BioSensor
# ExGSensor instructions

01 ErgoLAB wireless physiological recoder

The new generation of ErgoLAB wireless human factors recorder includes Biosensor sensor and EXGSensor sensor types. All hardware adopts modular design, built-in Type-C interface, and unified collector and different signal source acquisition lines are configured to realize synchronous lead of multiple systems. At the same time, the equipment built-in acceleration, gyroscope, magnetometer, in the collection of EMG, RMS, ECG, EDA, RESP, SKT, SpO2, HR and other multidimensional physiological signals, but also can obtain high-precision human motion posture data. The product has the characteristics of intelligence, high precision and portability, which can meet the diverse needs of laboratory research, real field research and various simulated cabin environment research.
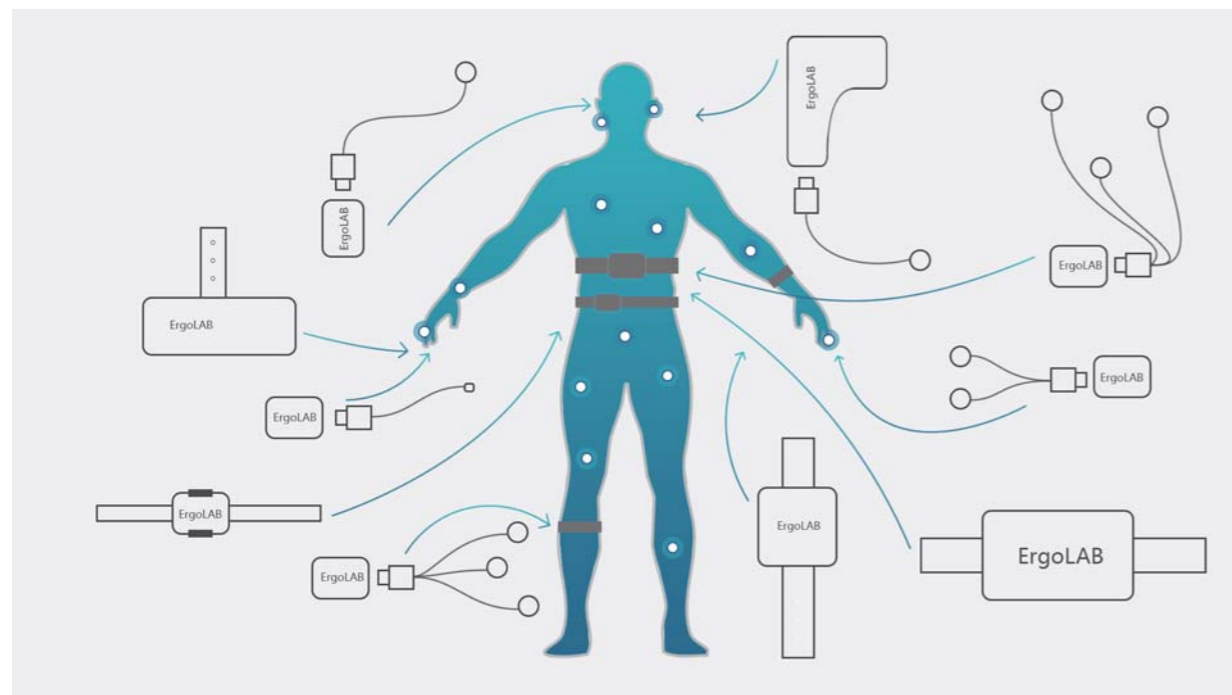
BioSensor wireless human physiological recorder adopts signal self-identification technology and is equipped with a unified collector. According to research requirements, the collection line of corresponding physiological signals can be arbitrarily connected. The equipment includes PPG blood volume pulse, EDA skin electricity, RESP respiration, SKT skin temperature, FSR fingertip pressure and other indicators, each sensor can collect multiple signal indicators.

You can complete the measurement mode of any index by adding sensors and electrode wires at any time.

EXGSensor wireless human factor sensor device adopts signal self-identification technology and is equipped with a unified EXG collector and acquisition line. According to research requirements, it can be equipped with EMG/ECG/EOG/EEG signal types, supporting patch mode and external acquisition line mode. The sampling frequency is up to 4096Hz, which can realize synchronous lead of multiple systems. At the same time, built-in acceleration, gyroscope, magnetometer, can obtain the human body's motion posture data.

