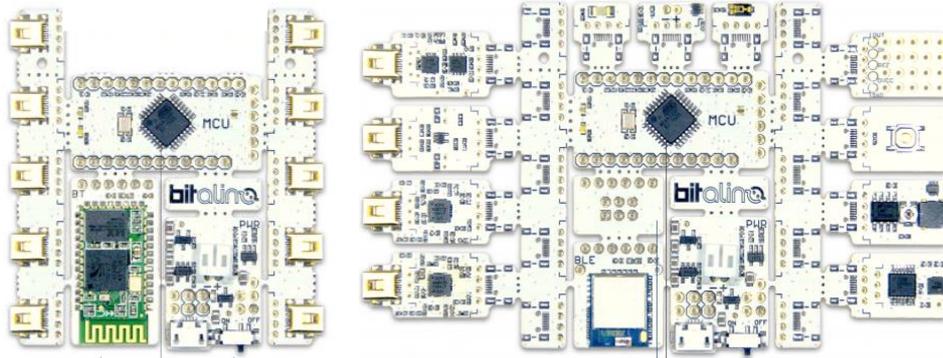




BITalino (r)evolution User Manual



ATTENTION

Please read this User Manual before
using your BITalino (r)evolution device

The information contained in this document has been carefully checked and were made every effort to ensure its quality. PLUX reserves the right to make changes and improvements to this manual and products referenced at any time without notice.

The word Bluetooth and its logo are trademarks of Bluetooth SIG Inc. and any use of such marks is under license. Other trademarks are the property of their respective own.

Please check your systems and sensors after receiving and before using it the first time to confirm if it contains all the ordered sensors, accessories and other components. Contact our support via e-mail at support@plux.info if there are any variations from your original order.

For regulatory information, please see the Regulatory Disclaimer at the end of this document.



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1. General Information

1.1. General Description

The BITalino (r)evolution boards “**Board**” and “**Plugged**” both contain the main part, the “**Core**” board.

It is built in the “**Board**” and comes as a separate part in the “**Plugged**” version. All boards are available with Bluetooth (BT) or Bluetooth low energy (BLE) / BT dual mode for data transfer.

A) BITalino (r)evolution **Core**

The BITalino hub “Core” is available as a separate part for do it yourself experiments, assembled with a 3D-casing or as part of the Plugged or Board.

BITalino (r)evolution **Core BT and Core BLE** (see

a) Figure 1)

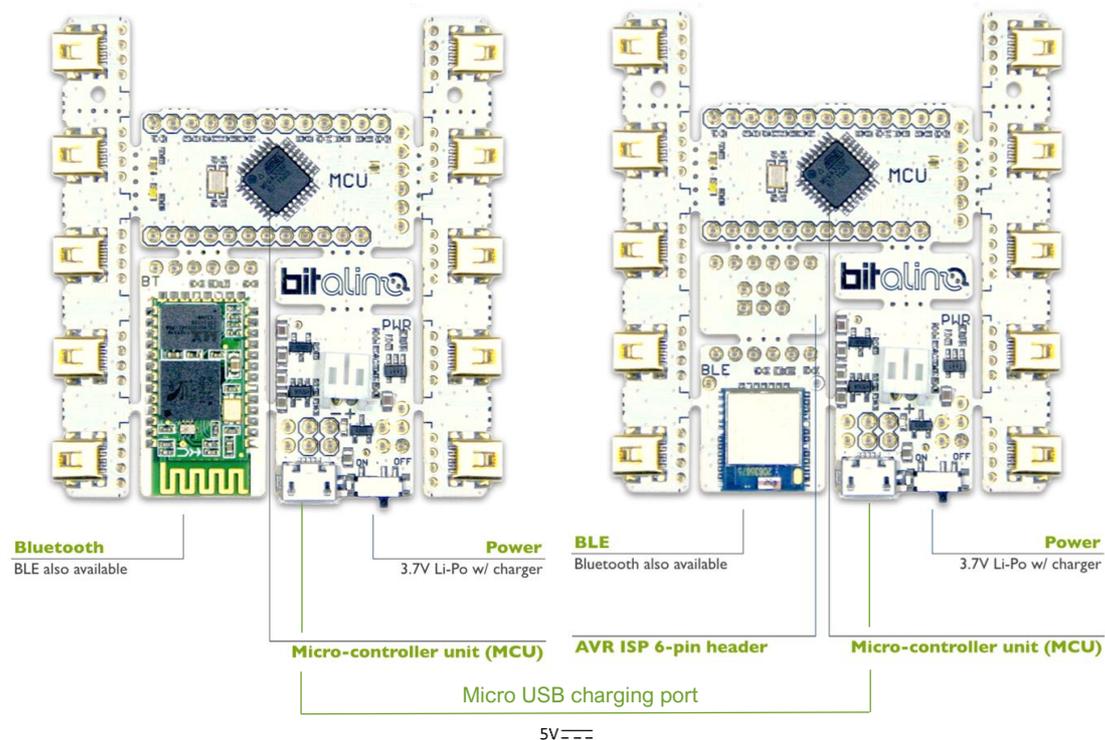


Figure 1: BITalino Core: BT (left) and BLE/BT (right).

b) BITalino (r)evolution **Assembled Core**

The Assembled Core comes already setup with battery and a 3D printed casing for easy handling (see Figure 2).

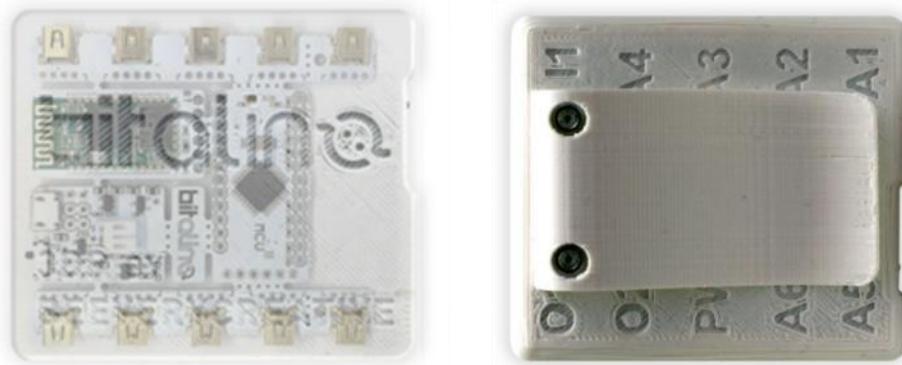


Figure 2: Assembled BITalino Core BT with 3D casing.

