OB3000 EEG Helmet
User Manual

OYMotion Technologies Co.,Ltd.
www.oymotion.com

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1. Preface

Dear user, thank you for purchasing the OYMotion OB3000 EEG Helmet. In order to better understand the product, please read this manual carefully before use. I wish you a pleasant experience!

2. Product Introduction

The OB3000 EEG helmet is mainly used for real-time acquisition of non-invasive EEG, ECG and posture signals. OB3000 supports the acquisition of 23 channels EEG and 1 channel ECG data. At the same time, the OYMotion wireless bioelectric acquisition software (EEG Helmet APP) can realize the real-time display of EEG and ECG signal waveforms, posture, heart rate calculation, data recording. It can also detect the impedance of each electrode.

3. Product Model

OB3000

4. Scope of application

Provides for human brain electrophysiological signal detection, processing, display, storage and heart rate monitoring.

5. Product Appearance

5.1. The names and functions of the various parts of the EEG helmet

It consists of a helmet host , ear clips, ECG lead wires, EEG electrodes , ECG electrodes , and EEG Helmet APP .

①Helmet host ②EEG electrodes

③Ear clip ④ECG lead wire

⑤ECG electrodes

5.1.1. Helmet host

Figure 5.1.1-1 Helmet host

1) Button

- Power button

Operate	Function
Press and hold for more than 2 seconds and then release	Power on/off

2) LED Light

- Status indicator

State	Instructions
Slow Flash	Power on
Always on	Bluetooth connected
Flash	During data transmission

- Charging indicator

State	Instructions
Orange steady light	Charging
Off	Not charging or charging is complete

3) Charging port

The charging port is a Type-C port, located on the lower left side of the helmet host .

4) Ear clip interface

The ear clip interface is a 2.5 audio secondary male interface. Connected to the ear clip , it is located at the bottom edge of both sides of the helmet host.

5) ECG lead wire interface

The lead wire interface is a 2.5 audio secondary male interface. It is connected to the ECG lead wire and is located on the lower left side of the helmet host.

5.1.2. ECG Leads

The ECG lead wire is used to connect the ECG electrodes and the helmet host. One side is connected to the helmet host using a 2.5 audio secondary male connector, and the other side is connected to the ECG electrodes through a button.

Figure 5.1.2-1 ECG lead wire

The specifications of ECG lead wires are as follows:

Product Name	Cable length	Material
ECG Leads	Cable length 21cm	Black TPU shielded cable

5.1.3. Ear clip

Equipped with two black ear clips, which are clamped on the two earlobes when in use as the input of reference signal and bias signal.

Figure 5.1.3-1 ECG lead wires

5.1.4. Electrode

The EEG electrode uses a dry electrode with a metal spring needle, as shown in Figure 5.1.4-1 .

The ECG electrodes are disposable ECG electrode sheets , as shown in Figure 5.1.4-2 .

The electrode is connected to the snap-on female connector on the lead wire through a snap-on male connector and fixed on the helmet host, making it flexible and convenient to wear.

Figure 5.1.4-1 EEG electrodes

Figure 5.1.4-2 Disposable ECG Electrodes

6. Equipment Operation

6.1. User wearing process

Wearing steps:

1. Take out the helmet host, ear clips, ECG lead wires, ECG electrodes and other accessories from the packaging.
2. Take out the ear clip and ECG lead wire from the packaging bag, and then connect them to the connector on the helmet host.
3. Take out a disposable ECG electrode and install it on the ECG lead wire.
4. Put the helmet host on your head, with the side with the word "OY" in front. Fasten the buckle at the lower jaw, adjust the tightness to ensure that the device is worn properly, and clip the two ear clips on the two earlobes.
5. Remove the plastic sheet of the disposable ECG electrode and place the ECG electrode under the left clavicle.

OB3000 EEG helmet connection diagram

6.2. Software Operation

6.2.1 Overview

OYMotion wireless bioelectric acquisition software (EEG Helmet APP) is a mobile software platform for OYMotion EEG acquisition product,which can mainly realize the following functions:

- Real-time acquisition and display of EEG and ECG signals
- Waveform display settings
- Local storage of EEG and ECG data
- Impedance detection
- Heart rate monitoring
- Heart rate variability detection

- FFT of EEG signal
- Power spectrum of EEG signal
- Data distribution
- Data playback
- View product information

App download link: https://eeghelmet.oymotion.com/admin/index

Notice

Before downloading, please make sure that your phone or tablet is connected to the Internet, Bluetooth is turned on , and location services are turned on.

6.2.2 Connecting device

1) Power on the device: Press and hold the power button until the status indicator turns purple , then release it. The device will power on and the status indicator will turn green and flash slowly .

2) Run the EEG Helmet APP , enter the startup page, click OK to enter the device search page, as shown in Figure 6.2.2-1.