02 Core advantages

- Adopting multi-signal and multi-sensor fusion design, each single sensor can collect multiple data indicators at the same time.

- The equipment selects high-precision components, the system resolution can reach 16-24bit, single channel sampling rate is the highest 4096Hz;

- One to many data transmission protocol, using Bluetooth 5.0 ultra wideband transmission, can collect multiple devices at the same time;

- All products adopt modular design, support intelligent insertion detection signal Type, support Type-c external sensor;

- The new sensor is designed to be portable and wearable. Including a band, buckle, bracelet, ear clip, finger, chest strap six wearing mode;

- All sensors are uniformly calibrated for NTP network time before delivery to ensure time synchronization of all data collection and eliminate clock differences between different sensors and different computers. At the same time, the sensor and the system will automatically real-time synchronous calibration;

- New appearance design. Material and process upgrade to ensure product comfort and beauty;

- Dataloger APP, PAD, PC multi-terminal device collection;

- With marking function. It can be controlled by the subjects freely and mark the time at a certain test stage to help better data analysis

03 Parts list

BioSensor   Parts   List
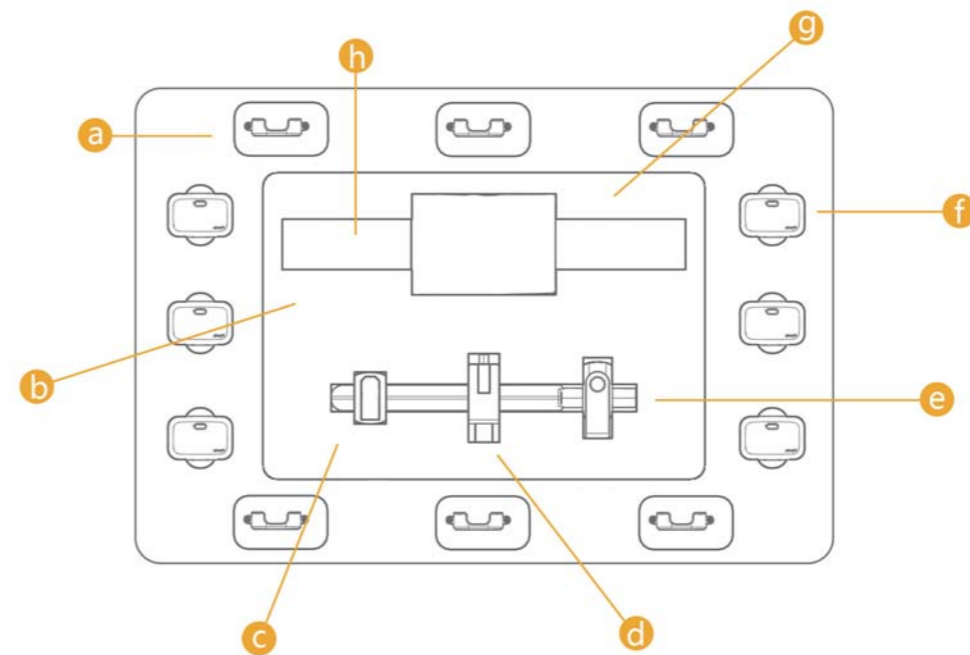
a Bind card bucklex6	**b** BioSensor instructionx1	**c** Donglex1
d Receive donglex1	**e** Installation packagex1	**f** BioSensorx6
g Chargerx1、Charging cable x6	**h** Lead wirex6	

Parts list

BIO 1 —— S/N 20212SBP000X —— PPG   BIO 2 —— S/N 20212SBE000X —— EDA

BIO 3 —— S/N 20212SBR000X —— RESP BIO 4 —— S/N 20212SBS000X —— SKT

BIO 5 —— S/N 20212SBS000X —— FSR

EXG 1 —— S/N 20212SEC000X —— ECG   EXG 2 —— S/N 20212SEM000X —— EMG

03 Manner of wearing

1.Exg-patch acquisition mode: three silver/silver chloride electrodes are embedded in the sensor, which only need to be fixed on the skin surface of human muscles with double-sided adhesive to remove the influence of cables, especially suitable for fine research of small muscle groups; New appearance design. Material and process upgrade to ensure product comfort and beauty;

2.BIO, EXG-Type-C external sensor acquisition: the system can automatically insert detection, customize the electrode measurement position, support the long-distance test of large muscle groups, better adapt to the requirements of different muscle group position data acquisition.
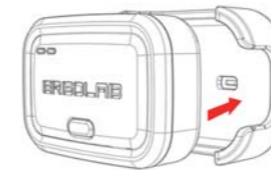
04 BioSensor Specific operation

