

Explore Desktop

User Manual

Overview

Thank you for using Explore **Desktop**

Explore Desktop is provided by Mentalab free of charge. It contains functions to visualize and record ExG signals with a Mentalab Explore device.



Plot



Record



Configure



Stream



Measure

For support and questions, please send an email to
support@mentalab.com

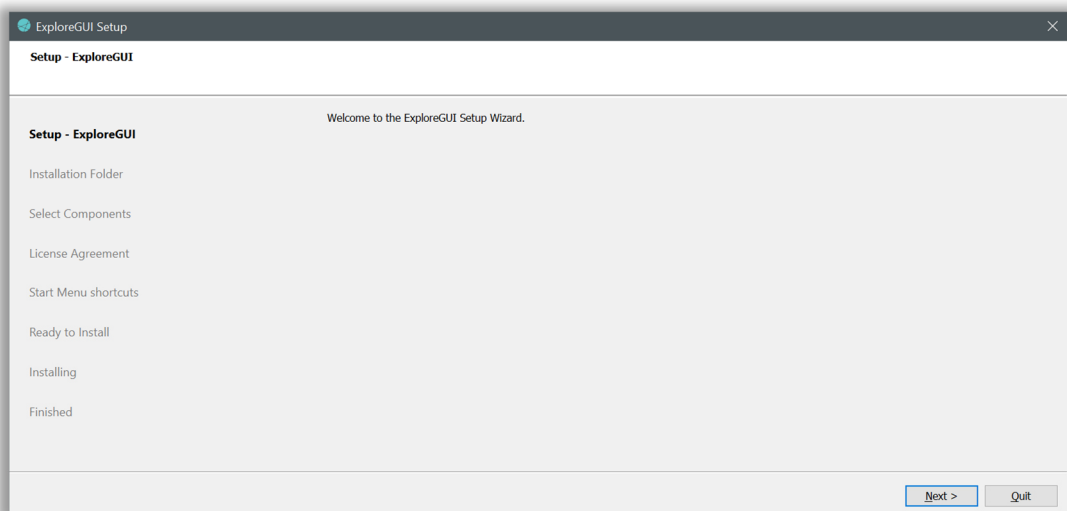
Getting started

This guide contains basic information on connecting to, streaming, recording and configuring your Mentalab Explore device.

For more extensive information regarding safety and usage, please refer to the user manual. Further guidelines and instructional videos can be found at wiki.mentalab.com

Installation

1. Download the Explore Desktop installer. For Ubuntu users, right-click on the installer, select 'Permissions' and check 'Allow executing file as program'.
2. Double click on the installer to launch and follow the on-screen instructions.
3. Once installed, Explore Desktop will reside in the Explore Desktop folder in the installation directory. It will also show in the Start Menu (Windows), Launchpad (MacOS), and Applications Menu (Ubuntu).