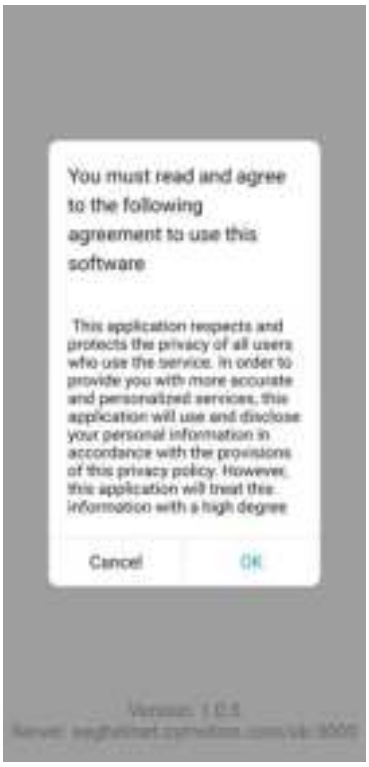

Figure 6.2.2-1

3) On the " **Find Devices** " page of the EEG Helmet APP , click the icon to find the device, as shown in Figure 6.2.2-2.Find the OB3000 device in the device list and click

"**CONNECT** ", as shown in Figure 6.2.2-3 . After the connection is successful, the status indicator is always green.

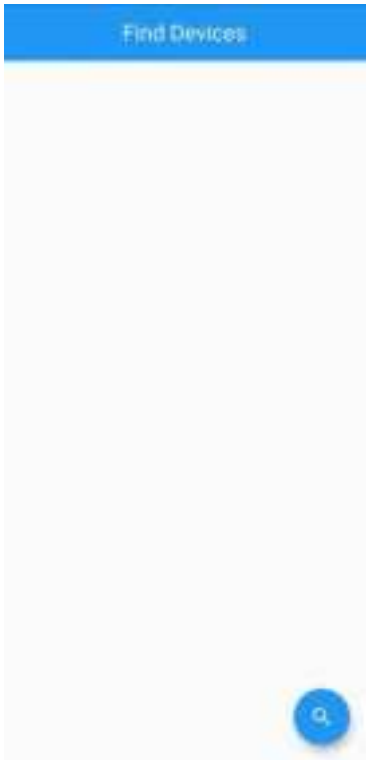

Figure 6. 2.2-2

Figure 6.2.2-3

6.2.3 Device Activation

When the mobile phone or tablet is connected to the device for the first time, a pop-up window will appear as shown in Figure 6.2.3-1 . Enter the activation code and click " **OK** ". A success prompt pop-up window will appear as shown in Figure 6.2.3-2 . Click OK, the device will automatically connect, and the main interface will be entered as shown in Figure 6.2.3-3 .

Figure 6.2.3-1

Figure 6. 2.3-2

Figure 6. 2.3-3

Notice

The activation code is issued together with the device. After the device is activated, it will be bound to the mobile phone/tablet. If you change the mobile phone / tablet later, please contact OYMotion after-sales personnel.

6.2.4 Waveform

After the user wears the device correctly, he can view the real-time waveform and impedance. The impedance can be turned on or off, and the sampling rate can be selected as Normal SampleRate/High SampleRate. Click Start to enter the Waveform page, as shown in Figure 6.2.4-1. The main interface of "Waveform" is shown in Figure 6.2.4-2, Figure 6.2.4-3, and 6.2.4-4 .

Figure6.2.4-1

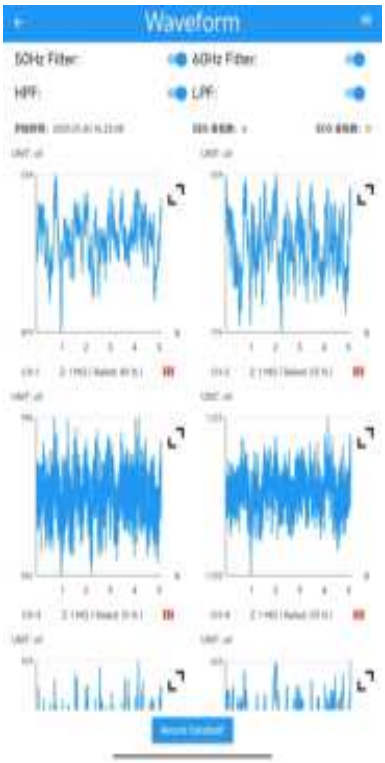

Figure6.2.4-2

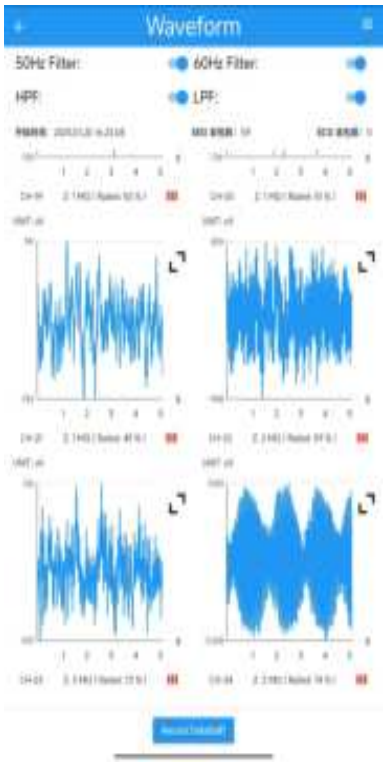

Figure6.2.4-3

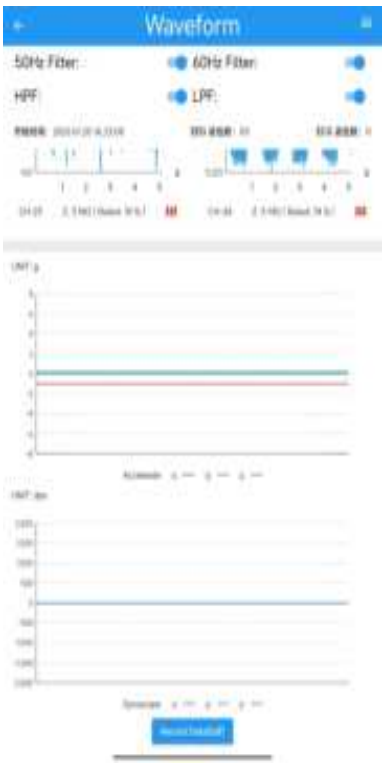

Figure6.2.4-4

In Figure 6.2.4-2 , you can select the waveform unit in the upper right corner. Click the " " button to enter the single-channel waveform setting interface, where you can view the waveform of

