

eVu Senz – TPS

How it Works

Research shows that slow, relaxed breathing encourages a balanced nervous system and promotes calm awareness, increased focus and decreased stress. eVu Senz is a self-training application that encourages these states by having you follow the on-screen breath pacer with your own breathing.

With aid of the TPS finger sensor, the eVu Senz app monitors three of your body's biosignals:

Heart Rate Variability



Temperature



Skin Conductance



As you learn to comfortably produce full, even breaths at a rate of 5-7 per minute, your increased relaxation response will express itself as:

- An increase in heart rate variability.
- An increase in finger temperature.
- A decrease in skin conductance.

An increased stress response would express itself with the biosignals reacting in the opposite direction from the above described trends.

eVu Senz will score your ability to produce this relaxation response based on simultaneously increasing the heart rate variability and temperature readings, as well as decreasing the skin conductance. The better you are producing this ideal response, the more points you will score during the session. The system will also gently let you know when your biosignals are improving through visual icon cues and feedback music.

If breathing between 5 and 7 breaths per minute is uncomfortable, change the breath pacer speed in the **Settings** tab. You can practice full even breaths at a higher respiration rate, and then when you are comfortable you can lower the breathing pacer speed.

We encourage you to use this app in a comfortable environment, free of distractions. Scores may improve when you are cultivating positive feelings and thoughts. If you practice often, you will find the breathing task easier, and you will score more points. You can also choose to ignore the breath pacer and practice gaining points using your own relaxation method.

The units of measurement for the three biosignals are as follows:

- Heart rate variability: percent of total power for the low spectral frequency, often abbreviated as %LF.
- Finger temperature: degrees Celsius or Fahrenheit.
- Skin conductance: μ Siemens

Don't worry about understanding the biosignals' units. eVu Senz does the work of letting you know when you're doing well or not. It can also display the biosignals as success index values between 0 and 100.

Pairing the TPS

Before using the TPS sensor for the first time with tablet or smartphone device, the two instruments must be paired in order to allow transmission of biosignal data from the TPS to your device.

To pair a TPS sensor to a tablet or smartphone:

1. Swipe down from the top of the tablet or smartphone's screen, and open the general settings. Find and select Bluetooth settings. If Bluetooth is off, turn it on. The screen should display a list of paired and available devices.

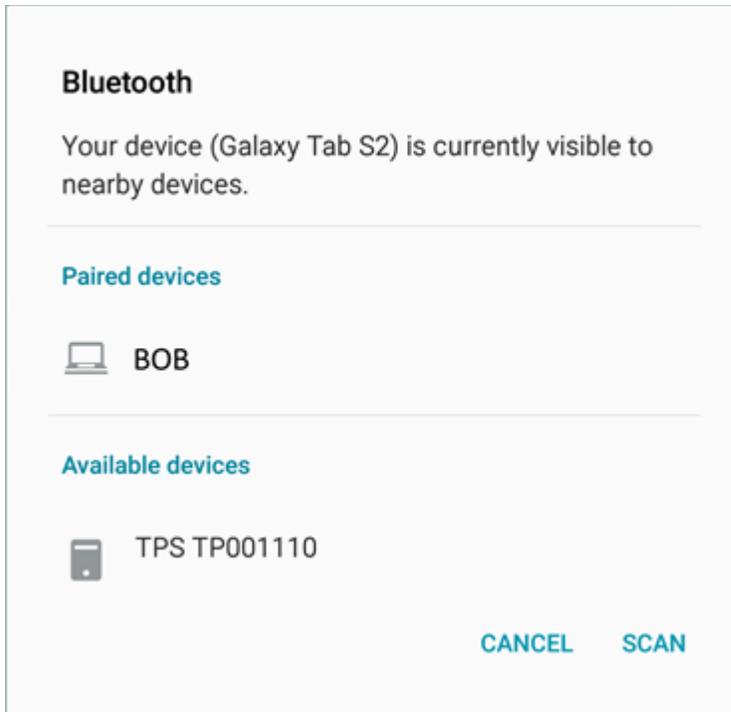
Please note that different version tablets and smartphones may have different interfaces for reaching the Bluetooth settings and scanning for available devices to pair. These are general guidelines.