Getting started

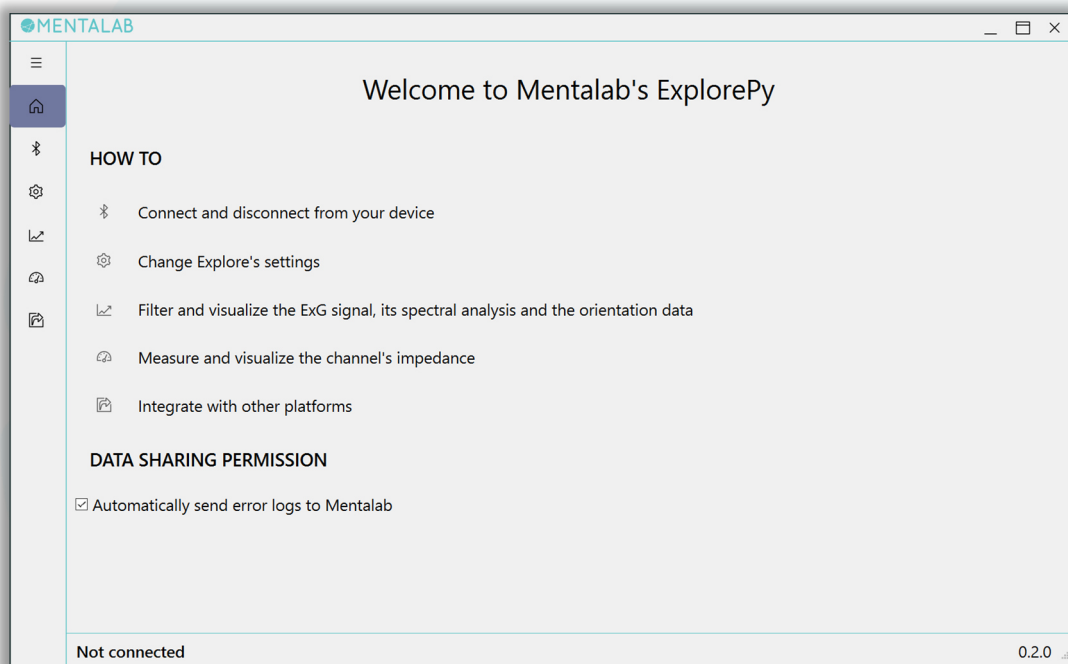
Starting Explore Desktop

Once Explore Desktop is installed, locate it on your Launchpad, Start Menu, or Application Menu. Click to launch.

When first opened, Explore Desktop will display the Home page. This page contains instructions on how to use the app.

The Home page also asks for data sharing permissions. Selecting the checkbox will allow Explore Desktop to send error logs to Mentalab so that errors can be properly fixed.

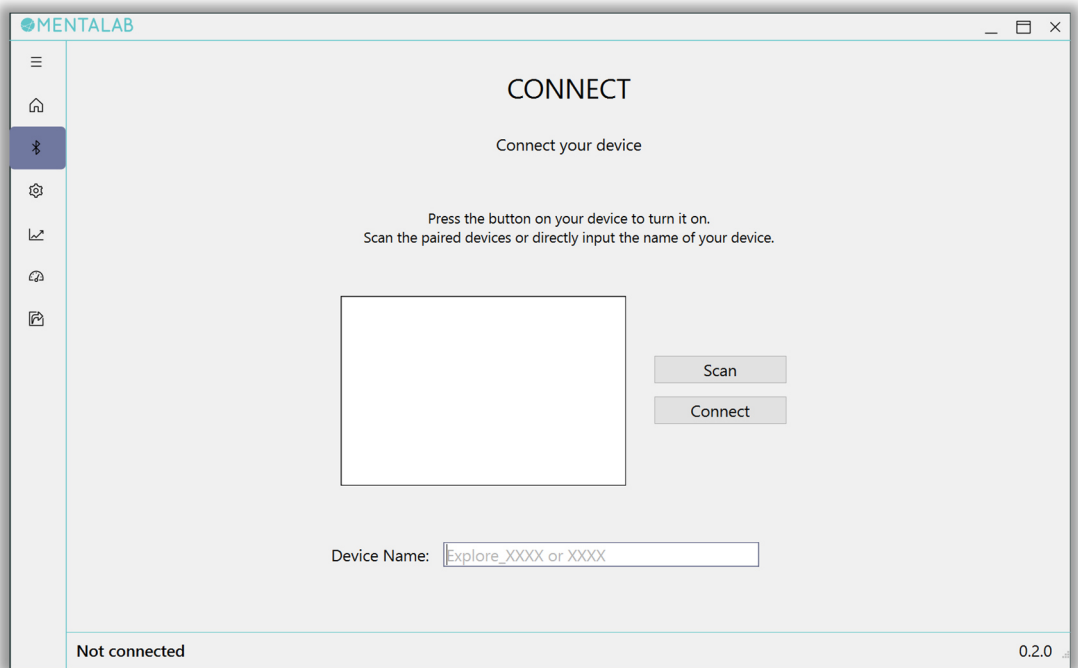
You can change your permission settings at any time.



Getting started

Explore Desktop has three main components: the navigation menu, status bar and main visualization pane.

