ThoughtStream™ USB Interface Software: User's guide

Rev. February 2011

Introduction

This software is intended to extend the capabilities of the ThoughtStream™ USB Personal Biofeedback Training System. It was developed to run under Windows, and is compatible with Windows XP, Vista and 7. Key features of the software include:

-Session data are plotted in graph form;
-Data from up to six sessions may be viewed on the same graph;
-Sensitivity range is increased to 1000% maximum;
-Notes may be added to each session's data graph;
-Three different biofeedback graphical displays are included.

Installing the software

If you have not done so already, download the USB version of ThoughtStream Interface (TI) Software from the ThoughtStream section at www.mindplacesupport.com. If you happen to have Procyon Editor installed on your PC already, you won't need to install drivers—otherwise, download the USB driver as well. First install the USB driver, then the TS Interface software, after unzipping each by double-clicking the downloaded, zipped files.

ThoughtStream Interface does not place an icon in your Start menu or elsewhere—to run it, just open the unzipped folder and double click the application (ThoughtStreamUSB_2_01.exe)

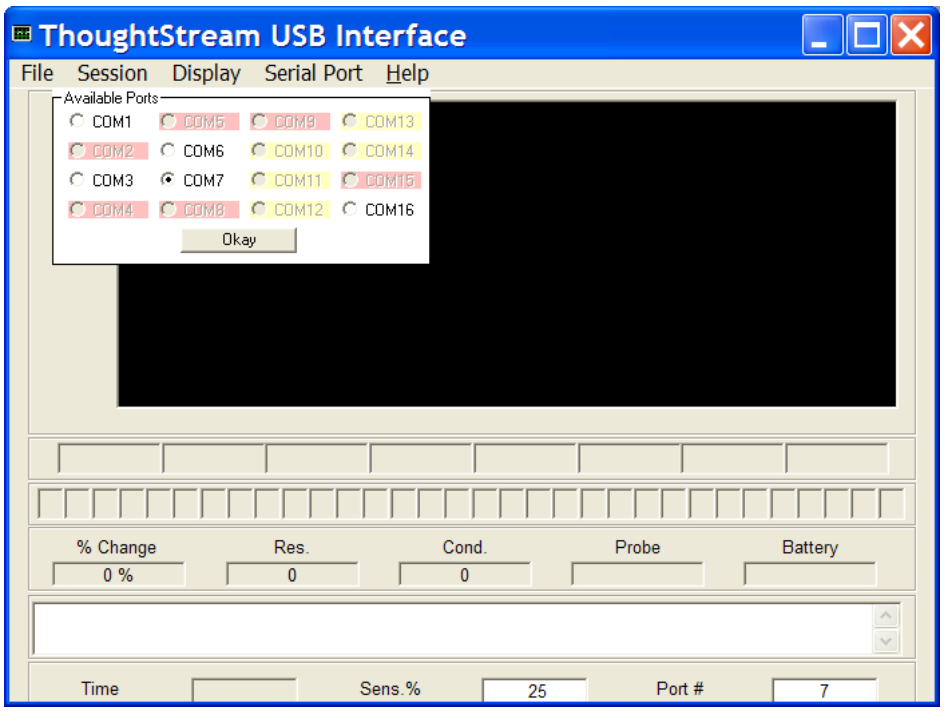
Using the software

Perform the following steps to prepare for a ThoughtStream session:

a. Connect ThoughtStream to your PC with the included USB cable.

b. Place the palm sensor on your palm or fingers, and adjust to a comfortable but snug fit.

c. Start the ThoughtStream Interface software, and click the Serial Port popdown menu to select a serial port. The following dialog box should appear:



d. Select one of the available COM ports, and click OK. Usually the default (preselected, COM7 in the image above) will work. Usually you will only need to perform this setup the first time you use this software.

e. (optional) Popdown the Display menu, and select the functions you would like to view (see reference section, below). For your first session, just leave the settings at their default settings.

f. (optional) Popdown the Session menu and select SET SENSITIVITY. Move the slider which appears to select the initial sensitivity range for the session; this can be adjusted between 20% and 1000%, full scale. The default setting is 25%, a good place to start. The software will automatically recalibrate if necessary if your GSR moves out of the vertical displayed range.