2. Turn on the TPS sensor by holding down the "On" button for several seconds and then releasing the "On" button when the blue light appears. The light will initially flash several times and then it will remain solid blue.

The TPS sensor's "On" button.



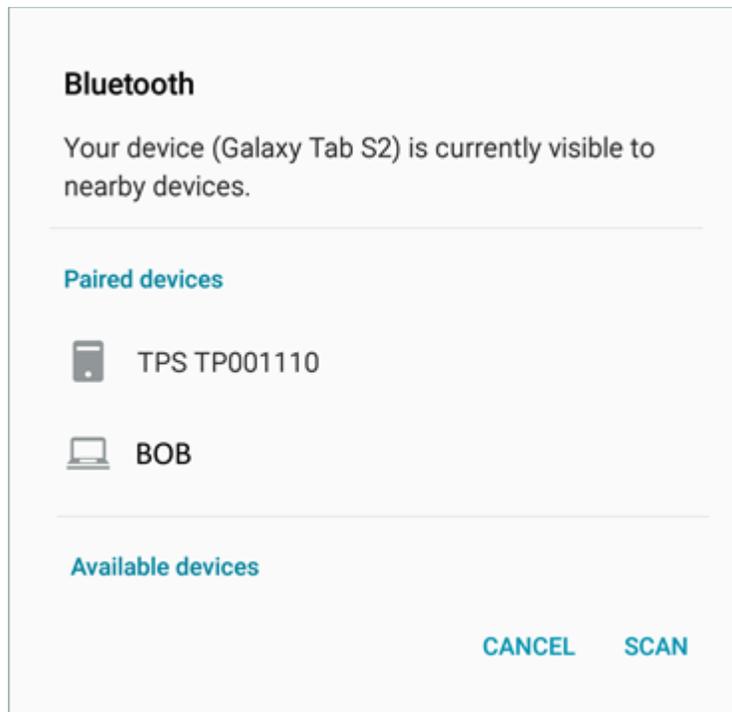
3. Hold down the TPS sensor's "On" button again for several seconds, until the blue light turns off and then turns back on. The blue light will now continually flash quickly. This sets the TPS sensor into discovery mode, so that your tablet or smartphone can detect it via Bluetooth.
4. In the tablet or smartphone's Bluetooth pairing window, the TPS sensor should appear under **Available Devices**. Notice that the serial number found on the top of your TPS sensor should match the name of the TPS sensor listed in the Bluetooth window.



The serial number of the TPS sensor shown below is TP001110. The same serial number is listed in the adjacent image for available Bluetooth devices.



5. Select your TPS sensor from the **available devices**. The tablet or smart phone will take a moment to pair the instruments together. When the process is complete, the TPS sensor will be listed under **paired devices**. Once the TPS sensor is paired to your device, the blue flashing light will automatically stop flashing and will remain solidly on.



If using multiple TPS sensors with a single tablet or smartphone, each individual TPS sensor must be separately paired with the device.

When the TPS sensor is in use during the **Practice** or **Train** sessions, the blue light will slowly flash.

Wearing the TPS

To correctly place the TPS sensor on your finger, follow the instructions below. Refer to the accompanying images.

1. Attach the TPS fabric strap to the TPS sensor, by slipping the two loops from one end of the strap onto the two outer hooks of the TPS sensor.



2. Apply the TPS sensor to your finger, with the writing on the label oriented upwards and with the "On" button pointing toward your hand. You can try using the TPS on any finger, but the index and middle fingers are generally recommended for best results. The sensor should be placed near the end of your finger. The two metal plates on the underside of the sensor should be resting against your skin, for best results, against fleshy parts of the finger.