The navigation menu on the left contains the following options: Home, Connection, Settings, Visualization, Impedance Measurement, Integration.



The status bar at the bottom of Explore Desktop contains:

- The connection status of Explore Desktop
- The firmware version of your Mentalab Explore device
- The battery level of your Mentalab Explore device
- The temperature of your Mentalab Explore device
- The Explore Desktop version

Usage

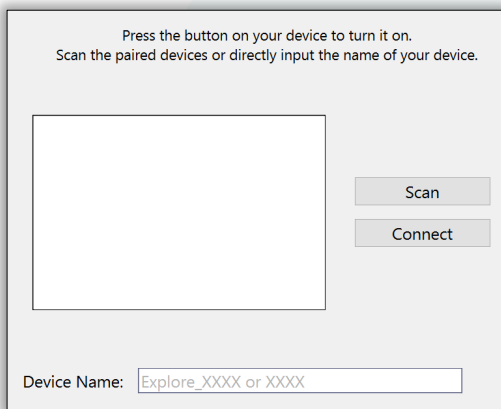
Connect

Under normal usage, Explore Dekstop will open to the Connect page. Use this page to connect to your Mentalab Explore device, or to import recorded data.

There are two ways to connect to your Mentalab Explore device.

Either scan for nearby devices and select your device, or write the name of your device in the input line.

In either case, ensure that your device is in advertising mode. In Explore Desktop, the device will display under: Explore_XXXX.



Click Scan and wait for nearby devices to list.

Once you have selected a device from the list, or written your device name in the input line, click Connect.

! Note

On Windows, all paired devices will be listed when scanning.

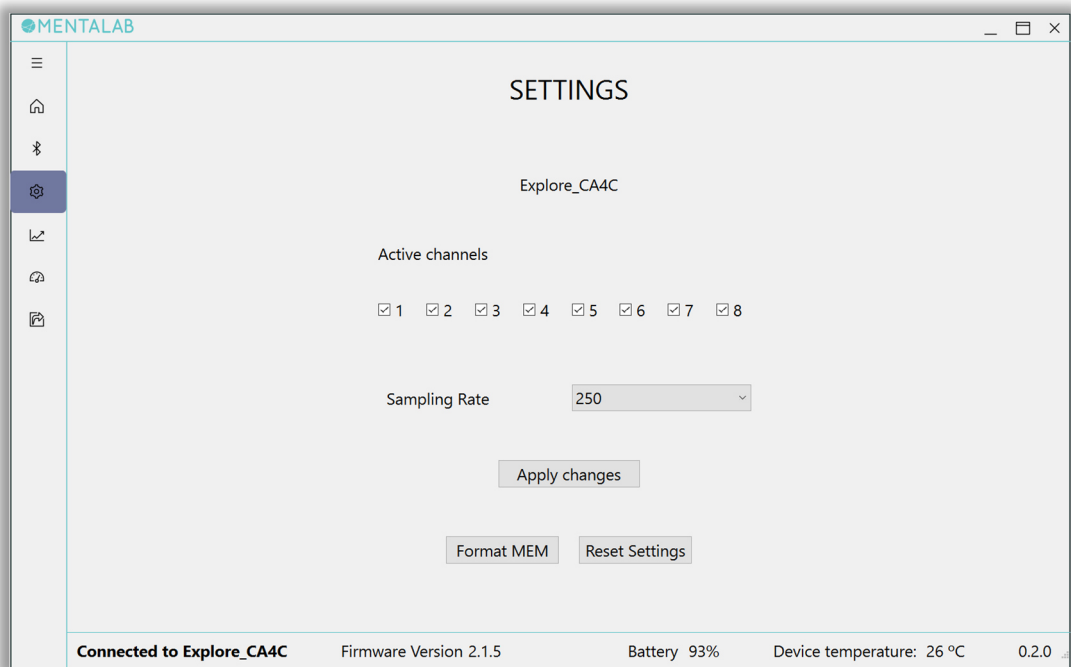
The connection process can take a few seconds. Once your device is connected, the status bar will change. If your device is not found, you will receive an error.

