

MINDROVE

Visualizer on Desktop  
**User Manual**

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## 2 System requirements

**Operation system:** Windows 10

**Architecture:** 64-bit

## 3 Starting the application

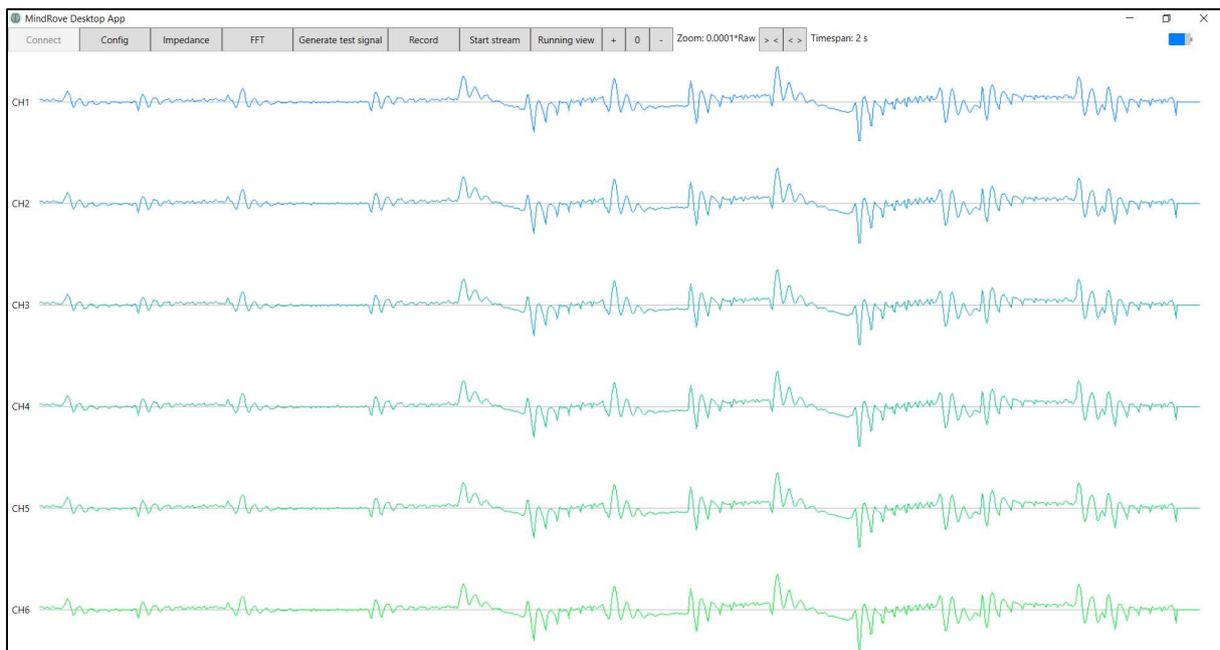
The MindRove Desktop App can be run by clicking on MindRove.exe within folder MindRove Desktop App. Prior to this, your PC is needed to be connected to the MindRove Headset (to do so, look for "MindRove\_headset" in the list of wireless networks, connect to it and upon request give password "#mindrove"). It is recommended to use the WiFi dongle provided (so that you can continue using the intrinsic WiFi of your machine for internet access) and choose the option "Connect automatically".

Upon the first start-up, Windows asks about communication permissions of the app. Please allow communication on both private and public networks:



## 4 Overview

The app starts with the EEG View (this view is also used for displaying EMG signals of the Armband). All the EEG channels are displayed on the screen using separate colours for each one, in the following order in case of an Arc device. You can select the type of your device (Arc, Strip, Armband) at the Config View (see at: 4.2 Config)



