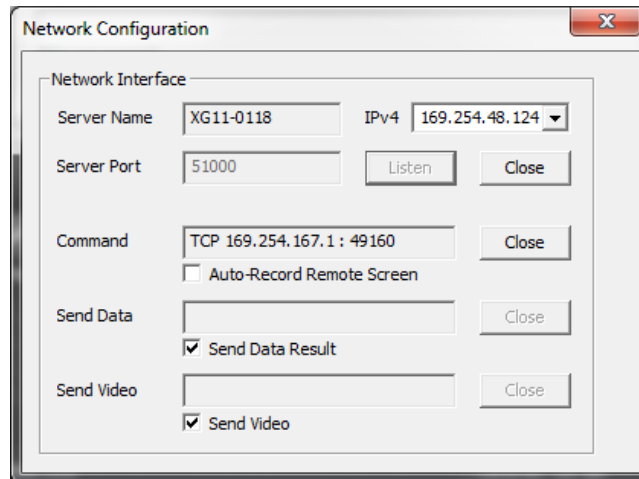


Configuration 4 -- The ETM PC and DTU can communicate either via WiFi or LAN cable. The ETM PC drives a second display monitor and runs the ETRemote application in addition to the ETM program. No external PC is involved.

For all configurations, the network to be used for external communication from the ETM PC must be set to “obtain IP address dynamically”. In most cases this can be done with the ETMobile Network Configuration Tool described in the ETMobile manual. The Network Configuration Tool window is shown below.



To implement **Configuration 1** use the Network Configuration Tool, on the ETM PC, to set “WLAN to DTU” and “LAN to Internet”, by clicking the corresponding buttons. Be sure WiFi is enabled on the DTU (see ETM manual). Make the connections shown in the configuration 1 diagram, and run both the ETM system and external PC. Be sure the ETM PC and DTU are communicating properly (see ETM manual for operating instructions). Click the *Network* button, under the *Scene* heading, on the ETM program, to bring up the Network jConfiguration dialog.



If the ETM PC network port is set to “obtain IP address dynamically” and is connected to an external PC or to a LAN, the ETM IPv4 address for the connection should be shown at the upper right of the dialog. This address will be needed as an input to the ETRemote application, on the external PC.

To implement **Configuration 2** use the Network configuration Tool, on the ETM PC, to set “LAN to DTU” and “WLAN to Internet”. Make the connections shown in the configuration 2 diagram, run both the ETM system and external PC, and be sure the ETM PC and DTU are communicating properly (see ETM manual for operating instructions). Use the Win7 Network controls to ensure that the ETM PC is connecting to the proper WiFi Network. Click the *Network* button, under the *Scene* heading, on the ETM program, to bring up the network configuration dialog. In this case the IPv4 address for the WiFi connection should be shown at upper right. If the pull down menu includes more than one IPv4 address, select the address corresponding to the WiFi connection. This address will be needed as an input to the ETRemote application, on the external PC.

To implement **Configuration 3** use the Network configuration Tool, on the ETM PC, to set “LAN to DTU” and “WLAN to Internet”, just as for configuration 2. The network port provided by the USB to Network converter cannot be set with the ETM Network Configuration tool. Use the Win7 network controls to set this port to “obtain IP address dynamically”. Make the connections shown in the diagram, run both the ETM system and external PC, and be sure the ETM PC and DTU are communicating properly (see ETM manual for operating instructions). Click the *Network* button, under the *Scene* heading, on the ETM program, to bring up the network configuration dialog. Select the IPv4 address for the USB to Network converter port connection from the pull down menu at the upper right. This address will be needed as an input to the ETRemote application, on the external PC.

To implement **Configuration 4** make the connections shown in the diagram, and use the Network configuration Tool, on the ETM PC, to set either “LAN to DTU” or “WLAN to DTU” depending on whether the ETM PC to DTU will be connected by a LAN cable or WiFi. Using Win 7 Display Settings, set the ETM PC to use the external monitor to act as screen 2 of an extended display. Run the ETM system and, if necessary, drag the ETM application window to screen 1 (the laptop screen). In this case the “Host” IP address than will be needed by the ETRemote application, will be “Local Host”.