BioSensor process includes four main steps: installing sensor, wearing sensor, starting sensor and connecting software for data collection.
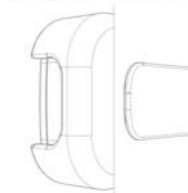
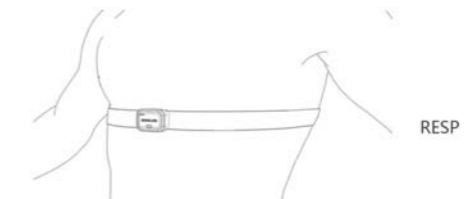Such as:

Wear way

① Installation

The sensor is fixed in the card slot, and the card slot is connected with the strap by means of penetration

The sensor is fixed in the card slot, and the card slot and the strap are connected by a clamp

② Wear (wireless wear)

Push the sensor into the card slot, and the card slot is directly connected with the strap

Worn in the appropriate position of the body

RESP

Wear (wired wear)

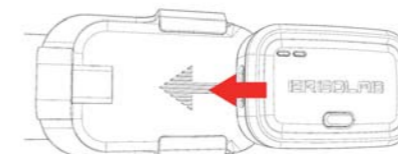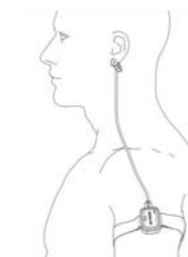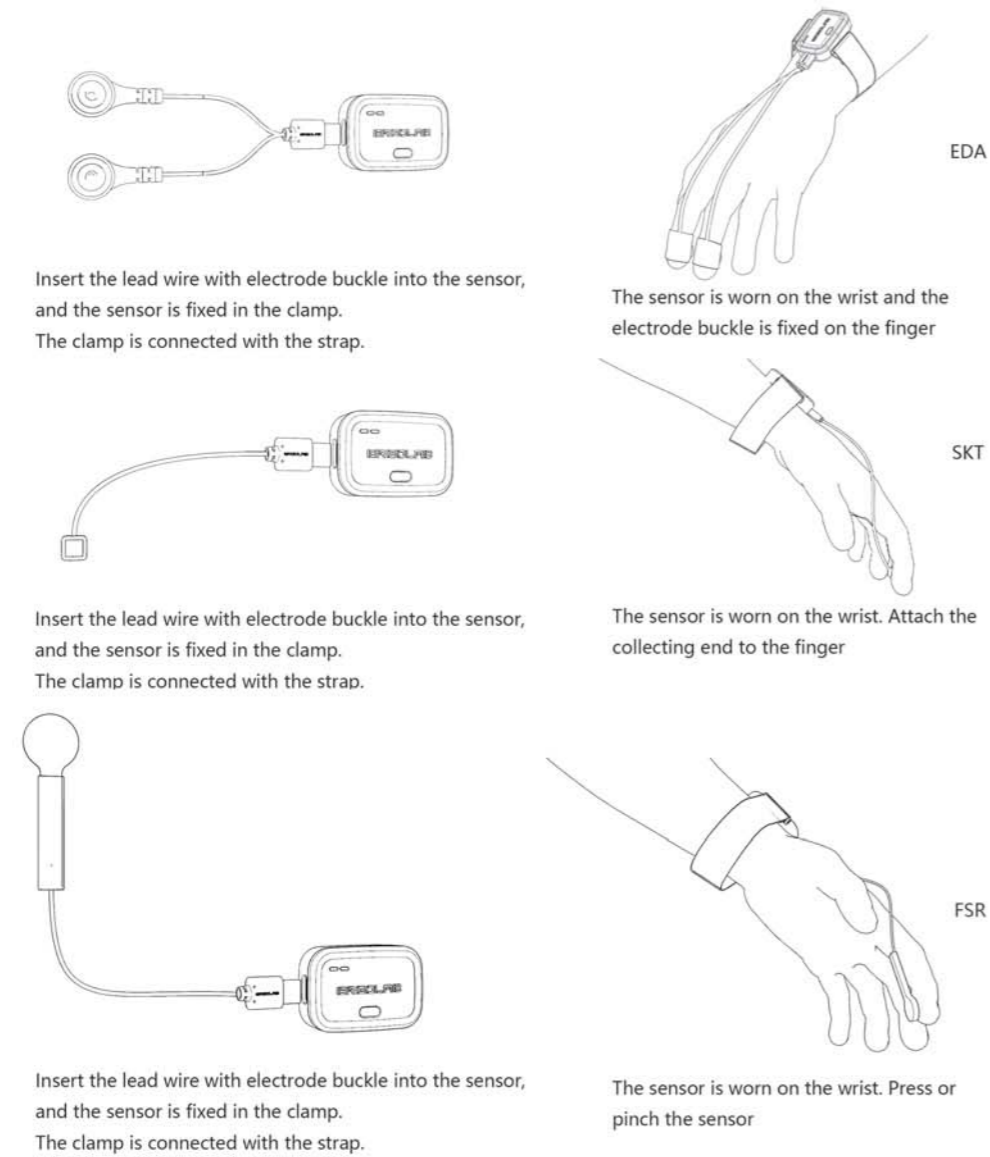Connect the sensor to the lead wire