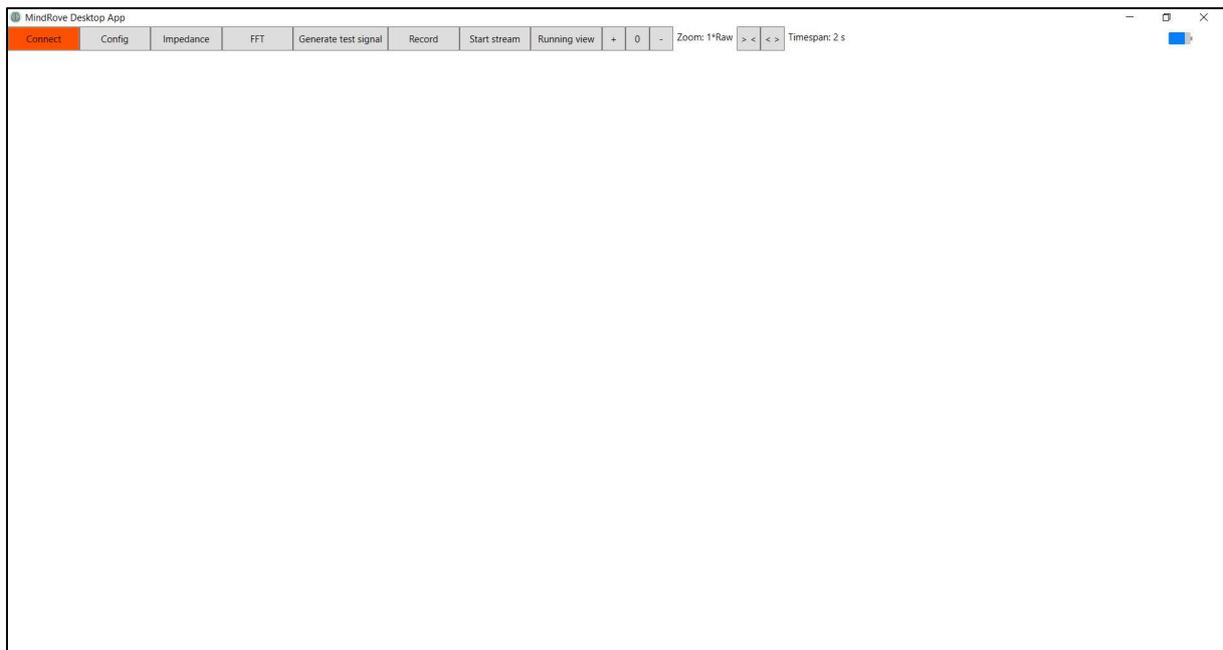
In the top of the window, the Menu Bar can be found. The menu provides access to the different app functions; these functions are described briefly in the following sections. Next to the Menu Bar, the current zoom values (software gain and window timespan) and on the far right, the battery state are displayed.

## 4.1 Connect

The connection is established upon start-up automatically. By default, the Connect button is disabled.

If the connection is lost, the app waits approximately 15 seconds then enables the manual option with the Connect button turning orange. During this few seconds, closing the application is not possible, either (it terminates after the waiting time).

**Note** that if option "Connect automatically" has not been chosen, you have to connect to the headset manually.



## 4.2 Config

The Config View allows you to:

1. Choose the type of your device (Arc, Strip, Armband, etc.)
2. Send trigger signals to the device. These signals will be registered in the recorded files if the recording is on (see at: 4.6 Record)

If you need more complex software configuration for specific measurement paradigms and applications, please review the MindRove SDK at the following link:

[https://github.com/MindRove/SDK\\_Public](https://github.com/MindRove/SDK_Public)



### 4.3 Impedance/EEG

The application starts displaying the EEG View showing the electrophysiological signals for each channel. This diagram has a timespan variable between 1 and 20 seconds (2 seconds by default). For details on adjusting the view, see sections 4.8 and 4.10.

Upon clicking the Impedance button, a diagram showing the magnitudes of impedance measured between specific pairs of electrode is displayed.