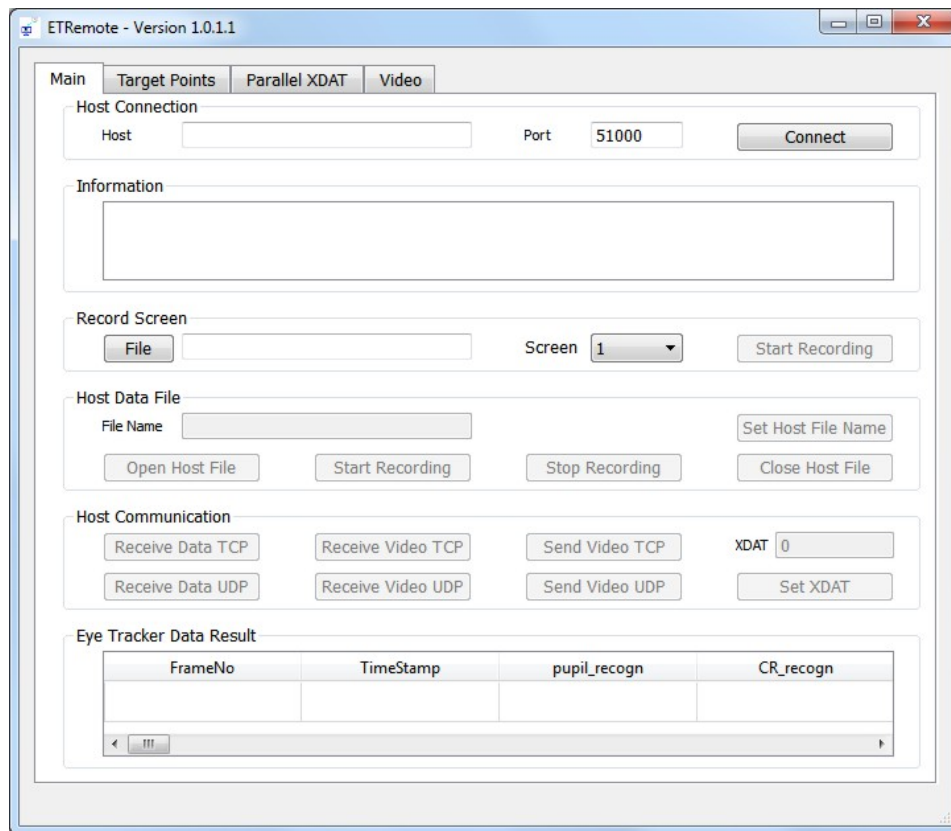
3 ETRemote Operation

The Parallel XDAT tab on the ETRemote window, and the Send Video buttons on the Main tab are for use with other eye tracker types, and have no function when using an ETMobile (ETM) system. Other ETRemote functions are described below.

3.1 Connect ETRemote to ETM

After preparing Configuration 1, 2, 3, or 4, as described in the previous section, click the Listen button on the /ETM Network Configuration dialog. It will turn grey when clicked.

Run ETRemote on the external PC, or on the ETM PC in the case of configuration 4. The ETRemote window, *Main* tab, should appear as shown below. Under *Host Connection*, Set *Host* to the IPv4 address as determined in the previous section (shown on the ETM Network Configuration dialog). If using configuration 4 (stimulus monitor connected to the ETM PC rather than an external PC) set *Host* to “Local Host”. Set *Port* to 5100. If the external PC is displaying different content on multiple screens, set *Screen*, under the *Record Screen* heading, to the number that specifies the screen to be recorded by ETRemote and/or the screen on which to display calibration target points. In the case of configuration 4 (stimulus monitor connected to the ETM PC rather than an external PC), this will usually be screen 2 on the ETM PC.



Click the *Connect* button. If a successful connection is made, the *Connect* button will change to *Disconnect*, and other buttons will become active.

If using configuration 4 (stimulus monitor connected to the ETM PC rather than an external PC) the ETM PC must simultaneously run at least 3 applications: the ETM application, ETRemote, and whatever application is being used to create a stimulus display. This will usually be fine; but be aware that if the stimulus display application requires too much processor time or resources, it is possible that this will cause the system to operate too slowly, or improperly. Be sure to verify normal system operation before attempting to collect important data.