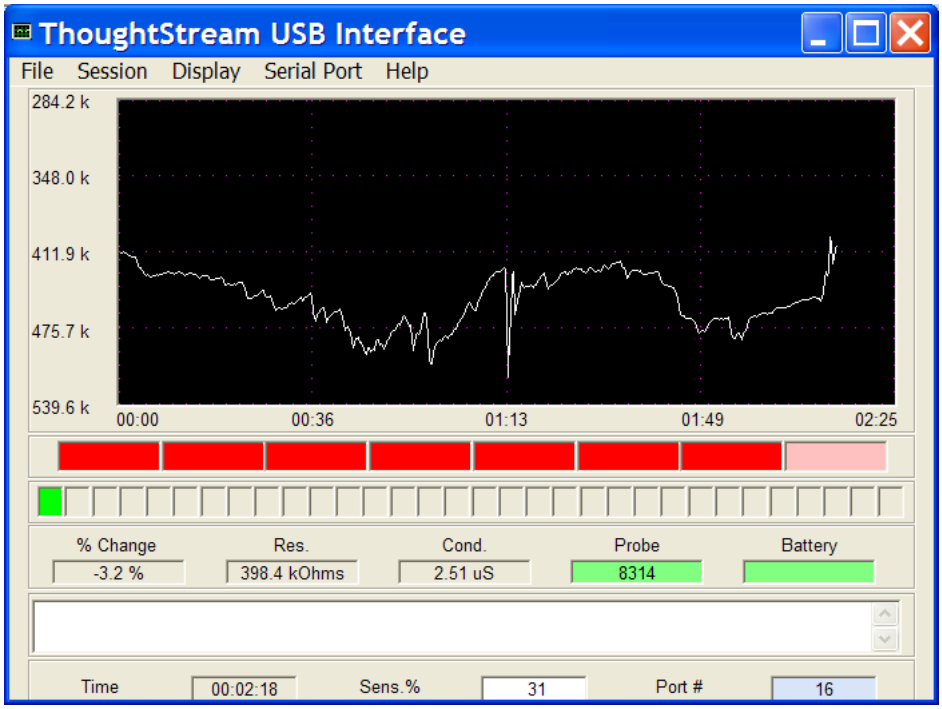
g. Select Session/Start.

h. When the session is over, select SAVE from the FILE popdown menu. Type in the session name (and directory path, if desired) and click on the Save button; in the example below, the session saved is john number 2.tst

i. That's all there is to running a session. Software details and reference follows in the next session.

Customizing the display

The user interface includes a variety of different display modes; you will probably not want to view all of them at once, to reduce 'clutter'. Those with a check mark next to them will be displayed.



<Picture graph

<Color bar graph
<Bar graph

<Internal status

<Session comments
<Display time etc.

Display: Picture Graph

The Picture Graph is the core of the program. During a session a graph is drawn of skin resistance in ohms (vertical axis) vs. elapsed time. The full scale range is established by the sensitivity setting you have selected, and defaults to 25% if you have not selected another value. If a reading occurs outside the range of the screen, then the vertical scale will automatically adjust itself to display the entire graph, and the new sensitivity range will be displayed at the bottom of the window. The horizontal scale, time, starts out at 30 seconds and gradually expands as the session progresses.

Display: Color Bar Graph

This is a multicolored bar graph which changes from solid red through a series of colors to magenta as the measured probe resistance increases through its sensitivity range. The spectrum of colors includes red, orange, yellow, green, cyan, blue and

magenta. If the measured skin resistance falls below the starting value then the displayed colors are pastel.

Display: Bar Graph

Enables a two color bar graph with 32 steps. As the skin resistance increases from the starting value the number of green boxes increases until all 32 are filled when the resistance has reached the level determined by the sensitivity setting. If the probe resistance decreases from its initial value the bar graph color is displayed in red. Note that this display may be used to train the GSR in both directions—for activation as well as relaxation. Activation is useful in sports training, etc.

Display: Internal Status

% Change displays the current percent change in resistance, from the initial value.
Res. displays the current probe resistance.
Cond. Displays the probe conductivity (resistance) in Siemens (Siemens = 1/Ohms). Also called Mhos.
Probe displays the current 14 bit ADC value coming from the ThoughtStream. If a probe reading is acceptable, the background color will be pastel green. If a probe error condition occurs (short circuit or open—no skin contact) the background color will change to pink. Note: The ThoughtStream will automatically shut itself off if a probe error lasts for ten seconds.
Battery indicates an approximation of battery life remaining.

Display: Session comments

Select this when you wish to include comments about a particular session within the session record.

Display: Display time, etc.

Time shows the elapsed time of the current session.
Sens. % is the current sensitivity setting.
Port # shows which COM port is being used by the interface program. Clicking on the port number when a session is not running allows the user to change the port number.

Before the ‘available ports’ window is displayed (when you select ‘Set Comm port’) the program looks at Com’s #1-16 to verify which are already in use. The port is set up automatically when it is opened so that the user does not have to set the baud rate, etc.

Session: Restart

Resets the current session back to the beginning.

Session: Start

Starts a new session. You will need to save this at the end of the session with "Save Session."

Session: start and save as

Eliminates the need for separate 'start session' and 'save session' selections.

Session: stop

Self explanatory.

Session: set sensitivity

Normally you would not need to use this, as the software auto-adjusts sensitivity, but this slider allows you to set the full range displayed on screen before starting a session.