each channel in detail. Select the channel by touching the " < " and " > " symbols on the left and right of the interface. Click " Shrink " to return to the main waveform viewing interface, as shown in Figure 6.2.4-5.

Figure 6.2.4-5

In this interface, you can set the EEG waveform frequency and seconds for each channel waveform, as described below:

EEG Filter: The options include " **None, δ, θ, α, β, γ, Standard** " , as shown in Figure 6.2.4-6 ;

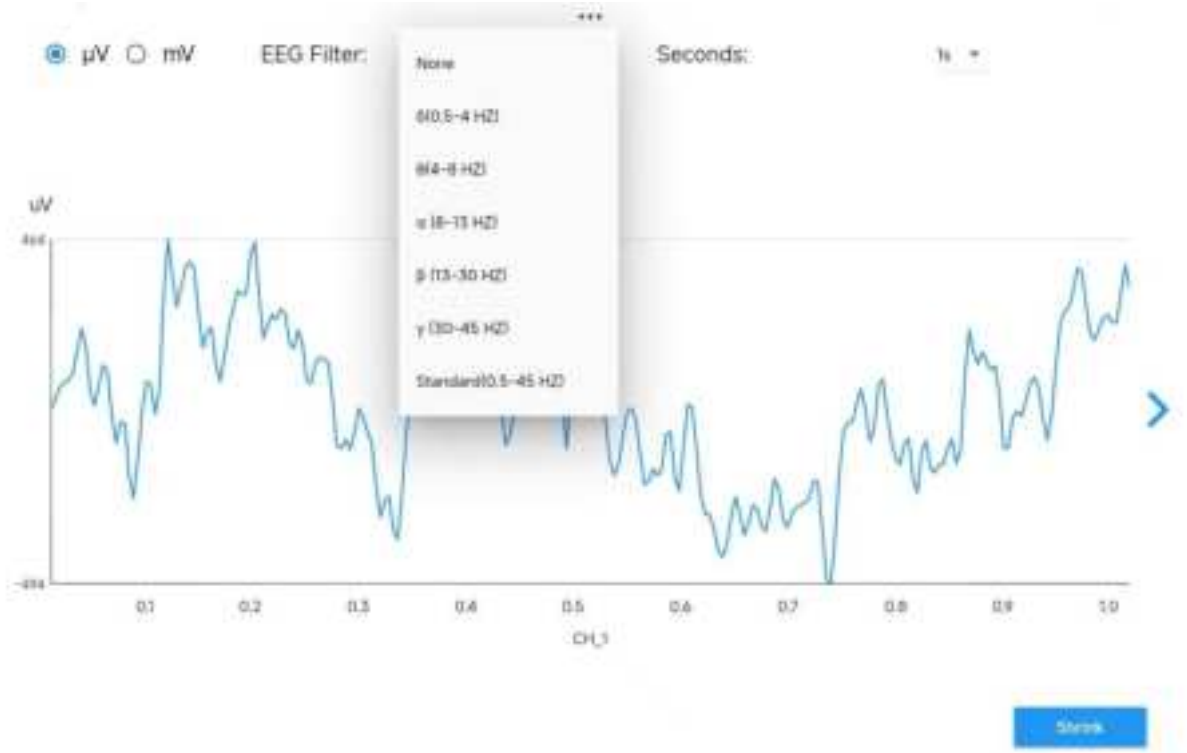

Figure 6.2.4-6