Usage

Configuration

Once your Mentalab Explore device is connected, the Settings page will become accessible.

The Settings page will display the name of your connected device and set of configuration options for that device.



Active channels

To enable and disable ExG channels on your Mentalab Explore device, select and deselect the channel's associated checkbox and click 'Apply changes'.

Only active channels, i.e. those whose checkbox is selected, will display in the Visualization and Impedance Measurement pages.

Sampling rate

To set the sampling rate of your Mentalab Explore device, select either 250, 500, or 1000 from the sampling rate drop-down menu. Sampling rates are measured in Hertz. Click 'Apply changes' to confirm.

! Note

Please note that our 1000 Hz sampling rate is in beta phase.

! Note

Channel masks and sampling rate cannot be changed while recording or streaming to LSL.

! Note

You can change the sampling rate and active channels of your device simultaneously.

Format memory

To format the memory of your Mentalab Explore device, select 'Format MEM'. A confirmation pop-up will appear.

Please note that after confirming you want to format the memory of your device, all binary files stored on that device will be deleted and cannot be recovered.

Reset settings

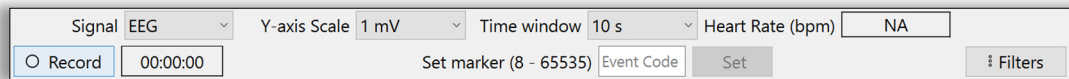
To reset the settings of your Mentalab Explore device, select 'Reset settings'. The device will disconnect, and all settings will return to their default values:

- 250 Hz sampling rate
- All channels active

Visualization

Visualize ExG, orientation and spectral analysis data in real-time by navigating to the Visualization page.

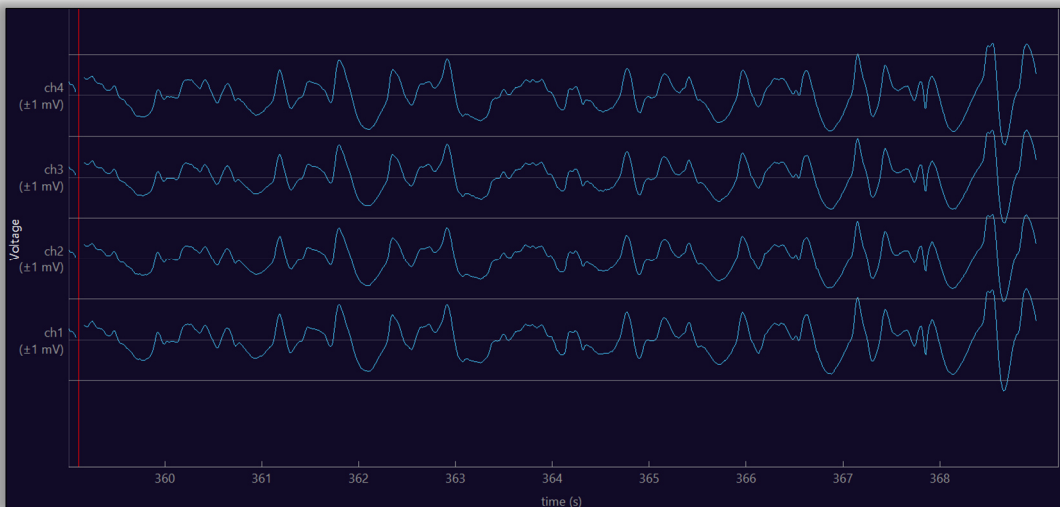
You can configure the visualization via the drop-down menus at the top of the Visualization page or by selecting 'Filters'.