3. Secure the TPS sensor to your finger by wrapping the fabric strap around your finger and back over the TPS sensor. Use the appropriately positioned hole to attach the strap to the central hook on the side of the sensor.

Choose a hole that holds the TPS sensor comfortably and securely. It is too tight if it is uncomfortable, and it is too loose if it constantly shifts positions or falls off.



When properly fastened, the fabric strap will cover the TPS sensor logo, but the indicator light will be visible when the sensor is on.

Charging the TPS

When it is connected to the TPS, the eVu Senz app displays the TPS sensor's battery power level at the top-right of the screen. When the icon changes from green to red, it's a good idea to recharge the TPS sensor.



Use the charger provided with the sensor. No other charger is supported for charging the TPS.



To charge the TPS sensor:

1. Plug the charging cable in the sensor's charging jack, which is adjacent to the "On" button.



2. Plug in the charger.

3. When the TPS sensor is charging, a green light is visible. When the sensor is fully charged, the green light turns off.



Please note that you cannot charge the TPS sensor while using it.

Starting Up

Login to keep track of your results and review your progress through personalized training programs.

If you instead select **Practice**, your biosignal data will not be saved and you will not be able to review any results. Make sure to strap the TPS sensor to your finger and to pair it with your tablet or smartphone before selecting **Practice**. Refer to **Pairing the TPS** for instructions on the device pairing process.

To login to your account:

Enter your username and password and then click **Login**.

Or

If you have never before used the eVu Senz app, click the **Sign Up** button to create your own account.

If you have forgotten your username and password, click **Forgot Password** and enter the email address you provided when you created your profile. The app will send an email containing your username along with a temporary password that can be used to log in to your profile.

Select **Keep me logged in** so that if you exit the eVu Senz app, you can re-enter it without entering your username and password. If you do not select **Keep me logged in**, you will have to remember your username and password each time you start the eVu Senz app. Note that even if you select **Keep me logged in**, explicitly choosing the **Log out** option will log you out of your profile and it will be necessary to provide your username and password to log in.

Once logged in, select the **Train** button to resume your training program or **Review** to examine your training program progress and biosignal results. Be sure the TPS sensor is strapped to your finger, turned on, and paired to your tablet or smartphone before selecting **Train**. Refer to the **Pairing the TPS** for instructions on the device pairing process.

After logging in, you can access a menu by pressing the ☰ icon at the top-left of the screen. This menu has several additional options to explore:

New Program enables you to start a new training program and select a different length or difficulty level. If you have already started a training program, you can use this option to create a new one with different parameters. If you start a new program, you can no longer train within the previous program.

Settings lets you alter the parameters of your **Train** and **Practice** sessions.

Profile update lets you update your profile information, including name, email, clinician's name and clinician's email.

Change password lets you change the password stored in your current user profile.

Report allows you to send a copy of the program results to the email address entered in the profile as "Clinician email". If this email address is missing or invalid, it can be added or corrected through the **Profile update** option.

Help displays the instructions manual for all aspects of using the eVu Senz app, arranged in several detailed tabs.

Logout logs out the current user from the app. After logging out, in order to view results or continue training under your user profile, you must log in again by providing your username and password.

Complete the Program

Training within the eVu Senz app is enhanced by the use of an integrated training program. A program is a series of ten training sessions, with identical durations. The program goal is to achieve a pre-defined number of points over all ten sessions. Points are scored by producing a relaxation response where your heart rate variability and temperature readings increase and your skin conductance decreases. Following the breath pacer with slow, full breathing facilitates this response. The better you are at producing this ideal response, the more points you will score during each session and the over the whole program.

The session time and program goal are defined immediately before the first training session of a new program. If you have never run a training session before with the app, the program settings will be specified when you click the **Train** button for the first time.

Success index data from completed training sessions is saved and can be examined in review mode. After a program is completed, a new one can be started. Programs and their features are only accessible after logging in.