B) BITalino (r)evolution **Plugged**

The BITalino (r)evolution **Plugged** comes with the **Core** plus sensors and actuators (see Figure 3). Actuators are namely the Light Emitting Diode (LED) and the Buzzer (BUZ). The sensors are namely Electrodermal Activity (EDA), Electrocardiography (ECG), Electromyography (EMG), Electroencephalography (EEG), Light (LUX), Pushbutton (BTN) and the Accelerometer (ACC). It is available as a **kit** with all accessories needed for an experimental setup such as battery, cables, and electrodes.

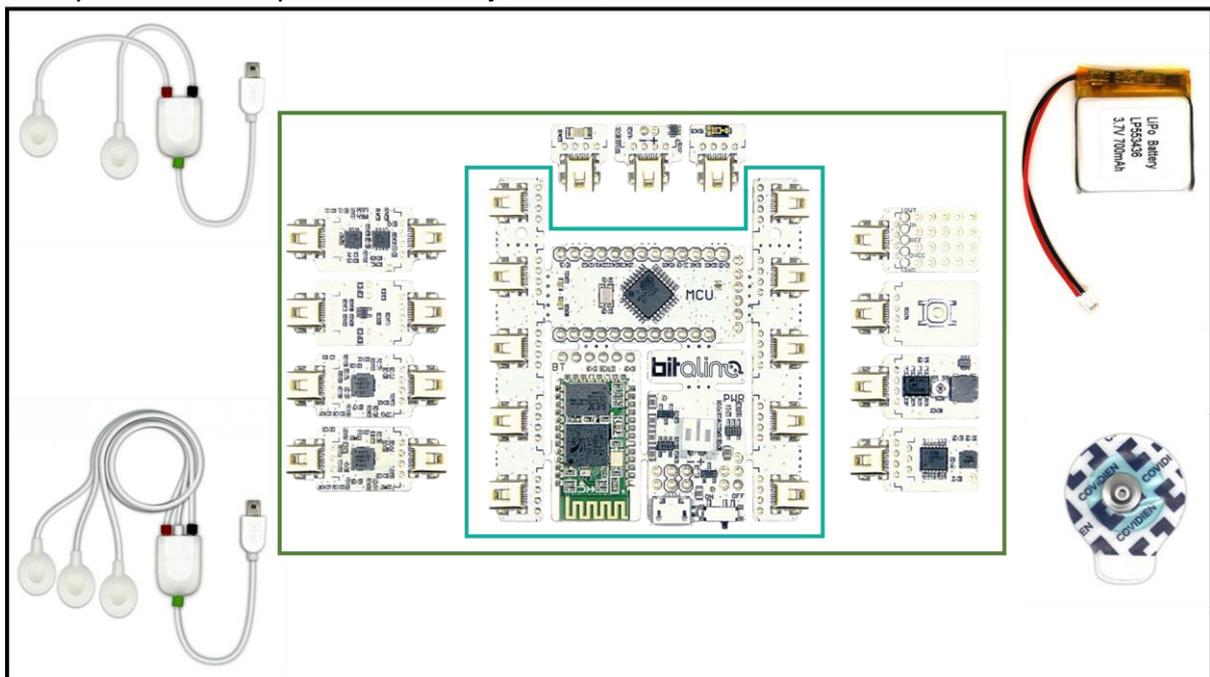


Figure 3: BITalino Plugged kit BT (black) with BITalino (r)evolution Plugged (green) with Core BT (turquoise).

a) BITalino (r)evolution **Plugged BT** (see Figure 4)

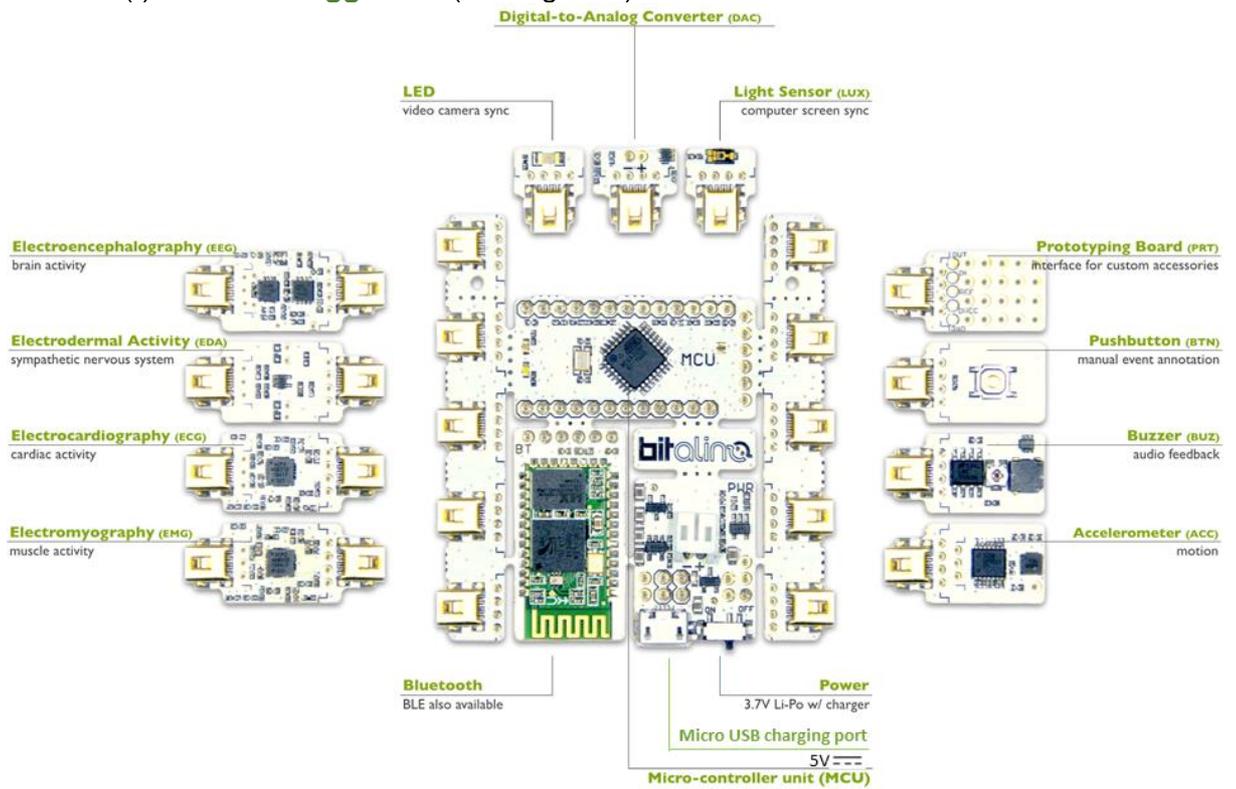


Figure 4: BITalino Plugged kit BT: Components of the “Core” and sensors.

b) BITalino (r)evolution **Plugged BLE / BT dual mode** (see Figure 5)