Seconds: The options include"**1s , 5s, 10s**", as shown in Figure 6.2.4-7 **;**

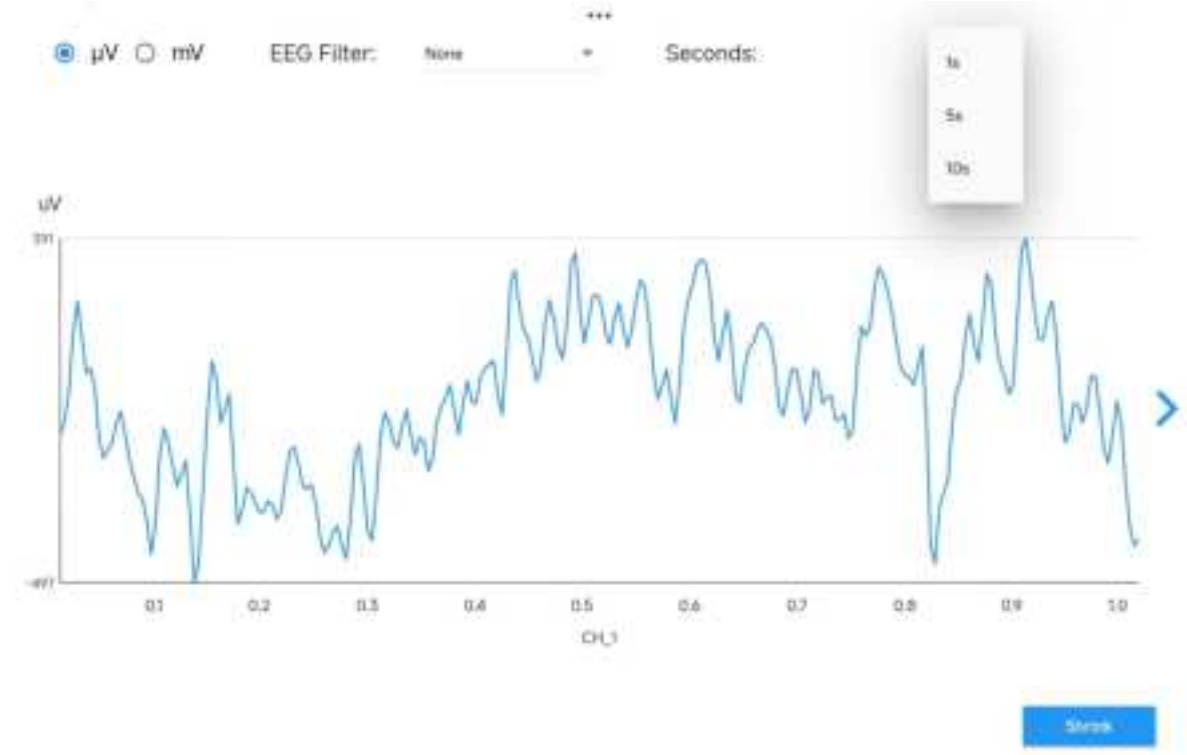

Figure 6.2.4-7

The last channel (CH_24) is an ECG waveform, which can display R-R Interval,Heart Rate, and Heart Rate Variability information, as shown in Figure 6. 2.4-8 ;

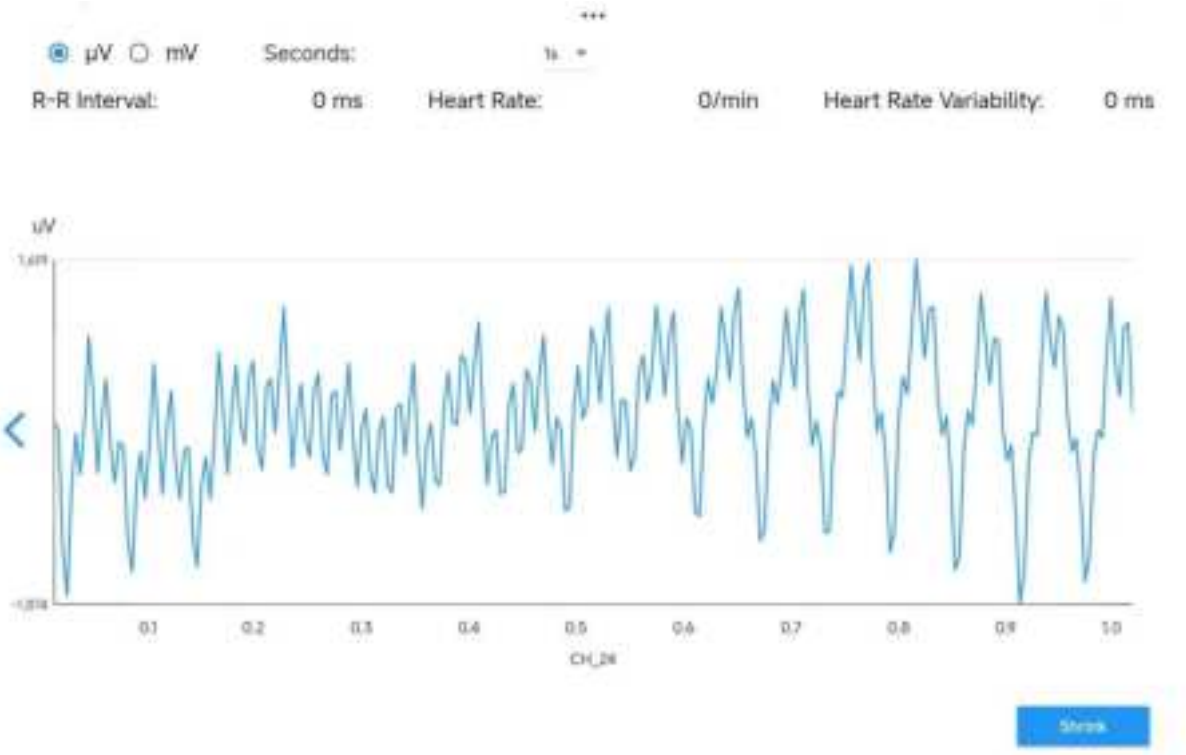

Figure 6.2.4-8

This interface can set the ECG voltage unit and duration , as described below:

ECG voltage unit: The options include " **μV , mV** " , as shown in Figure 6.2.4-9;

Seconds: The options include " **1s , 5s, 10s** " .