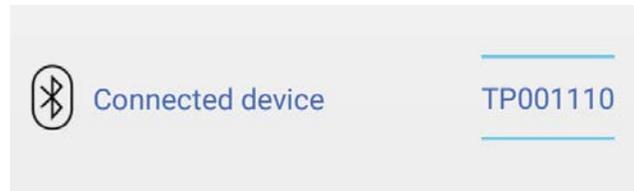
You can abandon your current training program and start a new program by going to the **eVu Senz** menu, at the top-left of the screen, and selecting **New Program**. The data from the previous incomplete program remains saved for review.

Practice sessions do not contribute to the score or goal of the program.

Training

A training exercise begins after selecting **Train**, following a 64-second countdown with the message *Feedback starting soon*. During the countdown, the app gathers biosignal readings to produce representative display of data.

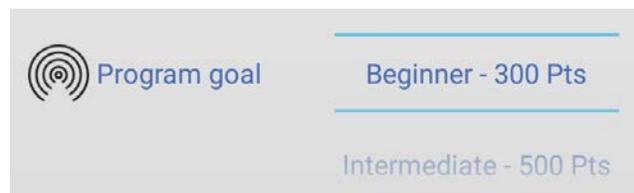
If this is your first time training, a **New Program** menu will appear before the countdown begins. In this menu, select the information specified below for your training program:



Connected Device: Normally you do not have to adjust this setting. If you have more than one TPS sensor paired to your device, check that the right TPS is selected for training.



Session Time: Choose how long you want each training session to last. They can be as short as 5 minutes or as long as 60 minutes.

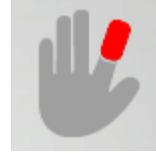


Program Goal: Choose the number of points you want to use as the training goal for the entire program. A beginner goal is appropriate if you are new to slow, relaxed even breathing. A more difficult goal is appropriate for someone who has practiced this type of activity before.

During training, try to keep your hand as still as possible, since movement makes it hard for the TPS sensor to properly read your biosignals. If you move your hand too much, a red shaking hand symbol will appear at the top-right of the screen. When there is no significant movement, the hand will return to its grey color



If the TPS sensor falls off your finger or is removed during a training session, the hand icon at the top-right of the device's screen will change as shown to reflect this.



For a successful session, follow the breath pacer line with your breathing:

Inhale as the dark blue line rises.

Exhale as the dark blue line falls.



Do your best to produce full, relaxed breaths in order to maximize your relaxation response.

The following three symbols for your biosignals are displayed throughout the training session:

Heart Rate Variability



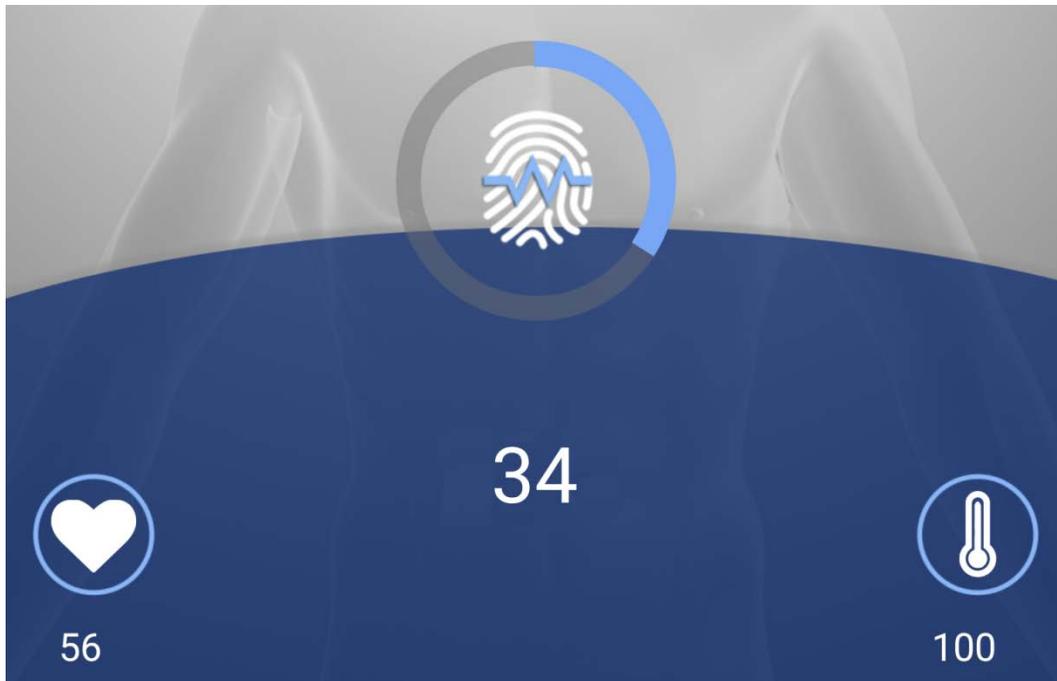
Temperature



Skin Conductance

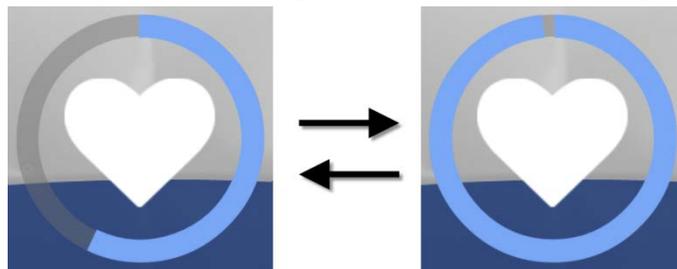


Below each symbol is a number that corresponds to that signal. Tap the central icon to change between displaying the signal value with units, or the success index. If the signal value was hidden, tapping the central icon will make the numbers appear and let you toggle between them. It is impossible to re-hide the numbers during a live session, this must be done through the general settings.



When a symbol is at the center of the screen, the app highlights that biosignal with three additional feedback cues. To select a different biosignal for the center position, tap on the symbol for that signal. These cues are based on an increasing relaxation response or an increasing stress response:

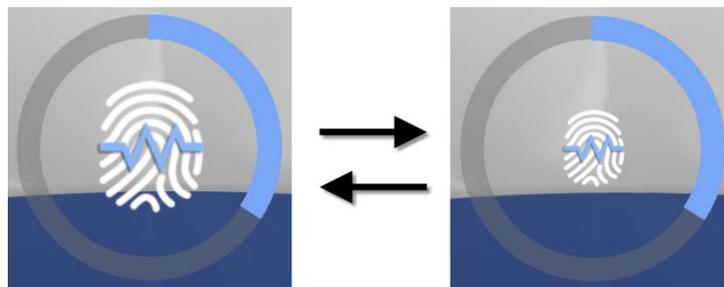
- **Success meter:** this is the colored ring surrounding the biosignal symbol. Correctly activating your relaxation response by following the breath pacer will lead to the success meter progressively filling up with blue. Increased stress will however lead to progressively decreasing the amount of blue filling the success meter.
The greater amount of blue in the ring = the better you are doing.



- **Symbol size:** the biosignal symbol will grow or shrink in size based on whether the signal is expressing an increased relaxation response or an increased stress response. For example, heart rate variability increased as a response to relaxation, which would make the symbol grow in size. Increased stress would make the heart rate variability decrease,

which would shrink the symbol.

The symbol growing large = you are doing well.



- **Feedback music:** when the biosignal is responding to an increased relaxation response, the session music will be easily heard. When the biosignal is responding to an increased stress response, the session music will be heard only faintly.
Louder feedback music = you are doing well.

Feedback music is available during the session. To mute or un-mute the session music, go to the **eVu Senz** menu at the top-left of the screen in mid-session and toggle the **Music on/ Music off** option. By default, the feedback music will be muted at the beginning of a training session.