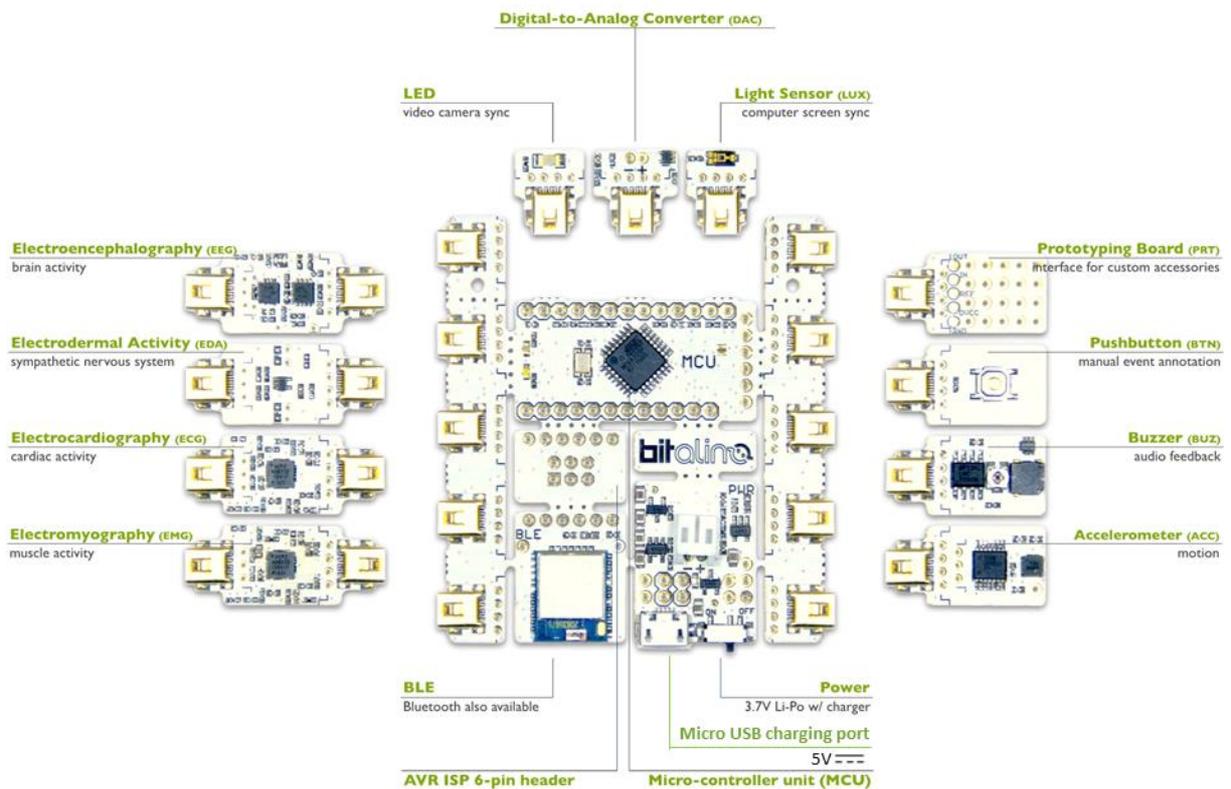


Figure 5: BITalino Plugged kit BLE/BT: Components of the “Core” and sensors.

c) BITalino (r)evolution **Board**

The BITalino **Board** has all sensors and actuators mechanically attached with the Core. It is also available as a kit with all needed accessories for an experimental setup such as the Plugged kit.

a) BITalino (r)evolution **Board kit BT** (see Figure 6)

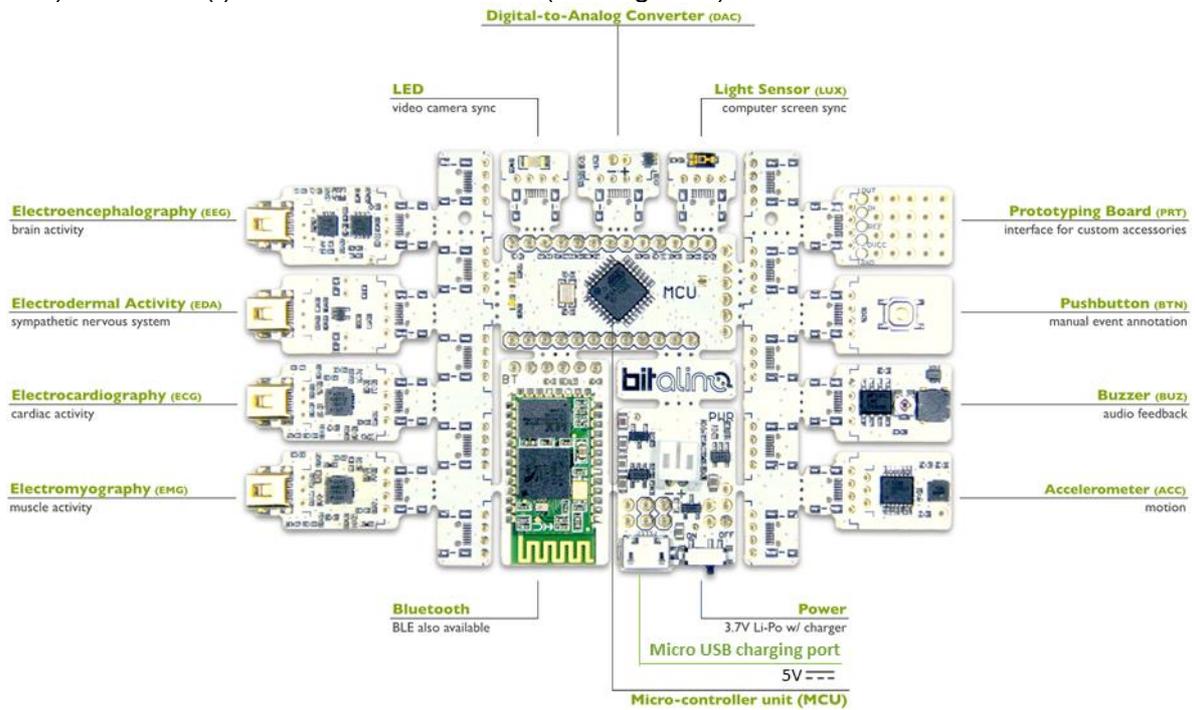


Figure 6: BITalino Board kit BT: Components of the Board with sensors and “Core”.

b) BITalino (r)evolution **Board kit BLE/BT dual mode** (see Figure 7)