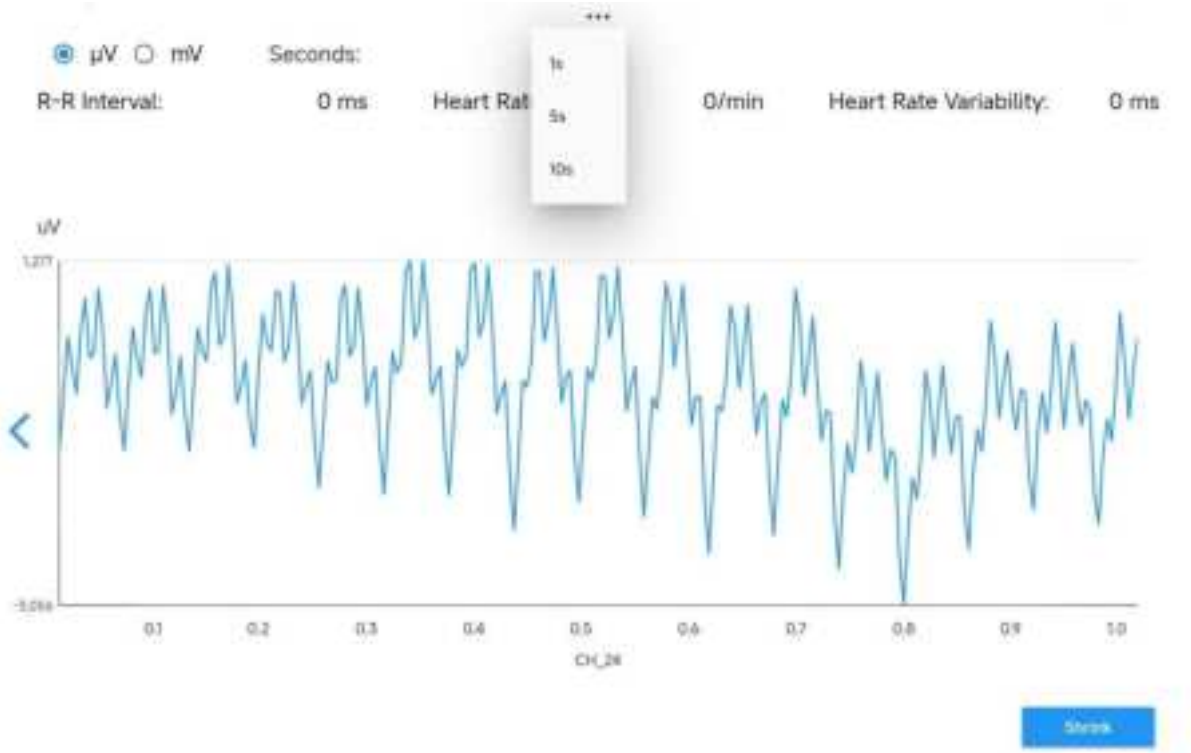

Figure 6.2.4-9

The line graph of device Acceleration and Gyroscope is displayed below the waveform main interface , as shown in Figure 6.2.4-10;

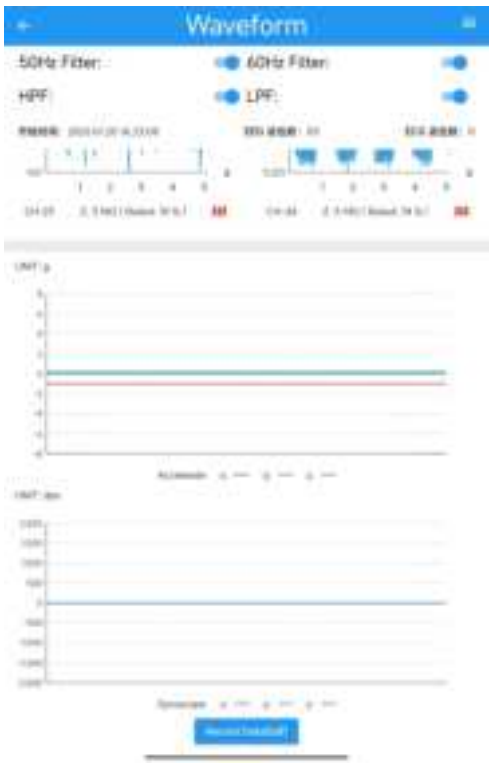

Figure 6.2.4-10

Click the "Record Data" button at the bottom of the page to start collecting EEG data. After clicking "Record Data", the "Record Data" button changes to the "Stop Record Data" button. After the collection is completed, click the "Stop Record Data" button. The APP will prompt the location where the collected data file is saved. Click OK to proceed to the next step, as shown in Figure 6.2.4-11 ;

Figure 6. 2.4-11

The collected data file is a .bdf file, which can be opened on the data playback page or using related software.

In the waveform viewing main interface, click the " " symbol in the upper right corner to switch to the FFT interface (Fast Fourier Transform) and PowerBand interface.

In the FFT interface, you can view the FFT of a single or multiple channels, and the FFT waveform of the selected channel will be displayed, as shown in Figure 6.2.4-12.

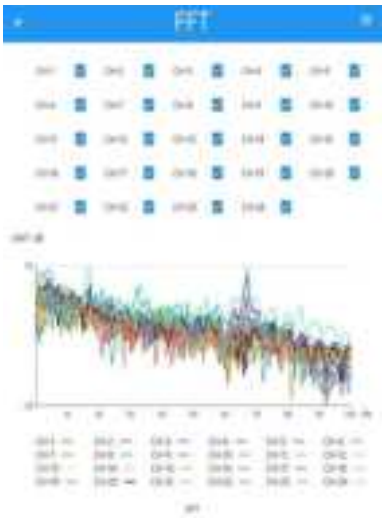

Figure 6.2.4-12

In the PowerBand interface, the APP will display the total power intensity of all selected channel data in delta (0.5Hz-4Hz) frequency band , theta (4Hz-8Hz) frequency band, alpha (8Hz-13Hz), beta (13Hz-30Hz) frequency band, and gamma (30Hz-45Hz) frequency band in the form of a histogram in pW, as shown in Figure 6.2.4-13. The data is refreshed every 1s.