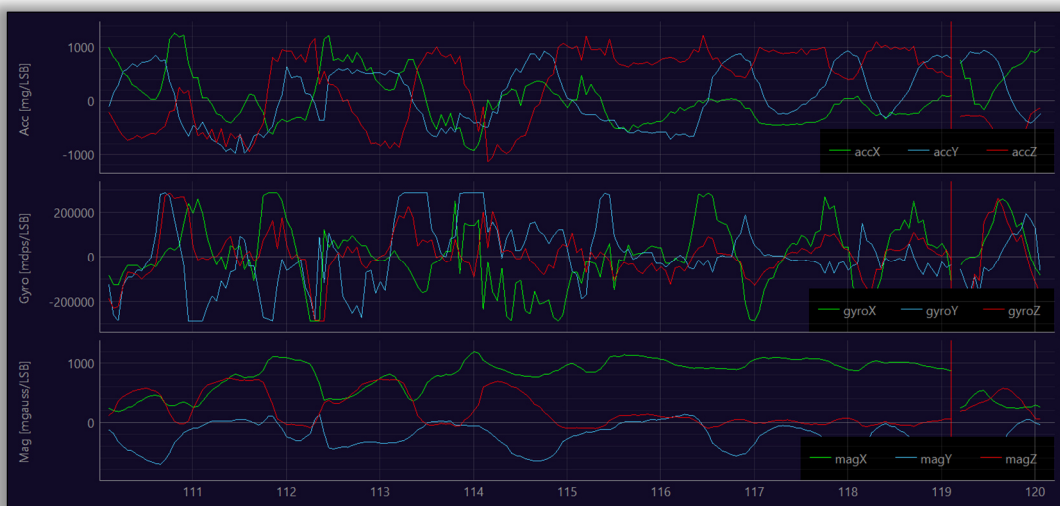
Settings include:

- Signal – EEG or ECG mode.
 - EEG provides the spectral analysis plot of the signal. ECG mode detects heartbeats and calculates heart rate from the RR-intervals.
- Y-axis scale – change the range of the y-axis.
 - 1 μ V to 100 mV range.
- Time window – change the time interval of the x-axis.
 - 5, 10, or 20 second range.
- Heart rate – if in ECG mode, heart rates will be computed and displayed.
- Record (see Recording Section).
- Event markers (see Event Markers).
- Filters.