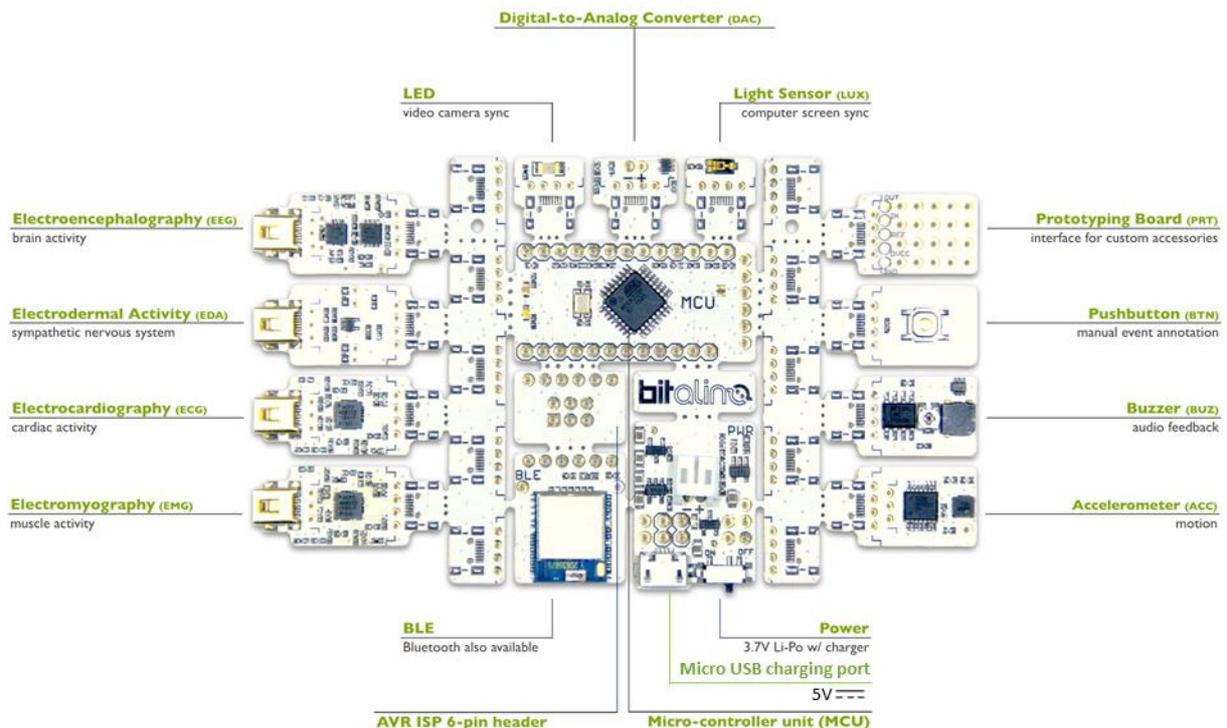


Figure 7: BITalino Board kit BLE/BT: Components of the Board with sensors and “Core”.

1.2. Data Acquisition

Together with our available add-ons for our [OpenSignals \(r\)evolution](#) software, one can easily extract statistical temporal and spectral parameters for further analysis of the acquired sensor data.

1.3. Technical Specifications

See the details below to learn more about the technical specification of BITalino (r)evolution Board. For more information regarding the technical specifications of the Microcontroller (MCU) and Bluetooth module (BT) please download the datasheets [here](#) & [here](#) / [here](#), respectively.

> Communication	Bluetooth 2.0 + EDR or Bluetooth 4.1 BLE
> Resolution	10-bit (A1-A4) + 6-bit (A5&A6)
> Digital Ports	2 INPUT (1-bit) + 2 OUTPUT (1-bit), CMOS 3.3V compatible
> Sensors	EMG; ECG; EDA; EEG; ACC; LUX; BTN
	For a full list of available and compatible sensors, please visit the BITalino store .
> Actuators	LED; BUZ
> Battery	700 mA 3.7V LiPo (rechargeable)
> Operating Voltage	3.3V
> Input Voltage Range	3.0-5.5V
> Sampling Frequency	1, 10, 100 or 1000Hz
> Analog Sensor Ports	4 in (10-bit) + 2 in (6-bit) + 1 auxiliary in (battery) + 1 out (8-bit)
> Size	65mm x 108mm x 2mm (Board); 65mm x 56mm x 2mm (Core)
> Consumption	~ 65mA

1.4. Charging Information

The micro-USB port is **ONLY USED** for battery charging. **BEFORE OPERATING** BITalino disconnect the charging cable.

> Charging Port	Micro USB (female)
> Input	5VDC with a maximum consumption of 400mA

1.5. Features

> Small form factor	> Raw data output
> Easy-to-use	

1.6. Applications

> Life sciences studies	> Biomedical device prototyping
> Biofeedback	> Human-Computer Interaction

1.7. Electrode Connections & Sleeve Color Meanings

The BITalino boards and sensors must be connected to open wire cables and / or electrode cables (see Table 1), to connect electrodes, sensors and the board.

Table 1: Cables for connecting the BITalino boards to the sensors and / or electrodes.

Sensor Cable	1-lead electrode cable	2-lead electrode cable	3-lead electrode cable
--------------	------------------------	------------------------	------------------------



The sleeve color meaning for the 2- and 3-lead electrode are described in Table 2.

Table 2: Sleeve color meanings for UC-E6 connection.

Sleeve Color	Red	Black	White
Electrode Cable 2-lead	+	-	/
Electrode Cable 3-lead	+	-	reference

1.8. Physical Characteristics

The BITalino **Core** comes in a size of 65mm x 56mm x 2 mm (see Figure 8).

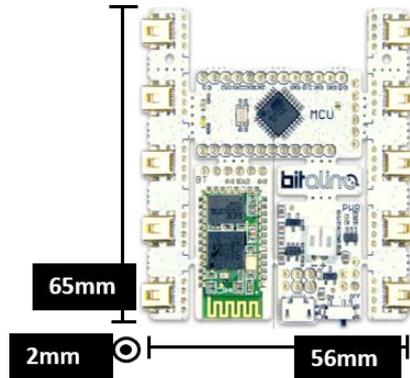


Figure 8 Physical characteristics of the BITalino Core (BT).

The BITalino **Board** comes in a size of 65mm x 108mm x 2mm (see Figure 9).

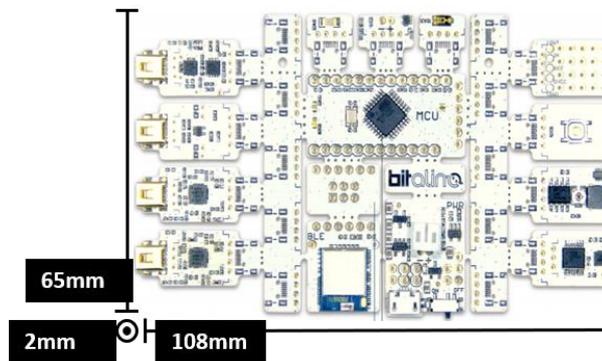


Figure 9: Physical characteristics of the BITalino Board.