Figure 6. 2.4-13

6.2.5 Data Distribute (LSL)

This function is a simple way for customers to directly analyze and redevelop the collected data. Customers who need to use this function , please contact OYMotion Technologies Co.,Ltd. for technical support according to the contact information at the end of the manual .

6.2.6 Playback (bdf)

(1) Click “Playback (bdf)” to enter the “Playback (bdf)” page. This page displays the number of channels and packets of the playback file. You can select the bdf file on the page , as shown in Figure 6.2.6-1 .

Figure 6.2.6-1

(2) Click "Pick File", then go to the file path saved during data acquisition (see Figure 6.2.4-11) and select the file you want to play back. After checking, click OK, as shown in Figure 6.2.6-2.

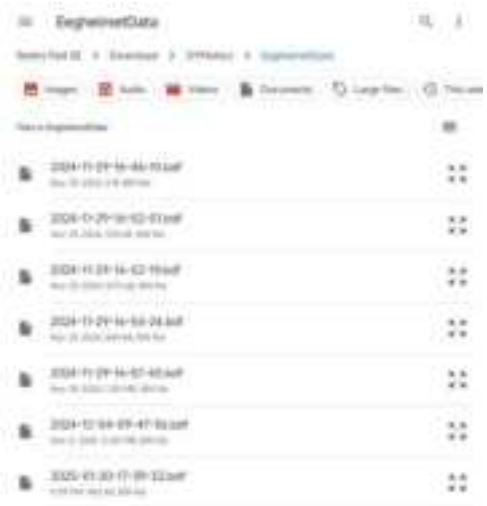

Figure 6.2.6-2

（3） After selecting the playback file, return to the main interface of data playback (bdf) and start playing back the file data or reselect the bdf file, as shown in Figure 6.2.6-3.

Figure 6.2.6- 3

（4）Click Review to start playing back the selected file. At this time, the Review button becomes the Pause button and the waveform of the data file begins to display, as shown in Figure

6.2.6-4.

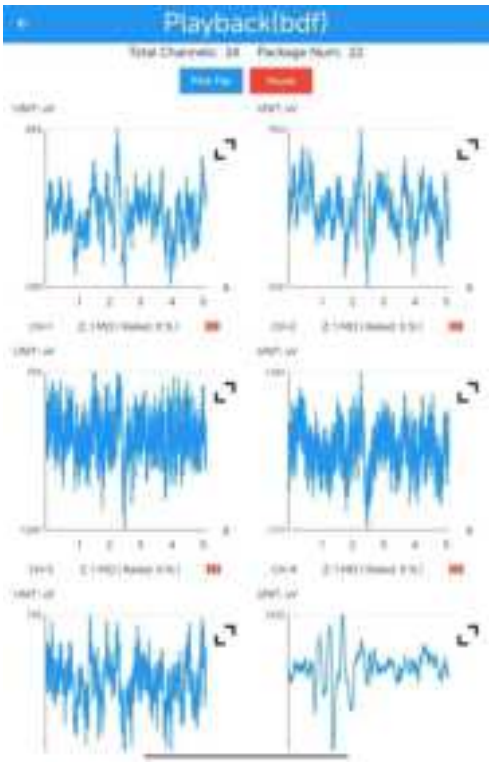

Figure 6.2.6-4

（5）In Figure 6.2.6-4 , you can select the waveform unit in the upper right corner. Click the " " button to enter the single channel waveform setting interface, where you can view the waveform of each channel in detail. Select the channel by touching the "<" or ">" symbols on the left and right of the interface. Click "Shrink" to return to the main waveform viewing interface. Click "Review" to start waveform playback of the data in the file, as shown in Figure 6.2.6-5 .