The heart rate ear clip is inserted into the sensor, and the sensor is fixed in the card slot, and the card slot is connected with the strap by means of insertion

Sensors are worn on the upper arm and heart rate ear clips are clipped to the ears

PPG

BioSensor Specific operation

Insert the lead wire with electrode buckle into the sensor, and the sensor is fixed in the clamp.
The clamp is connected with the strap.

Insert the lead wire with electrode buckle into the sensor, and the sensor is fixed in the clamp.
The clamp is connected with the strap.

Insert the lead wire with electrode buckle into the sensor, and the sensor is fixed in the clamp.
The clamp is connected with the strap.

EDA

The sensor is worn on the wrist and the electrode buckle is fixed on the finger

SKT

The sensor is worn on the wrist. Attach the collecting end to the finger

FSR

The sensor is worn on the wrist. Press or pinch the sensor

③ Start

Press the switch and the equipment starts

④ Connection

Software installation

05 BioSensor Specification param-

Collect	Gathering indicators	EDA、PPG、HR、SKT、SPO2、RESP、ACC、GYRO、COMP、Analog、FSR
	Acquisition methods	Patch collection or external sensor collection
	System sampling rate	2048Hz
	System resolution	16bit
	Acquisition software	Android APP or Windows cross-platform software
Type-C	Function	Data acquisition Charging input Insertion detection
	External input	PPG、EDA、RESP、SKT、SPO2、Analog、FSR
Communication	Communication methods	Radio frequency 2.4GHz
	Transmission rate	2Mbps
CMRR	115dB	
Single signal parameter		
PPG	Collection scope	0~240bpm
	Precision	1%
	Sampling rate	64Hz~128Hz
EDA	Collection scope	0~30μS
	Precision	0.001μS
	Sampling rate	64Hz~128Hz
RESP	Collection scope	0~140rpm
	Precision	1rpm
	Sampling rate	64Hz~128Hz
SKT	Collection scope	20~60℃
	Precision	0.01℃
	Sampling rate	64Hz~128Hz
FSR	Collection scope	20g~6KG
	Precision	0.01Kg/cm2
	Sampling rate	64Hz~128Hz
Analog	Collection scope	0~12V
	Sampling rate	64Hz~128Hz

BioSensor Specification parameter

Mechatronics specification		
Sensor specifications	45*30*13mm 17.2g	
Common charging interface	USB Type-C	
Battery life	15h	
Communication distance	10m	
Operating environment	Working temperature -20℃~50℃	Working temperature 10%~90%RH
	Storage temperature -40℃~50℃	Storage temperature 5%~90%RH

BIO Sensor Acceleration and magnetometer axis orientation. As shown in the figure below (Take Type-c to the left as the front)：
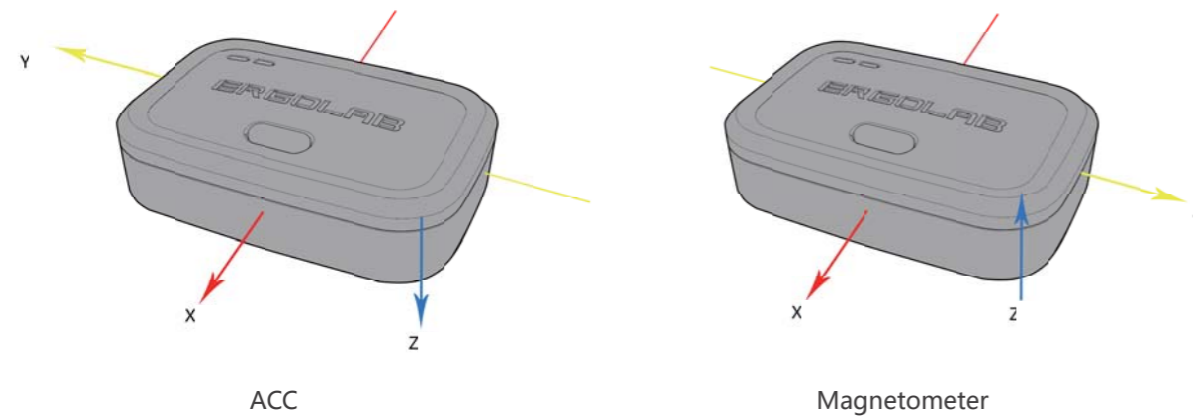
ACC   Magnetometer