2. Application Notes

2.1. Quick Start Guide

1 Download OpenSignals

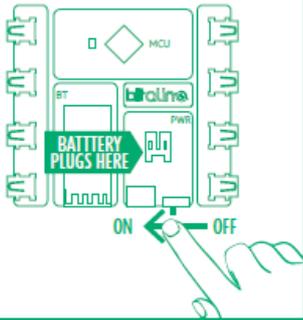
Visit our website www.bitalino.com/software to download and install the software for your operating system.



OpenSignals will issue notifications whenever new releases and improvements are available.

2 Turn On the Device

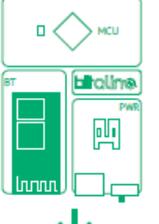
Plug the battery onto the socket found on the Power (PWR) block; slide the switch to the ON position.



You can easily confirm that the device is turned on, as a white LED will start fading on the Microcontroller (MCU) Block.

3 Your BITalino is a

BT



GO TO STEP 3.1

BLE



GO TO STEP 4

Note that some internal Bluetooth adapters have limited performance to handle the BITalino throughput.

Please refer to the following thread on our forum for additional information: bitalino.com/ble-notes

3.1 Bluetooth Adapter

Internal Bluetooth adapter:
Ensure that the Bluetooth adapter is active through the Windows taskbar icon.



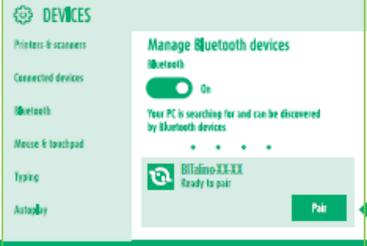
External Bluetooth dongle:
Plug in the Bluetooth dongle and wait for the device drivers to be installed.



Mac OS
Check the top right corner of your menu bar and ensure that the Bluetooth is ON; open Bluetooth preferences.
On Mac OS the internal Bluetooth adapter will suffice.



3.2 Pair Device



Mac OS usually manages the connection state automatically, which means that some time after pairing (and whenever the device stays a period of time without being used) you will see the indication "Not Connected". This is normal and you do not need to pair the device again (Mac OS will automatically change the state of the device back to "Connected" when you try to use it).

4 Launch OpenSignals

Browse  for devices in range.



This will search for devices turned on and within Bluetooth range of your computer.

5 Enable Device

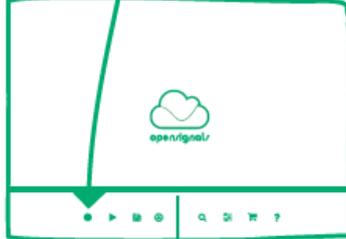
Make sure that the device is enabled (ENABLE button highlighted in blue)



Generally, in its first use, the software automatically enables the device for data acquisition.

6 Have Fun!

Press  (record) and have fun!



After stopping your recording, data can be saved through the  button; please refer to the OpenSignals manual to learn all about its features.

Issues with Performance?

If you are experiencing connection drops or poor performance, try **reducing the number of channels** being acquired and/or the **sampling rate** on the device settings window.



BITalino.com Offers



Software and APIs
for data acquisition

<http://bitalino.com/en/software>
<http://bitalino.com/en/development/apis>



Detailed documentation
to make the most of your device

<http://bitalino.com/en/learn/documentation>
<http://bitalino.com/en/learn/examples>

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2.2. Connecting the BITalino devices with sensors and actuators

2.2.1. BITalino (r)evolution Board

The BITalino (r)evolution Board comes with sensors and actuators attached to it (see Figure 10). The sensors EEG, EDA, ECG, and EMG need to be attached to an electrode cable using the sensor port (marked in red).

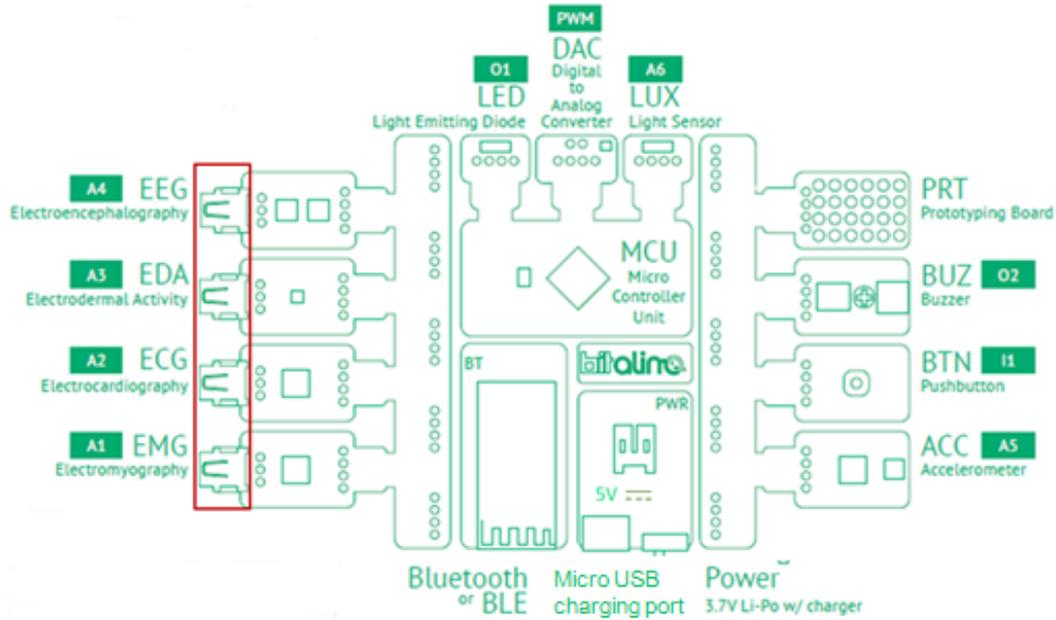


Figure 10: BITalino (r)evolution Board with pre-connected sensors and actuators. Sensor ports for connection to an electrode cable marked in red.

The correct electrode cable (2-/3-lead) can be found in Table 3 and the setup in Figure 11 Figure 13.

Table 3: Sensors and electrode cable combinations.