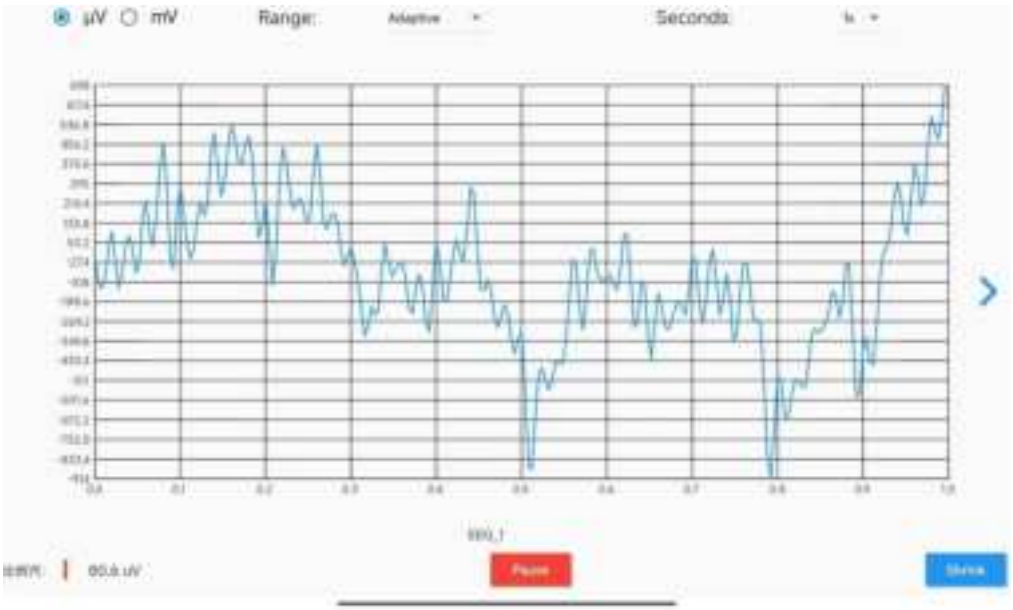

Figure 6.2.6- 5

（6）Switch the voltage value unit, set the range and duration for each channel waveform , as described below :

Voltage value unit : can be switched between μV and mV .

Range setting : The options include 10 types: " Adaptive, -10~10, -20~20, -50~50, -100~100, -200~200, -500~500, -1000~1000, -2000~2000, -5000~5000 " , as shown in Figure 6.2.6-6 ;

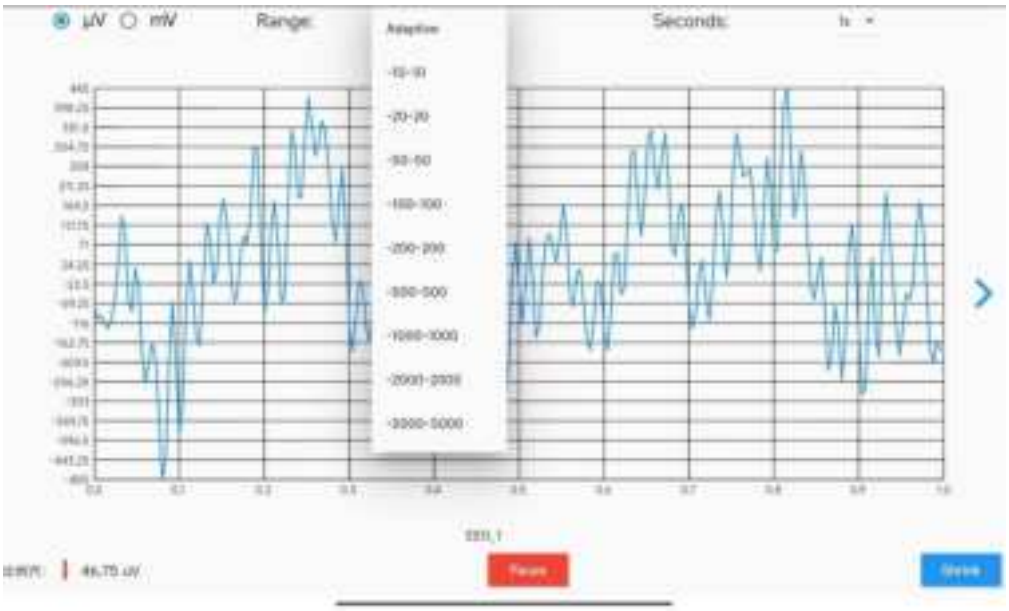

Figure 6.2.6-6

Duration setting: There are three options: "1s, 5s, 10s", as shown in Figure 6.2.6-7;

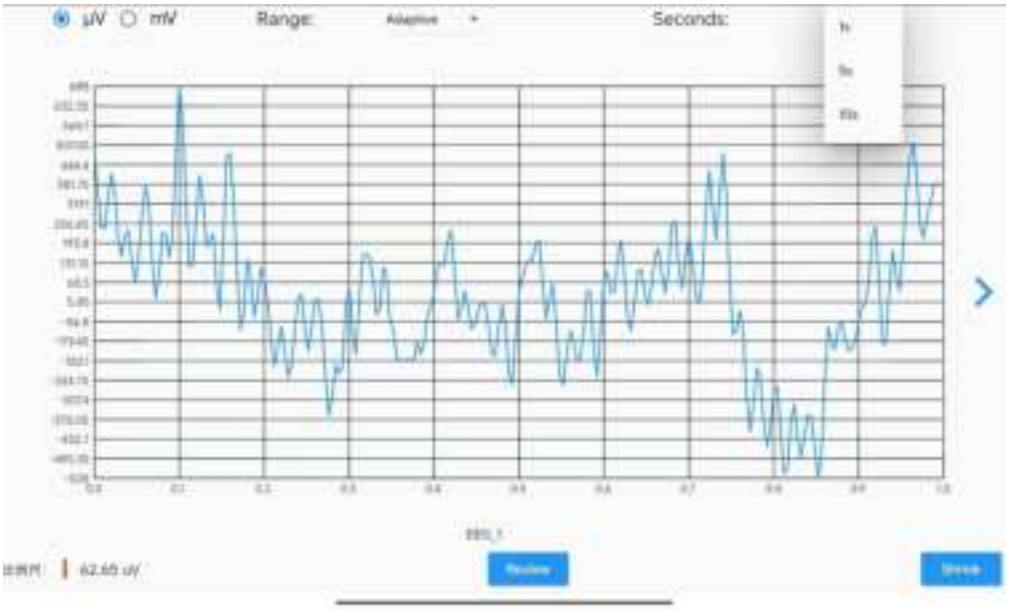

Figure 6.2.6-7

6.2.7 Product Info

(1) Click “ **Product Info**” to enter the “ **Product Info**” page, which displays the relevant

information of the OB3000 device, as shown in Figure 6.2.7-1.