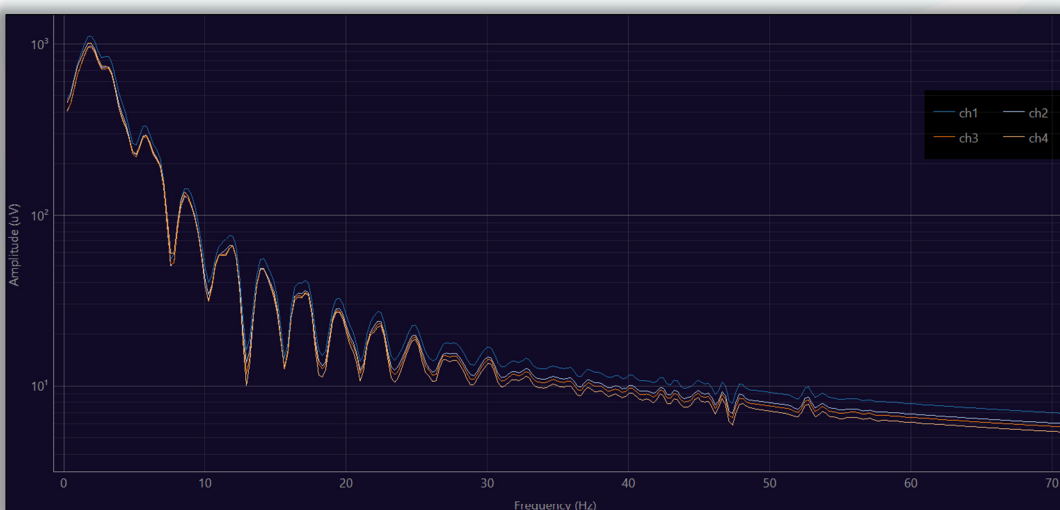
Visualization



ExG data



Motion sensor data



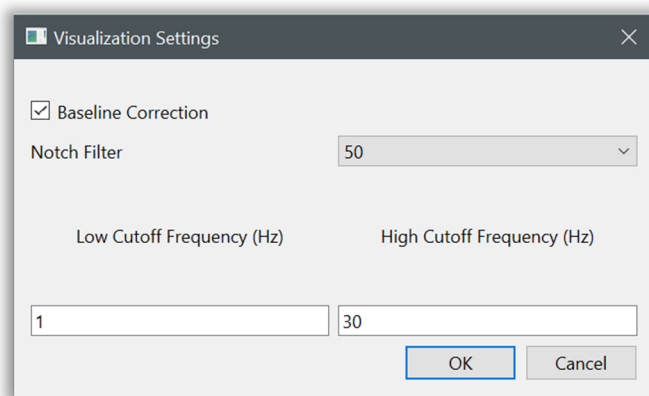
Spectral analysis

Visualization

Filters

The Visualization page will prompt you to define your visualization filters. Explore Desktop will begin streaming data once you have selected your filters.

You will still be able to filter signals while the device is streaming. To do so, select 'Filters'.



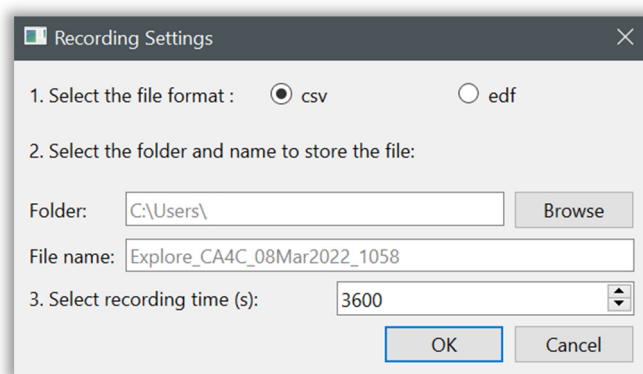
The following filters are available:

- Baseline correction – removes the signal's DC offset, based on a moving average.
- Notch filter (band stop filter) – attenuates the power line noise at 50 or 60 Hz.
- Low cutoff frequency – rejects signals with frequencies above this threshold.
- High cutoff frequency – rejects signals with frequencies below this threshold.

Recording

Record data in real time to EDF (BDF+) or CSV by selecting 'Record'

A pop-up allows you to configure your recording.



- File format – select the output file type (EDF or CSV):
 - CSV mode generates an extra file for the marker events
 - EDF mode records data in BDF+ format (in 24-bit resolution)
- Folder and name prefix – select where to store files and the file prefix.

For example, if the prefix is 'test', data will record in three separate files: 'test_ExG.csv', 'test_ORN.csv', and 'test_Marker.csv'. These files will contain ExG data, orientation data, and event markers.
- Recording time (in seconds) – set the duration of the recording. You can stop recording at any time by clicking 'Stop'.

Recording

! Note

Because environmental factors, like temperature, can affect your sampling rate, we recommend computing the sampling rate of your recorded data. If you find a deviation between the sampling rate you calculate and Explore Desktop's sampling rate, resample your signal to correct for drifts. The timestamps in the CSV/EDF file can be used to compute the resampling factor.

! Note

If you are setting markers in your recording, record to CSV. Alternatively, push data to LSL and record with LabRecorder. EDF cannot guarantee precise marker timings.

! Note

If the Bluetooth connection is unstable, data may not arrive in order. Timestamps are saved by the Mentalab Explore device and can be used to sort recorded samples.

Event markers

One method to generate a marker event is to press the button on your Mentalab Explore device. Alternatively, you can set event markers using the 'Set' button.

Marker events display as vertical dashed lines in the Visualize page. A corresponding event code will display.

! Note

Marker codes between 0 and 7 are reserved for hardware. Please use any other integer (from 8 to 65535) as a code for your marker.

Impedance

To measure the impedances of your electrodes, navigate to the Impedance Measurement page.

Select which type of electrodes you are using from the drop-down menu. Then, click on 'Measure Impedances'.

Channel impedances will display their value and corresponding color code as in the table below.