Sensor	2-lead	3-lead	Additional info
ECG		X	
EDA	X		
EMG		X	
EEG		X	

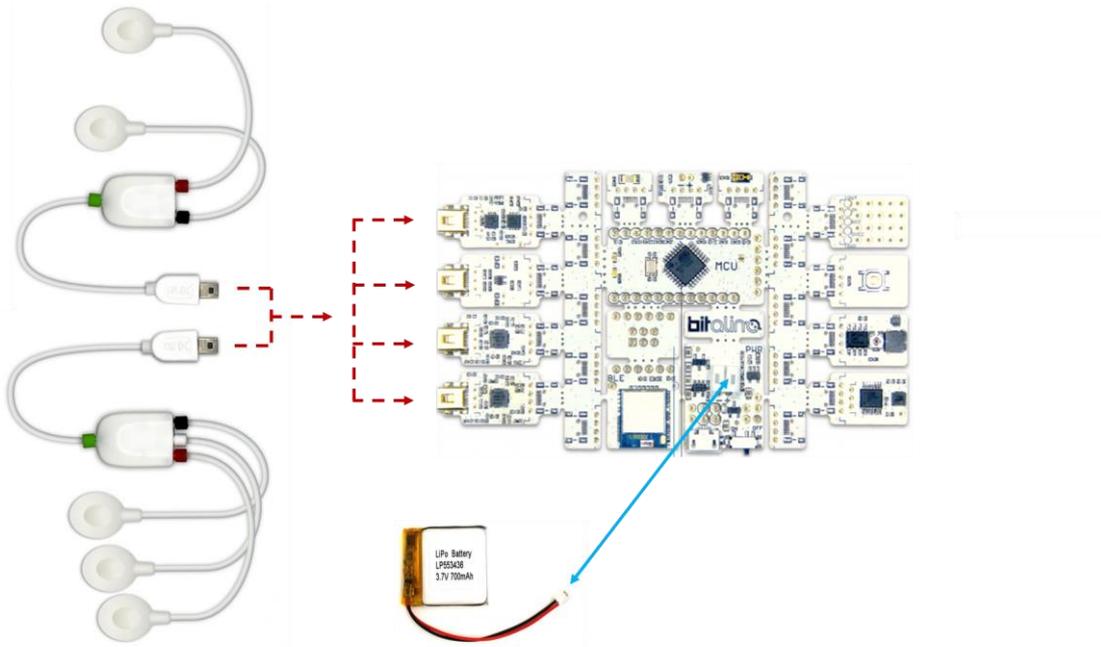


Figure 11: Setup for the BITalino Board kit and electrode cables (red) and battery connection (blue).

2.2.2. BITalino (r)evolution Plugged and Core

The BITalino (r)evolution Plugged and Core can be connected to individual sensors such as ECG, EMG, EEG, EDA, ACC and LUX using the analogue ports A1-A6 (see Figure 12). All parts can be connected to the board using a sensor cable (see Figure 12 lower right). The sensor BTN can be connected to the port I1/I2.

The actuators such as LED and BUZ can be connected to O1/O2 and the digital-to-analogue converter (DAC) to pulse width modulation (PWM). Sensors for connection to an electrode cable marked in red.

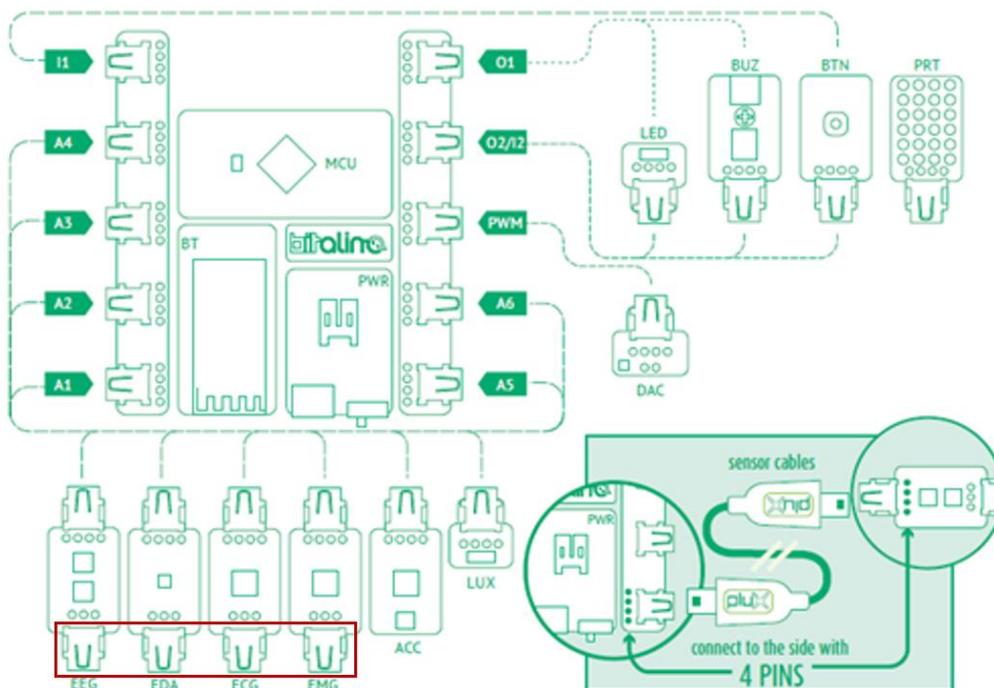


Figure 12: BITalino (r)evolution Plugged and Core connection ports for sensors and actuators. Sensors for connection to an electrode cable marked in red.

Additional sensors such as Electrooculography (EOG) and Electrogastrography (EGG) are also available for connection to an analog port. For a full list of available and compatible sensors, please visit the [BITalino store](#).

The correct electrode cable (2-/3-lead) can be found in Table 4 and the setup in Figure 13 with markers on the back of the sensor for correct alignment marked in green, sensor and cable alignment marked in red and battery connection marked in blue.

Table 4: Sensors and electrode cable combinations.

Sensor	2-lead	3-lead	Additional info
ECG		x	
EDA	x		
EMG	x	x	2-lead + 1-lead (REF)
EEG		x	