Figure 6.2.7-1

6.3 Shutdown

(1) Exit the APP software.

(2) Press and hold the power switch for more than 2 seconds and then release it . The device indicator light will go out, indicating that the OB3000 has been shut down.

(3) Unplug the lead wires and ear clips connected to the main unit, take off the main unit, and put the main unit and accessories into the storage box.

6.4 SDK

This product supports secondary software development. OYMotion Technologies Co.,Ltd. can provide SDK. SDK supports environments such as Python, C#, and Matlab on the 64-bit Windows platform.If you need SDK and development manual, please contact OYMotion Technologies Co.,Ltd. for technical support according to the contact information at the end of the manual .

7. Technical specifications

Indicator Category	Indicator name	Index
Basic Information	Model	OB3000
	Number Of Channels	23 channels EEG + 1 channel ECG
ADC Specifications	Sampling Rate	Normal/High
	Resolution	24 -bit
	Input Range	-666mV ~ + 666mV
	Sensitivity	≥3u V
	Input Impedance	>500MΩ
	Common Mode Rejection Ratio	Comply with GB 9706.226
	Impedance Check	support
Battery (Energy)	Battery Type	Rechargeable lithium battery 3.7 V , 800 mAh
	Battery Life	12 hours
	Rated Current	65mA
IMU	Raw Record Data	Accelerometer, gyroscope
	Sampling Rate	50Hz
LED	LED Indicator	Status indicator, charging indicator, impedance status indicator
Button	Function Buttons	Power button **:** device power on/off
Voltage	Input Voltage	DC 3.7 V
Host size	Helmet Size	274mm* 249mm*156mm
Net weight of main unit	/	1240g±62g
Host material	Helmet material	ABS+PC
Communication Methods	/	Bluetooth BLE5.0

8. Precautions

8.1. Designed for use in indoor and outdoor ambient temperature environments. It is prohibited to use in damp, wet, or electromagnetically interfered settings, and it must not be used while charging.

8.2. The electrode pads are intended for single use only. Users may procure disposable ECG electrode pads with a snap diameter of 3.7-3.8mm on their own. It is imperative to adhere strictly to the instructions provided with the electrode pads when using them. Reusing the pads may lead to signal distortion, interference, and other related issues..

8.3. Individuals with allergies to disposable electrode pads should use them with caution. It is strictly prohibited to apply the electrode pads onto skin that is wounded or scarred.

8.4. The electrode pads should be used as soon as possible after opening. If the conductive gel has dried out or the pads cannot adhere firmly, their use is strictly prohibited.

8.5. After using the electrode pads, the disposal of waste must comply with the laws and regulations of the relevant local authorities.

9. Product After-Sales Service

9.1 Free Service

The warranty period for the hardware product of the OB3000 EEG helmet provided by our company is 1 year. If any quality problems occur within 1 year from the date of sale, our company will be responsible for solving all aspects of the problems such as repair materials and equipment performance. The obligations under this commitment do not include other expenses such as freight. No free service will be provided for direct, indirect or final damage and delay caused by the following circumstances:

This commitment does not apply to the following situations:

- Damage caused by improper use due to human factors , such as damage caused by wrong connection, modification, unauthorized repair, etc.
- Damage caused by accidents, such as damage caused by objects squeezing, liquid immersion, etc.;
- Damage resulting from force majeure events such as earthquakes, floods, fires, lightning strikes, chemical corrosion, and similar uncontrollable circumstances.

- Damage caused by unauthorized upgrades, additions, and deletions;
- Other damage caused by unintended use.

9.2 Accessories Replacement Instructions

If there are any problems with the accessories of the EEG helmet or consumables that need to be replaced regularly, please contact OYMotion Technologies Co.,Ltd. for paid replacement;

9.3 Waste Disposal

This product must not be disposed of with normal waste. It is the user's responsibility to hand over his or her waste equipment to a designated collection point for the collection of waste electrical and electronic equipment.

The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment.

Equipment that has exceeded its service life or scrapped accessories should be disposed of in accordance with local laws, regulations and other relevant provisions.

10. Packing list

Serial number	Name	Model/Specification	Quantity	Unit
1	Helmet host	Model: OB3000	1	unit
2	Power adapter	Input: 100-240V~50/60Hz 0.4A Output: DC 5.0V 2.0A	1	unit
3	Charging cable	Type-C	1	piece
4	Ear clip wire	/	2	unit
5	ECG Leads	/	1	unit
6	EEG electrodes	OEH-LLW (19-pin long needle) OEH-LMW (19-pin middle needle) OEH-F (Flat Electrode)	Several	unit
7	ECG Electrodes	/	Several	piece
8	User Manual	210*148mm (A5)	1	Book

9	Warranty card	210*148mm (A5)	1	piece
10	Certificate	/	1	piece

11. FCC Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

Note: The Grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. such modifications could void the user's authority to operate the equipment.

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

12. Contact Details

Company Name: OYMotion Technologies Co.,Ltd.

Address: Floor 6, Building 2, 222 Guangdan Road, Pudong, Shanghai PRC

Zip code: 201318

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