If the breath pacer is moving at a rate that is too slow or fast, you can modify the pacer rate by going to the **eVu Senz** menu at the top-left of the screen in mid-session and selecting **Pacer**.

Your points total for the session is displayed in the lower-right corner of the screen. You are awarded one point for each individual biosignal that is maintained for a duration of 10 seconds in the desired relaxed condition.

The training exercise will automatically end after the session countdown timer reaches zero. The timer is visible in the lower-left corner. At the end of the exercise, you will be able to see the results of the session and compare it to previous sessions of your program.

If a training session is abandoned before the timer reaches zero, the system will not save that session's biosignal data or score.

Practice

The **Practice** session is a limited version of the **Training** session. No biosignal data is saved during a practice exercise and no review mode is available. Since the practice session is not part of the training program, it includes fewer on-screen features: there is no session timer and there is no tracking of points. You can quit from a practice session whenever you want.

Refer to the **Training** tutorial tab to learn more about what a training session looks like.

The practice session can be used to gain understanding of the breathing exercise before starting a program and training sessions.

Settings

Various practice and training session settings can be altered in the **Settings** tab of the **eVu Senz** menu, found at the top-left of the screen:

Current TPS device: choose the TPS sensor used for training. This setting is only used if more than one TPS sensor is paired to the device.

Displayed values: choose whether the biosignals are shown as success index values, signal values, or hidden completely at the beginning of the session. When signal values are chosen, the following unit values are used:

- Heart rate variability: percent of total power (a value between 0 and 100%) for the low spectral frequency (also known as LF).
- Temperature: degrees in Celsius or Fahrenheit.
- Skin conductance: microSiemens.

The success index is a measure ranging from 0 to 100 where 100 is the top score that can be achieved. The success index increases based on your relaxation goal being achieved. In other words, for heart rate variability, the index will increase as percent power of LF increases, for temperature, the index will increase as temperature increase and for skin conductance, the index will increase as skin conductance decreases.

Auto disconnect timeout: set how long the app maintains its Bluetooth connection to a TPS sensor when not in a Training or Practice session. Shorter time settings conserve TPS sensor battery life.

Breath pacer: set the length of each segment in the breath pacer cycle. Inhale time, post inhale time, exhale time and post exhale time can each be specified. The breath pacer settings can also be altered in mid-practice or training sessions.

The app's installation default for the pacer is 6 breaths per minute, with the breathing components set to the following durations:

- Inhale time: 4.1 seconds
- Post inhale time: 0.4 seconds
- Exhale time: 5.1 seconds
- Post exhale time: 0.4 seconds

Temperature unit: choose between Fahrenheit and Celsius temperature scales.

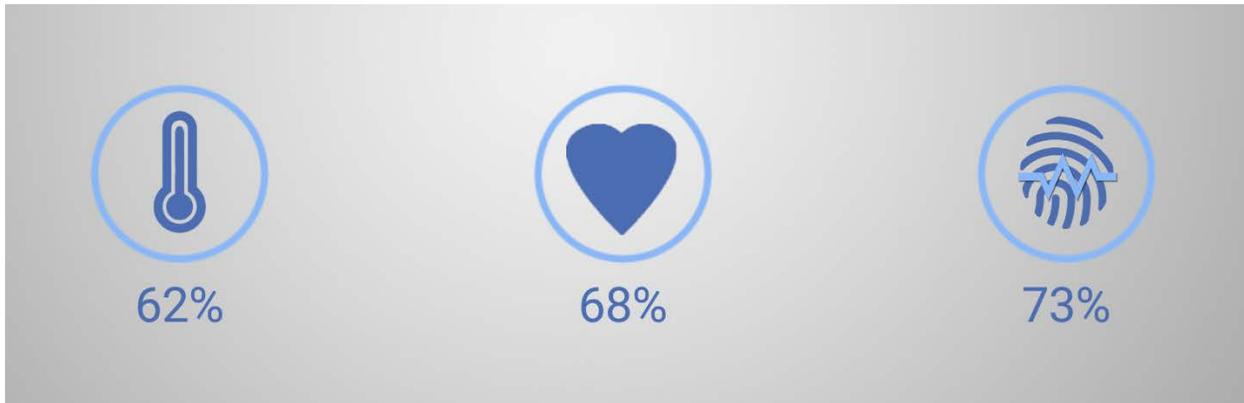
Music: choose among the five selections of feedback music. The music can be muted/un-muted from within the training or practice session.