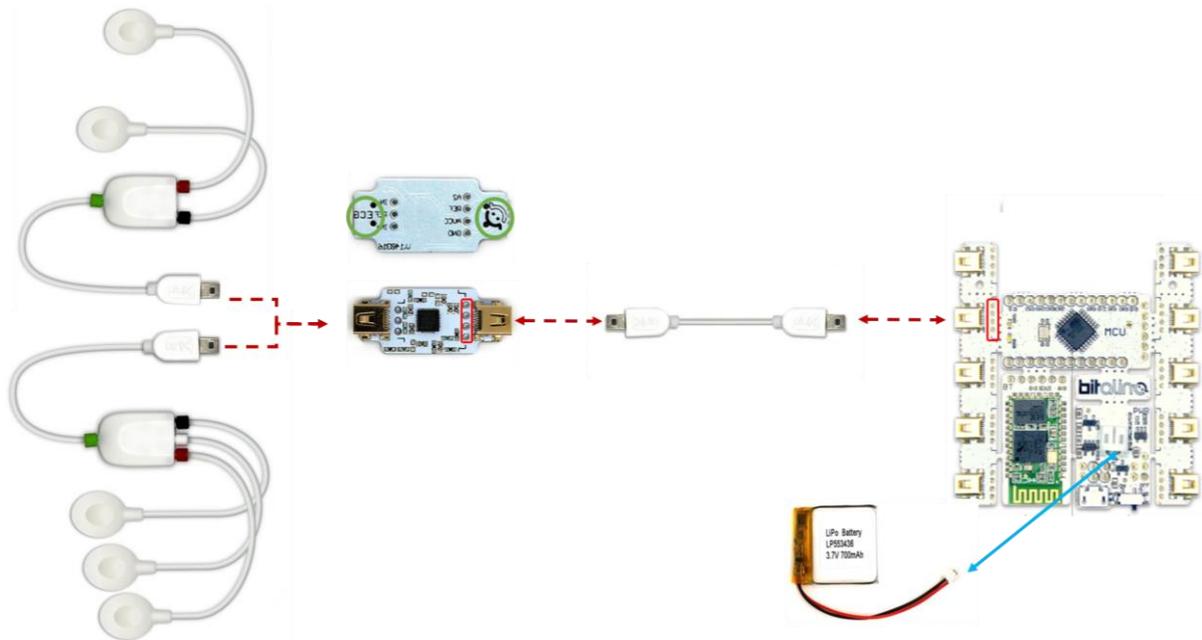


Figure 13: Setup for the BITalino Plugged kit and Core with Cables and Sensors (red) and battery connection (blue). The markers on the back of the sensor for correct alignment is marked in green.

2.2.3. Assembled BITalino Core

The assembled Core can be connected to the available assembled sensors which are listed in Table 5. The connection ports are the same as for the Core and Plugged. The analogue ports (marked in green, see Figure 14) are for the connection to the sensors, namely EMG, EDA, ECG, EEG, ACC-Z, ACC-XYZ, EOG, EGG, BTN, LUX, Respiration (RIP), Photoplethysmography (PPG), High Definition Temperature (TMP), and FlexiForce (FSR).

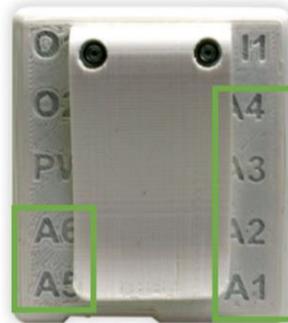
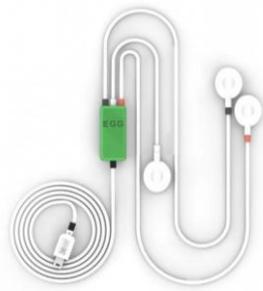


Figure 14: Assembled BITalino Core with connection ports A1-A6 for the sensors (assembled) marked in green.

Table 5: Assembled Sensors for the BITalino Assembled Core.

EMG	EDA	ECG	EEG
			
ACC- Z	ACC-XYZ	EOG	EGG
			

BTN	LUX	RIP	PPG
 The image shows a black rectangular sensor module connected to a white USB cable. The cable is coiled.	 The image shows a black rectangular sensor module connected to a white USB cable. The cable is coiled.	 The image shows a black rectangular sensor module connected to a white USB cable. The cable is coiled. Next to it is a black flexible sensor strip and a black component.	 The image shows a white sensor module connected to a white USB cable. The cable is coiled. Next to it are a black flexible sensor strip, a small gold component, and two black circular components.
TMP	FSR		
 The image shows a white sensor module connected to a white USB cable. The cable is coiled.	 The image shows a white sensor module connected to a white USB cable. The cable is coiled.		

2.3. ECG Signal with BITalino (r)evolution boards

Figure 15 shows the application of the ECG sensor in combination with the **Assembled Core** (left), the **Plugged** (middle), and the **Board** (right). The two measuring electrodes (IN +/-) were placed on the collar bones and the reference electrode on the iliac crest to receive the signal of the Einthoven Lead I. Please see the [ECG Sensor Datasheet](#) for more information regarding the ECG signal.

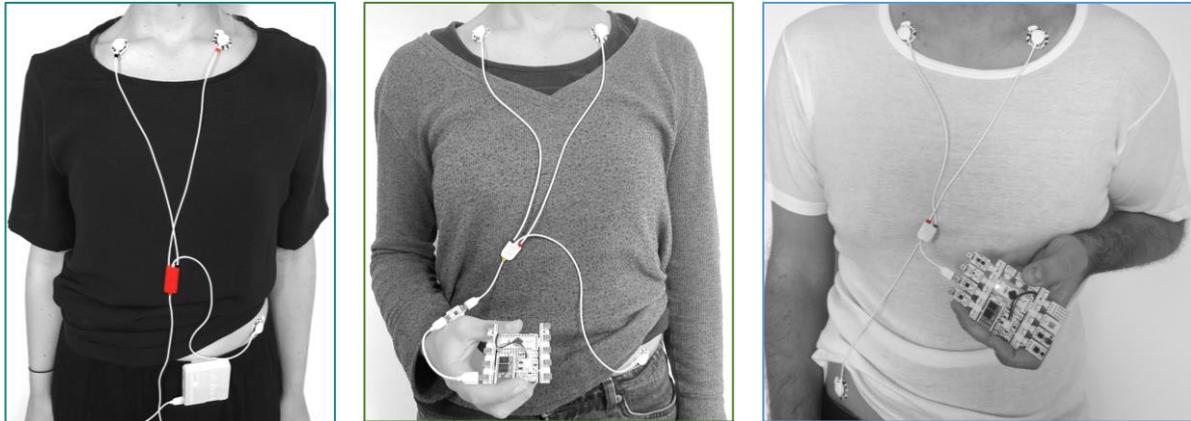


Figure 15: ECG acquisition: Assembled Core (left), Plugged/Core (middle), and Board (right) with electrodes positioned on the collar bones (IN +/-) and reference (REF) on the iliac crest for Einthoven Lead I.

An example ECG Signal from the assembled sensor and the assembled Core is illustrated in Figure 16.

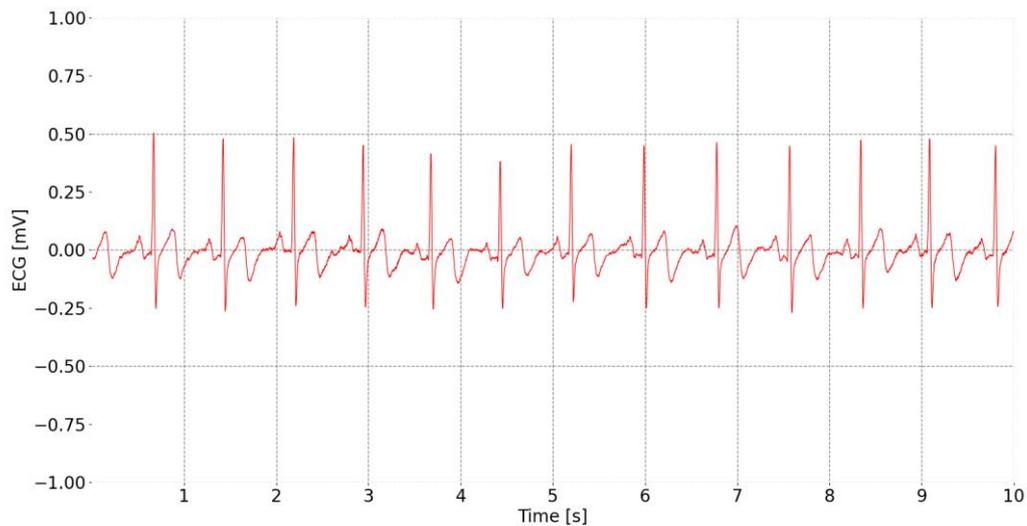


Figure 16: Sample ECG Signal acquired with BITalino (r)evolution assembled core and assembled ECG sensor at the collar bones (IN +/-) and the iliac crest (REF).