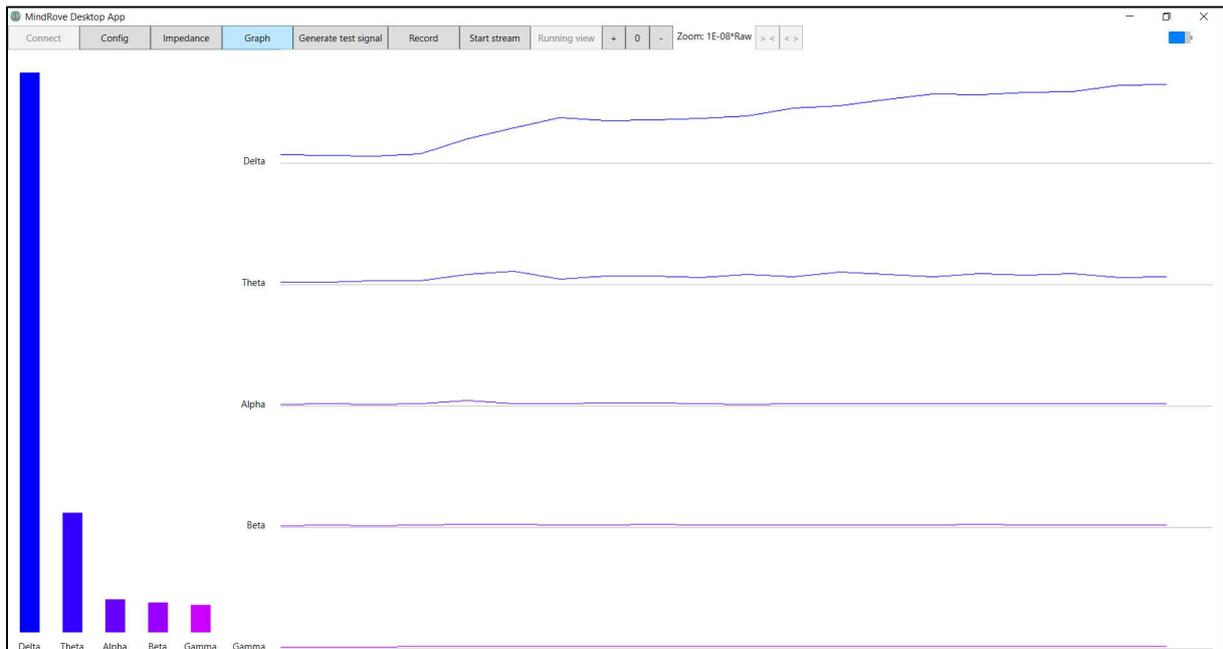


Accurate values are shown at the bottom of each bar (the chart graphically saturates at 100 kΩ).

Upon clicking the EEG button, the app returns to EEG View.

#### 4.4 FFT

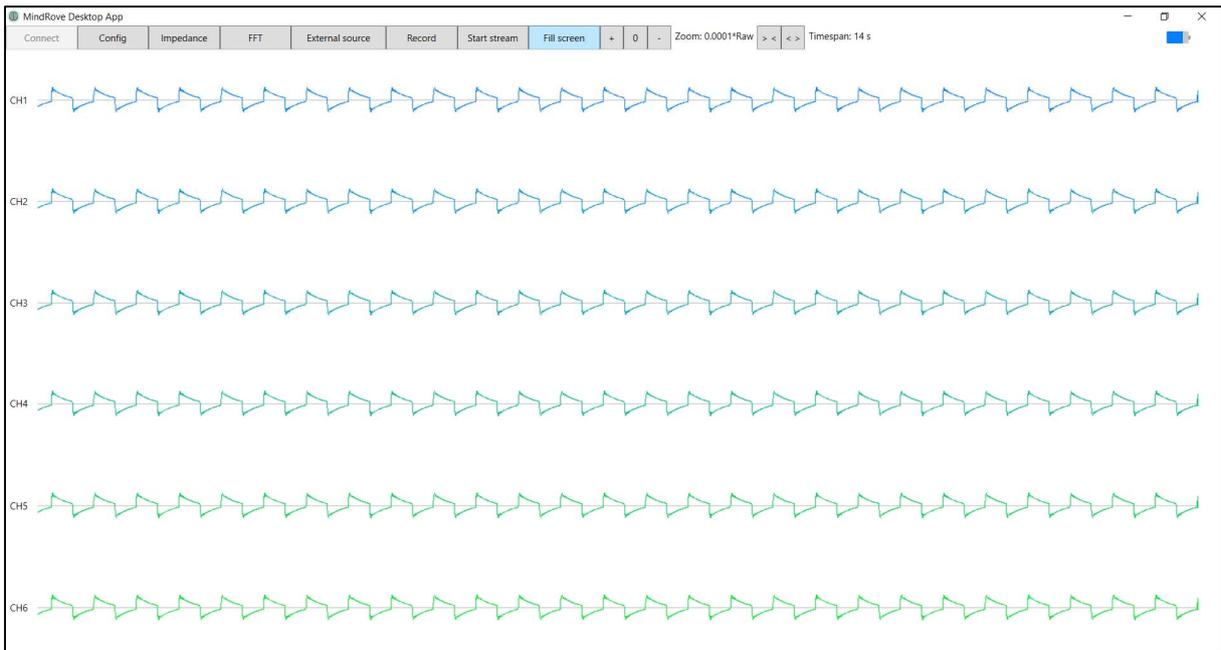
The FFT View displays signal intensities across frequency bands delta, theta, alpha, beta and gamma. On the left side of the screen, the average intensities for the last second are shown (normed by the maximum band value), while on the right side a history diagram composed of values from the last 2 seconds is displayed. The magnitude of the displayed signals can be adjusted manually; for details, see section 4.8.