Color	Range (k Ω)	
	Wet electrodes	Dry electrodes
Green	< 10	< 20
Yellow	10 – 20	20 – 35
Orange	20 – 30	35 – 50
Red	30 – 50	50 – 70
Black	> 50	> 70
Grey	Inactive channel / Device not connected / Impedance too high (250 kHz for wet electrodes)	

! Note

Impedance values depend on the impedance of the reference electrode. The value shown for each electrode is the average of the ground and ExG electrodes' impedances.

If all channel impedances are high, try cleaning the skin under the reference electrode more thoroughly using, e.g., alcohol, abrasive gel, or EEG gel.

! Note

Impedance values are subject to environmental conditions like noise and temperature. Aim for regular room temperatures (~15-25°C).

Lab Streaming Layer

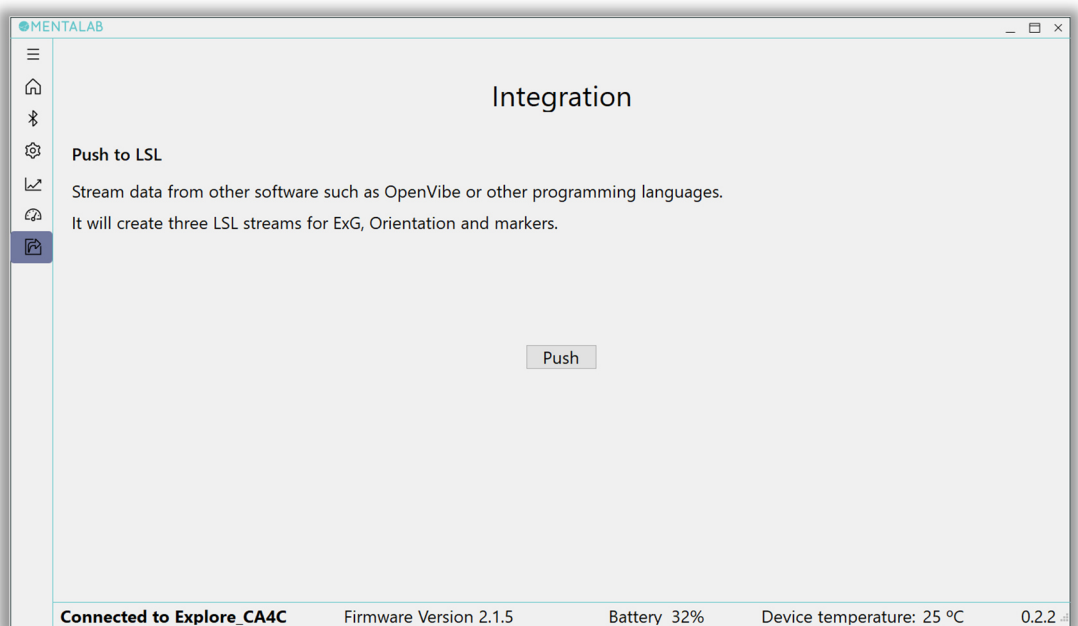
To push data to Lab Streaming Layer, navigate to the Integration page.

Select 'Push' to start streaming data to LSL, and 'Stop' to stop streaming data to LSL.

If your device loses Bluetooth connectivity, Explore Desktop will attempt to reconnect automatically.

When streaming to LSL, Explore Desktop generates three data streams. One for ExG data, one for motion data, and one for the event markers.

You can LSL to stream data from other data providers, like OpenVibe, MATLAB, Java, and C++. See our wiki for more: wiki.mentalab.com



Troubleshooting

Unstable Bluetooth connection

Possible causes are:

- An HDMI cable connected to a second display can make the connection unstable.
- If the computer is connected to other Bluetooth devices that have a high data transfer rate, like a headset, connections can become unstable.
- The device is at the limit of its range.

No device found with name

Ensure your device is on and in advertising mode (blinking blue once a second).

Contact

Mentalab is a biomedical technology company from Munich, Germany. Mentalab Explore is a high-end, mobile measurement device for biosignal applications.

Mentalab Explore is used by researchers and scientists around the world in applications ranging from BCIs to sleep and neuropsychology research.