Version: display the version of the eVu Senz app.

Review

Click the **Review** button to examine your program's progress results.

The top-half of the screen displays results derived from each biosignal, averaged from all sessions of the program. These are the percentages of time your body's nervous system is expressing an increasing relaxation response for the entire program.

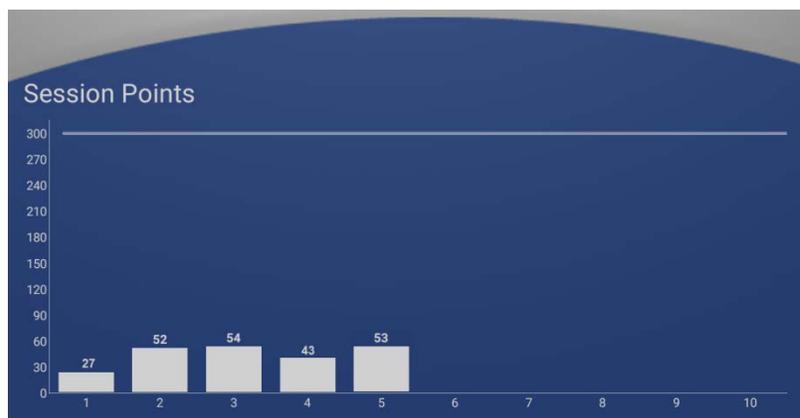


At the top-right of the screen is the **Points to Goal** number. This indicates how many more additional points you need to achieve the Program Goal that was set when you started this program.