#### 4.5 Generate test signal/External source

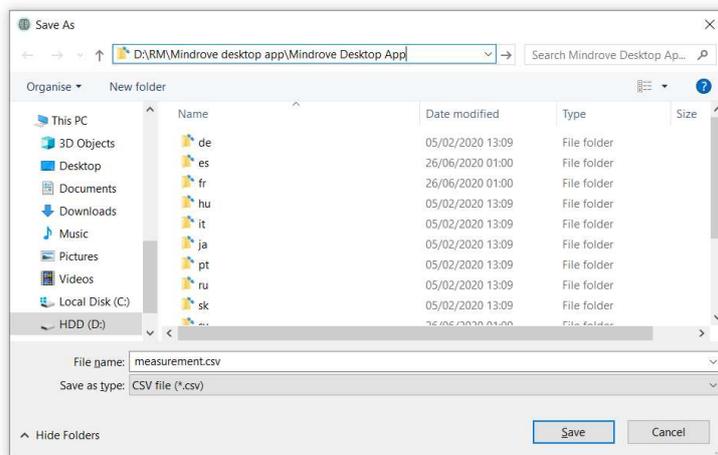
The headset is capable of generating internal signal (square wave, in the figure its shape is distorted due to 50 Hz notch filtering) for diagnostic purpose. This functionality can be accessed by clicking on Generate test signal button.

Return to measurement mode is possible by clicking the External source button.



### 4.6 Record

Signals measured by the MindRove headset can be saved in .csv file. Upon clicking on the Record button, a dialog window pops up enabling the user to save the measurement file anywhere on the PC.



Recording ends when the user clicks on the Save button.

Measurement files store each variable in separate columns with their first row specifying the delimiters for Excel and the second row acting as a header.

Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Trigger	G00	G01	G10	G11	G20	G21	N	fs
-121	-209	-195	-121	539	42	0	4111	-15987	815	-215	409	95	67705	500
-162	-210	-57	-107	765	371	0	4111	-15987	815	-215	409	95	67706	500
-255	-304	-86	-155	549	13	0	4111	-15987	815	-215	409	95	67707	500
-27	-95	18	79	694	146	0	4111	-15987	815	-215	409	95	67708	500
-72	-179	-69	-47	632	-11	0	4111	-15987	815	-215	409	95	67709	500
-316	-443	-332	-343	434	-251	0	4111	-15987	815	-215	409	95	67710	500
-458	-563	-428	-451	354	-250	0	4103	-16006	804	-204	406	94	67711	500
-351	-428	-255	-265	515	14	0	4103	-16006	804	-204	406	94	67712	500
-356	-471	-317	-301	518	-171	0	4103	-16006	804	-204	406	94	67713	500
-220	-288	-207	-170	463	-324	0	4103	-16006	804	-204	406	94	67714	500

Measurement values are listed below:

- **Ch1–Ch6:** voltage measured on each EEG channel [A/D converter counts]
- **Trigger:** trigger events; 0 — None, 1 — Beep trigger, 2 — Boop trigger
- **Gij:** values from the gyro sensor
- **N:** packet identifier
- **fs:** sampling frequency [Hz]

#### 4.7 Data streaming

Signals measured by the MindRove headset can be streamed via Lab Streaming Layer. The stream is available under name “MindRoveStream”.