Our team is happy to support you in developing your own innovative solutions.



contact@mentalab.com
support@mentalab.com



<http://mentalab.com>



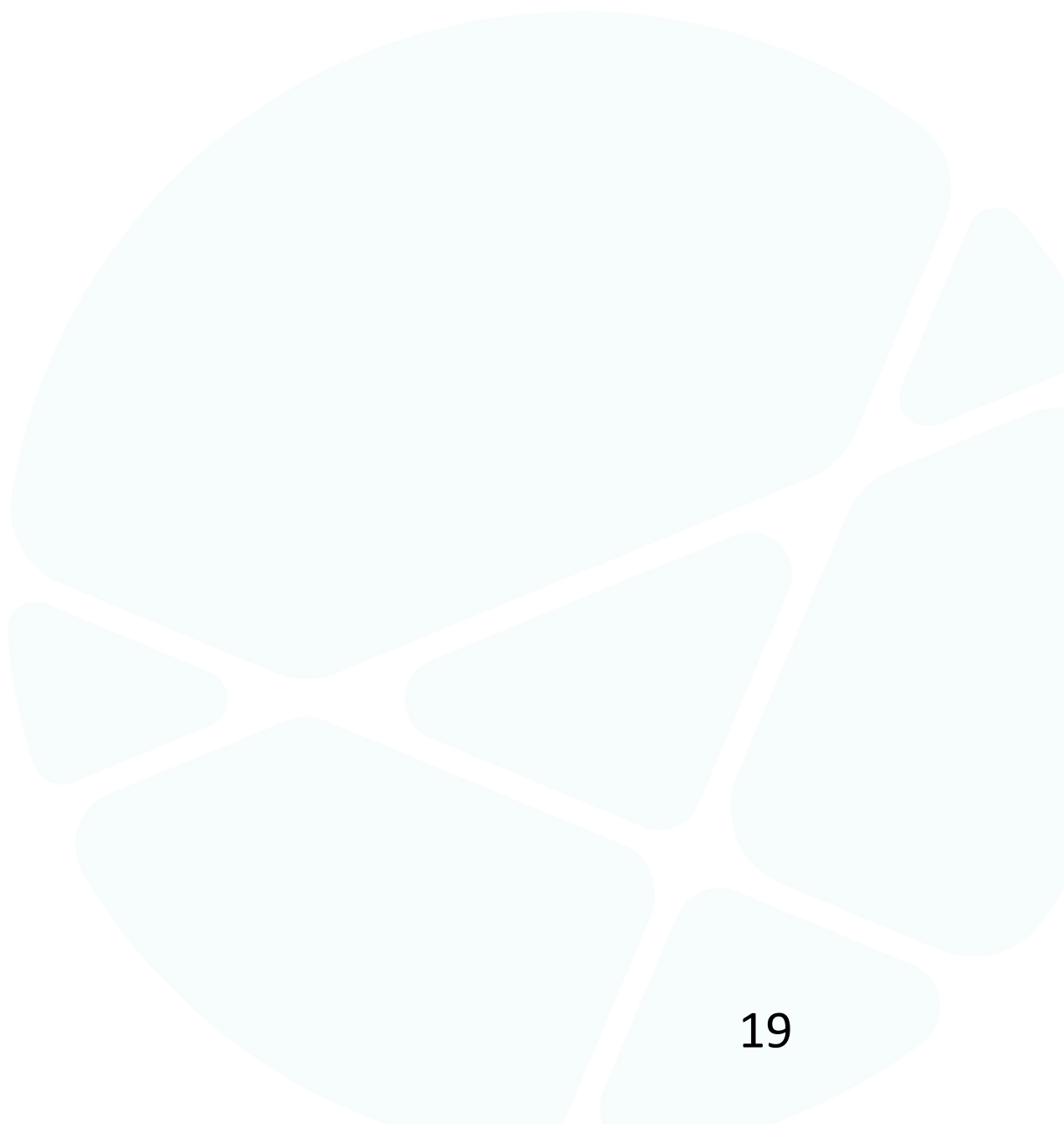
<http://github.com/Mentalab-hub>



<http://explorepy.readthedocs.io>



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