141 points to goal

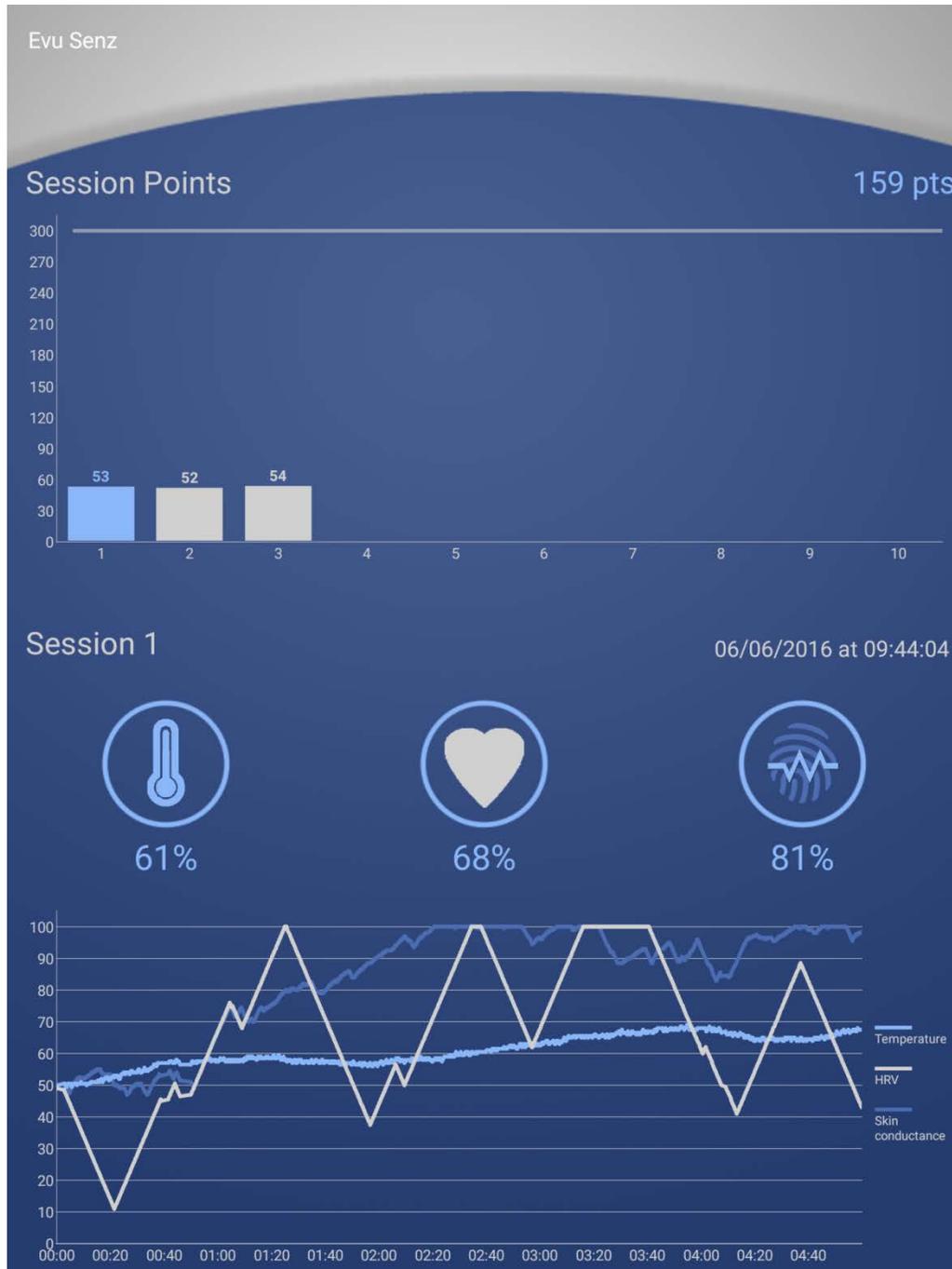
If you have run more than one program, swipe left and right to switch between programs.

On the lower-half of the screen, the session progress bars show how many points you have scored during each training session. The more points you score in each session, the better you did.



Swipe the graph up to examine each training session in detail. A line graph will appear that indicates the within-session changes in success for each biosignal. Above the line graph are the

three biosignal icons representing the average readings for that particular session. This means the proportion of time, during the session, during which your nervous system was expressing an increasing relaxation response.



Each biosignal of the line graph represents your body's relaxation and stress response. Each line moves upward toward the 100% maximum when your body is successfully relaxing, and each line moves toward the 0% minimum when your body is exhibiting a stress response. You are

doing well when you get the lines to move towards 100% and remain at higher values. Each biosignal responds at different rates and sensitivities, so don't worry if a certain signal is more difficult to raise than another.

Swipe left and right to view a different session of the same program. The bar graph highlighted in blue indicates the session being displayed in detail below.

About

About eVu Senz

Intended Use

eVu Senz is intended to be used as a biofeedback tool, and as such does not display signals or provide analysis intended to aid in the diagnosis or assessment of any medical condition. Any use beyond this stated purpose is at the discretion and risk of the user.

Requirements for Use

eVu Senz requires a TPS sensor and a Bluetooth-enabled Android device. User profile setup requires an email address.

Copyright Notices and Acknowledgement

©2016 Thought Technology Ltd

The following libraries are used under license from their respective authors, under terms of the [Apache 2.0 license](#)

BackgroundMailLibrary, ©2013-2015 Kristijan Drača

HelloCharts, ©2014 Leszek Wach

We acknowledge use of the Ormlite package provided by Gray Watson.

Last update: September 28th 2016