Streaming can be initiated by clicking on the Start stream button and terminated by clicking on the End stream button.

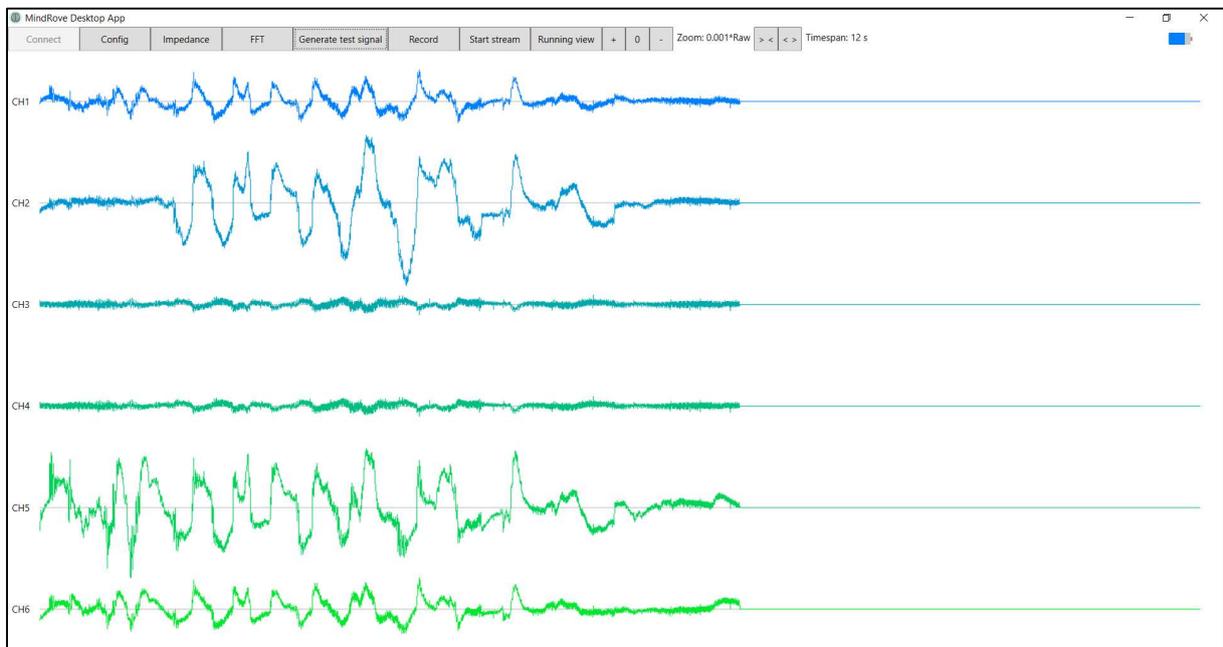
Transmitted values are listed below:

- **Ch1–Ch6:** voltage measured on each EEG channel [A/D converter counts]
- **Trigger:** trigger events; 0 — None, 1 — Beep trigger, 2 — Boop trigger
- **Gij:** values from the gyro sensor
- **N:** packet identifier

#### 4.8 Running view/Fill screen

Measurement signals can be displayed in two ways:

- running from the left to the right in a static window, filling the screen; when the signal reaches the far right, new data are shifted in from the left (Fill screen, default option, depicted below)
- shifting from the right to the left continuously, giving the illusion of a moving screen (Running view)



#### 4.9 Zoom buttons

The scale of the voltage diagrams (EEG and FFT View) can be adjusted manually either by clicking buttons +, 0 and - (+: zoom in, 0: default scale, -: zoom out) or by pressing the Shift buttons (left: zoom in, right: zoom out) on the keyboard.

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The displayed amplitudes are increased or decreased by one order of magnitude. The scale factor is shown next to the Zoom buttons on the right with respect to the magnitude of the raw signal.

#### **4.10 Timespan buttons**

The timescale of the EEG View can be adjusted manually either by clicking buttons > < and < > (> <: longer timespan, < >: shorter timespan) or by pressing the Ctrl buttons (left: longer timespan, right: shorter timespan) on the keyboard.

The timespan can be increased or decreased by one second. Its value is shown next to the Timespan buttons on the right.

Thank you for your support!