3.2 Display ETM video on ETRemote

On the ETM program, Network Configuration dialog, be sure that *Send Video* is checked. On ETRemote, *Main* tab, click the *Receive Video TCP* or *Receive Video UDP* button, under *Host Communication*. Select the *Video* tab on the ETRemote window. The ETRemote Video tab, on the external PC, should now display the same video image displayed on the ETM program window on the ETM PC.

3.3 Display ETM data on ETRemote

On the ETM program, Network Configuration dialog, be sure that *Send Data* is checked. On ETRemote, *Main* tab, under *Host Communication*, click the *Receive Data TCP* or *Receive Data UDP* button. Labeled columns of scrolling data should appear under *Eye Tracker Data Result*, on the *Main* tab of the ETRemote window.

3.4 Control File recording on ETM and set XDAT values

ETM always has opened csv data and avi video files, both having the same file name and both ready to record. The file name always includes an integer suffix which automatically advances whenever recording is stopped, so that the file will not be overwritten when recording is started again. The file name can be changed by modifying the Subject Profile on the ETM program window, and can also be changed using ETRemote

To use ETRemote to command ETM to start recording the csv and avi files currently specified on the ETM window, simply click *Start Recording*, on the ETRemote *Main* tab. Click *Stop Recording*, on ETRemote, to end recording on that file. The csv and avi files will close and new csv and avi files will open with the same name and an incremented integer suffix just as if the Record and Stop buttons had been clicked on the ETM window.

If the optional ET3Space feature is in use, before starting to record click *Open Host File*, on ETRemote, to open an ET3Space “ehd” file with the same name as the csv file. Once an ehd file is opened on ET3Space, the ETRemote *Start Recording* and *Stop Recording* buttons will start and pause recording on the ehd file as well as controlling the csv and avi files.

When the the *Stop Recording* button is clicked on ETRemote, the csv and avi files will close and new csv and avi files will open on ETM with the same name and an incremented integer suffix. The ehd

file will remain open, and if *Start Recording* is clicked a new data segment will be recorded on this file. The ehd file can be closed by clicking *Close Host File*, and a new ehd file opened, with the same name as the current csv file, by clicking *Open Host File*.

To specify a csv and avi file name from ETRemote, type in a desired path and file name in the *File Name* box, under *Host Data File*. If only a file name (without path specification is entered) the new file will be opened in the currently specified folder. The new file information should now be displayed on the ETM window. If the optional ET3Space feature is in use, click *Open Host File* to open an ET3Space “ehd” file with the same name, as previously described. Command the ETM to start and stop recording the csv, avi, and ehd files as previously described.

Note that control can be mixed between ETRemote and the ETM program. For example it is possible to open an ET3Space “ehd” file on the ETM PC, and then begin recording by using the Start Recording button on ETRemote, etc.

To set an XDAT (external data value) on the ETM, type the desired value in the ETRemote XDAT box, under *Host Communication*, and click *Set XDAT*. XDAT values must be integers between 0 and 65535.

3.5 Record the external PC (or 2nd monitor) display screen as a video file

To manually start and stop recording the external PC screen as a wmv file, click the *File* button under *Record Screen*, on the ETRemote *Main* tab. Use the browser that appears to specify a path and name for the video file, and click *Save*. Click the *Start Recording* button, under *Record Screen*, to begin recording. When recording starts, the button function and label will change to *Stop Recording*. Once recording has started the ETRemote application can be minimized, using the Win7 minimize icon at the top right of the ETRemote window, so that it does not appear on the external PC display screen. Do not, however, click the *Close* icon, or ETRemote will have to be re-opened and connected as previously described.

To automatically start recording the external PC screen, in synchronization with ETM data (csv) and video (avi) files, check the box labeled “Auto-Record Remote Screen” on the ETM “Network Configuration” dialog. The ETRemote application, on the external PC, can be minimized so that it does not appear on the external PC display. Whenever the ETM begins recording a csv data file it will send a command to ETRemote to open a screen file and begin recording. A command to stop screen file recording and close the screen file will be sent to ETRemote by the ETM whenever data recording stops.