Session: set filter size

This 'filter' is a moving average of the readings generated within ThoughtStream, which occur 20 times per second. In action, it causes the line graph to appear smoother. The default setting is 3, which should be fine for most applications. Set it to 1 if you want to have the most sample-accurate data displayed, and higher numbers (up to 8) if you prefer a smoother trend-graph.

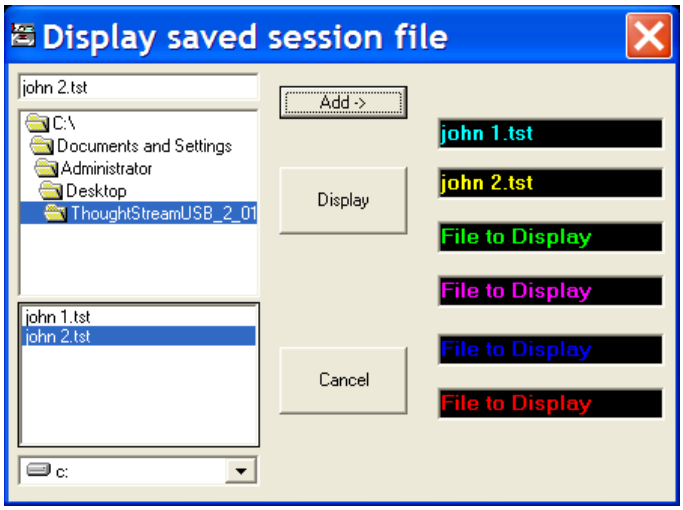
Session: adjust jitter rejection

"Jitter" refers to samples which are outside the expected range. Samples are compared to the previous sample, and the 'jitter rejection' rejects samples far out of range. This is a legacy function, more useful for the original, and slower and less accurate, ThoughtStream. Setting this too low will result in a lot of data rejection; the default value is 100 and should be fine for most purposes. The range is 0 to 255.

Displaying multiple sessions

It is possible to recall and plot the data from up to six sessions for comparison purposes. To do this:

a. Select DISPLAY SAVED SESSION from the File popdown menu. This brings up the following window:



b. Select the first session you wish to display by clicking on a session name in the list on the lower left side of the display, then clicking the ADD button. The session will be displayed in the color shown (e.g., “John number 1” will be plotted in pale blue, etc.)
c. Continue selecting sessions until you are ready to plot them. Then, click the DISPLAY button. This will bring up the following window:

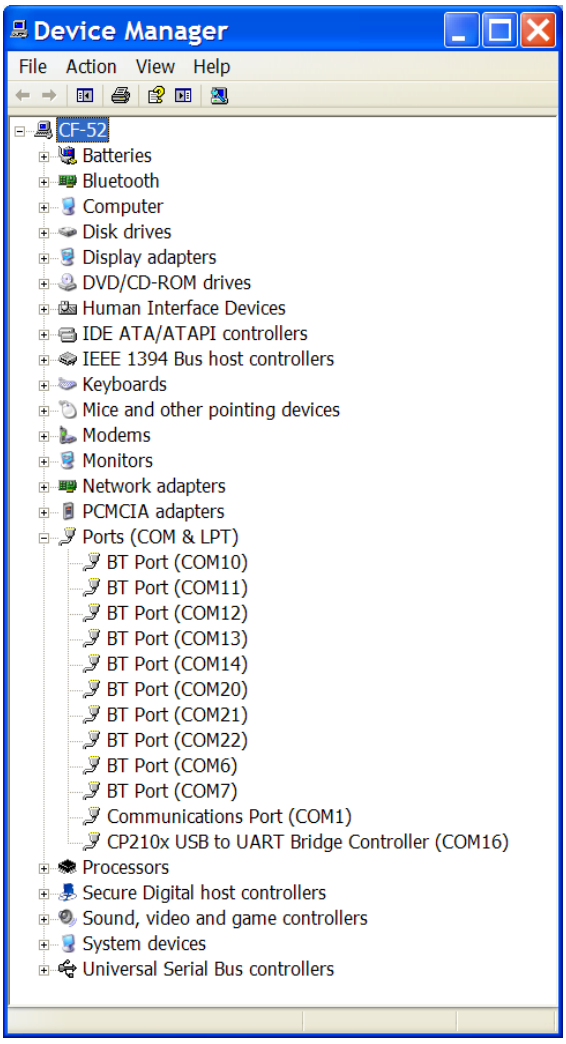
Any comments recorded in the individual records will be displayed together with the session data.

Tips

--Wear the sensor band for at least 30 seconds (longer on cold days or if you have unusually dry hands) before starting a session to allow the metal to form a good contact with the skin.

--Clean the sensor metal periodically with rubbing alcohol to remove oils and residues which might interfere with accurate readings.

--If you have trouble finding a working COM port during setup, you can open Device Manager, and open the Ports dropdown to verify which COM port the USB controller is associated with; this is called “CP2102x USB to UART Bridge Controller’.



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