EXG Sensor Acceleration and magnetometer axis orientation. As shown in the figure below (Take Type-c to the left as the front)：

ACC   Magnetometer
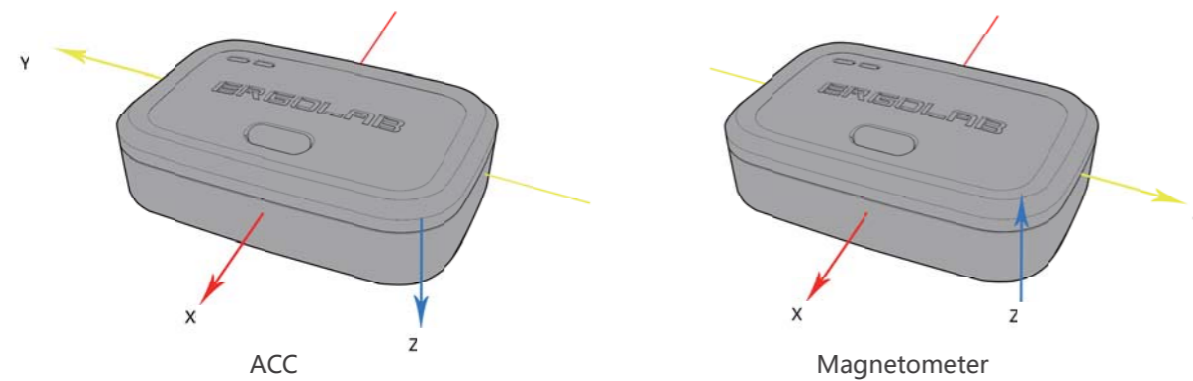
06 EXGSensor Specific operation

EXG Sensor process consists of four main steps: installing the Sensor, wearing the Sensor, starting the Sensor and connecting the software for data collection.
As shown below:

Wear way (Wireless wear)

① Installation

Double-sided adhesive

This shadow is not double-sided adhesive area

Adhesive method: stick one side of the built-in double-sided adhesive on the back of the product. The other side is placed at the test skin

Binding method: the sensor is fixed on the binding buckle from the bottom

② Fixed

Paste on the test site

Hang the bandage on the test site, Adjust bayonet position and fasten

③ Start   ④ Connection

Press the switch and the equipment starts

Software installation

Other way (Cable wear)

Plug the lead wire into the charging port on the left side of the sensor

Connect the collecting end with the position

07 EXGSensor Specification parameter

Collect	Gathering indicators	EMG、ECG、HR、ACC、GYRO、COMP、RMS
	Acquisition methods	Patch collection, External sensor collection
	System sampling rate	4096Hz
	System resolution	16bit
	Acquisition software	Android APP or Windows cross-platform software
Type-C	Function	Data acquisition Charging input Insertion detection
	External input	EMG、ECG
Communication	Communication methods	2.4GHz
	Transmission rate	2Mbps
Magnification	Adjust1500、3000、6000	
CMRR	86dB	
Single signal parameter		
EMG	Collection scope	-6000μV~6000μV
	Precision	0.183 μV
	Sampling rate	256~4096Hz
ECG	Collection scope	-6000μV~6000μV
	Precision	0.183 μV
	Sampling rate	256~4096Hz
ACC	Precision	0.06mg
	Sampling rate	64Hz~128Hz
GYRO	Precision	0.007°/s
	Sampling rate	64Hz~128Hz
COMP	Precision	0.59μT
	Sampling rate	128Hz
Mechatronics specification		
Sensor specifications	45*30*13mm 17.2g	
Common charging interface	USB Type-C	
Battery life	15h	
Communication distance	10m	
Operating environment	Working temperature -20℃~50℃	Working temperature 10%~90%RH
	Storage temperature -40℃~50℃	Storage temperature 5%~90%RH