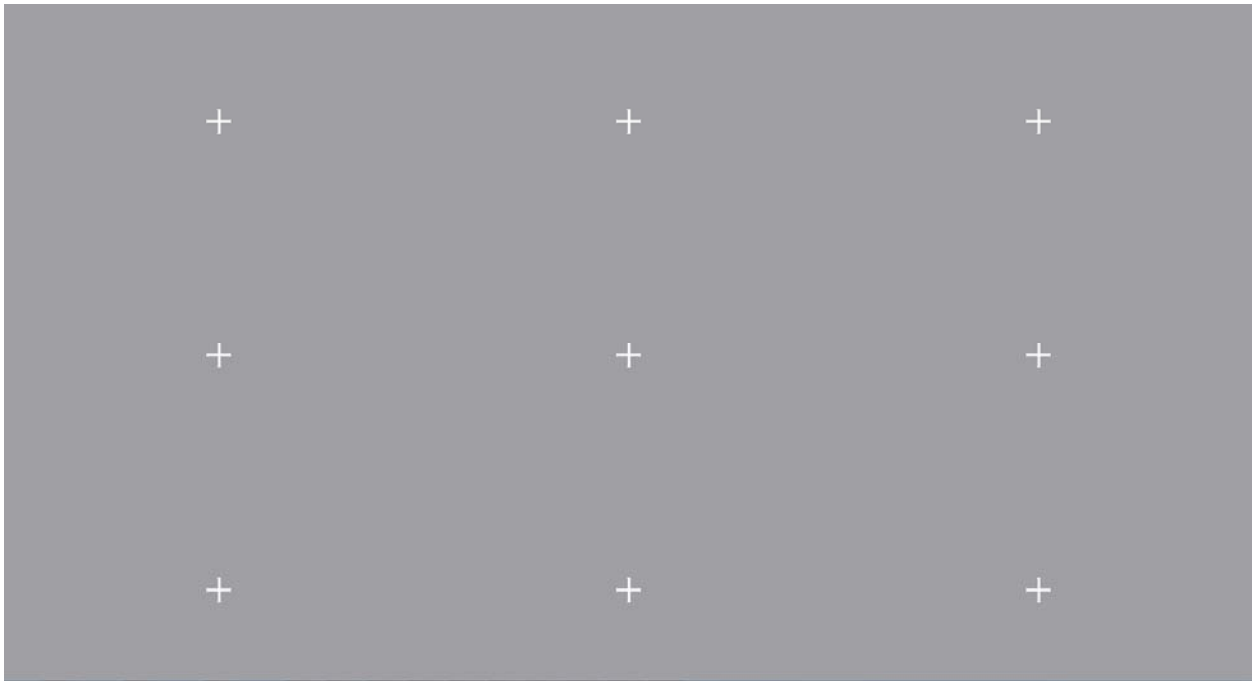
The result of using the “Auto-Record Remote Screen” feature is that there will be a screen video file, recorded on the external PC, which has the same start and stop time as the corresponding ETM data and video file (and ehd file if ET3Space is in use).

If data analysis is to be done using the optional *Stim Tracking* feature on the Argus Science ETAnalysis program, it is essential that the “Auto-Record Remote Screen” feature be used when recording data. The stimulus screen session can be synchronously recorded by using ETRemote, as

described above, or alternately by a user created program written to perform the same function. See the ETAnalysis manual for a description of the *Stim Tracking* feature.

3.6 Display Target Points

ETRemote can display a default target point pattern on the external PC running ETRemote. If desired, This target pattern can be used for ETM subject calibration (see ETM manual for subject calibration instructions). The background color and point displays can be modified in ETRemote, but the default positions of the points cannot be modified. There is no interaction between this display and the ETM system, and no functional difference between this display and any other calibration targets that may be displayed in different ways.



If the calibration target points are to be displayed by a PC with multiple screens, first be sure that *Screen*, under the *Record Screen* heading, is set to the proper screen number. To display the ETRemote calibration pattern, select the *Target Points* tab and click the button labeled “Default 9 Points Full Screen”. Press the <ESC> key to close the target point display.

To change the background color of the display, click the “Color” button, under *Full Screen Background Color*, and select the desired color from the resulting color pallet. Each target point is a bit map image file specified under *Target Point Settings*. To select a new bitmap file for any point, use the drop down menu to set *Index* to the desired point number, and click the “File” button to bring up a browser. Use the browser to select the desired bit map files and click *Open*. To use the file for all target points, click the “Apply to All Target Points” button. Change the size of each target by adjusting the *width* and *height* values.