08 Indicator status

The following describes the status of sensor LED lights in use, and the corresponding meaning：

Battery indicator light：

🟢 >60%   🟢 59%~40%   🟡 59%~40%   🟠 59%~40%   🔴 >60%

When charging, the battery light flashes at low frequency, and the color is determined by the electric quantity. After charging, the green light is steady on, and the Bluetooth light is off. After startup, the battery light will be on every 5s and off for the rest of the time：

Bluetooth light color	Bluetooth light status	Meaning
⚪	Put out	When the device is in charge mode, the Bluetooth light is off
🔵	Normally on	(Wired) The device is disconnected after being turned on
🔵	High frequency blinking	(Bluetooth) After the device is turned on, it is in broadcast state
🔵	Normally on	It is connected to the receiving end
🟢	Low frequency blinking	After the software is connected, data is reported
🟠	Low frequency blinking	The collection end is abnormal
🔴	Power off after steady on	When the power is less than 3%

PS:

1. Press on key equipment to start

2. Long press the key device to shut down

3. After startup, press the open key to mark the event

4. Bluetooth indicator on the left and battery indicator on the right

5. If no data is transmitted after the device is started, the indicator is in blue

6. After the device is started and data is being transferred, the indicator is green

7. When the Bluetooth indicator turns orange and flashes at low frequency, it indicates that

data collection is abnormal. Check whether the electrodes are properly connected

8. If the device is not connected 3 minutes after startup, it will be in low-power mode.

At this time, press the on key again to turn on

09 Data collection

ErgoLAB synchronization test cloud platform acquisition system

ErgoLAB is independently developed by Jifa Technology, which can be applied to scientific research, personnel status identification, product design evaluation, intelligent measurement of human-information system.Professional and efficient   cloud architecture comprehensive platform in the direction of rating. It includes subjective and objective experimental design, multi-equipment data acquisition and data analysisStatistical report in one and build a complete test process system.
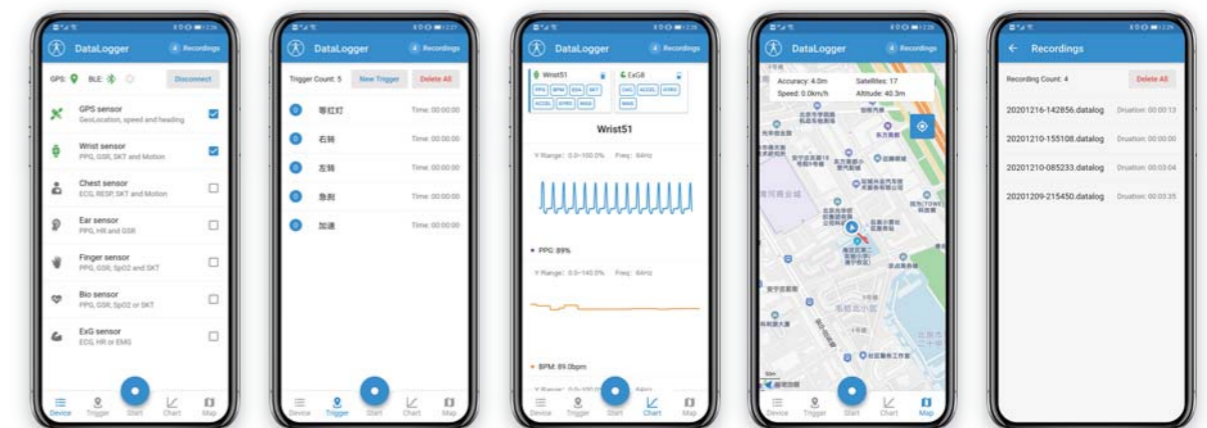

ErgoLAB Datalogger APP portable acquisition system.

Datalogger APP enables real-time collection of all physiological data without any cables or computers, making it the best choice for outdoor research. At the same time of physiological data collection, temporal and spatial trajectory data can be collected synchronously, and then imported into ErgoLAB system for physiological signal analysis and temporal and spatial analysis, supporting synchronous analysis and comprehensive statistics with other multimodal data.

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.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

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

FCC ID: 2ADKA-SENSOR