3. Using the BITalino (r)evolution boards with OpenSignals

The software coming with this device is OpenSignals and it can be download [here](#).

3.1. Configuring the Board and Sensor in OpenSignals

3.1.1. OpenSignals (r)evolution (Windows, macOS, Linux)

Open the OpenSignals (r)evolution device manager to access and configure your BITalino device, see Figure 17.



Figure 17: Access the OpenSignals (r)evolution device manager.

Select the device you intend to use for acquisition by clicking on *ENABLE* button on the device panel in the OpenSignals device manager, see Figure 18. The device is activated for acquisition if the *ENABLE* button is blue.

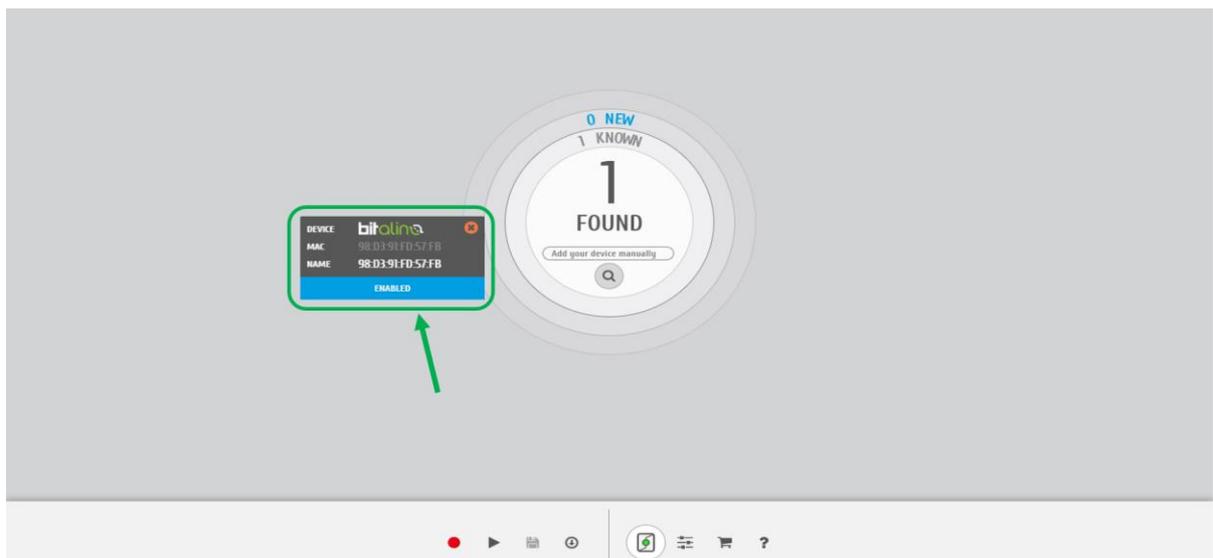


Figure 18: Enabling the device for acquisition.

Click on the BITalino logo to access the available settings, see Figure 19. Select the channel your sensor is connected to and select the *sensor type* from the dropdown menu highlighted in the next screenshot.

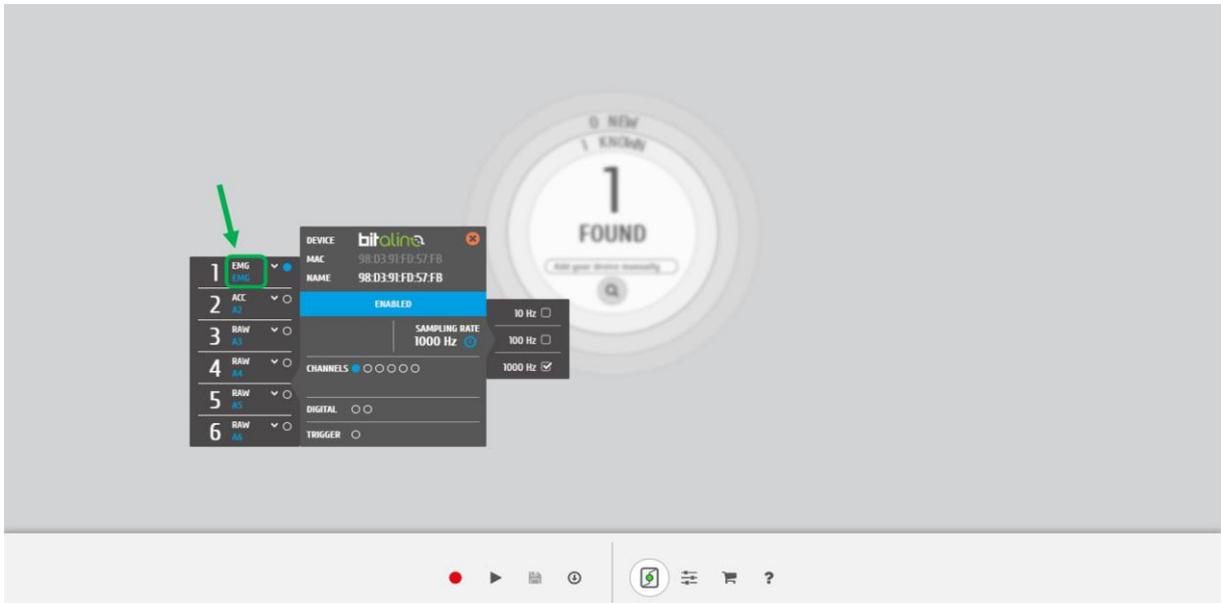


Figure 19: Set the sensor type of the channel you have your sensor connected to.

Activate the channel for acquisition by clicking on the circle next to the channel type (must be blue), see Figure 20. If not done before, follow the instruction available in section 2 *Application Notes* to learn how to apply the sensors and 2.2 *Connecting the BITalino devices with sensors* to learn how to connect your device to your BITalino device. Click on the record button in the OpenSignals main interface whenever you're ready for your acquisition.

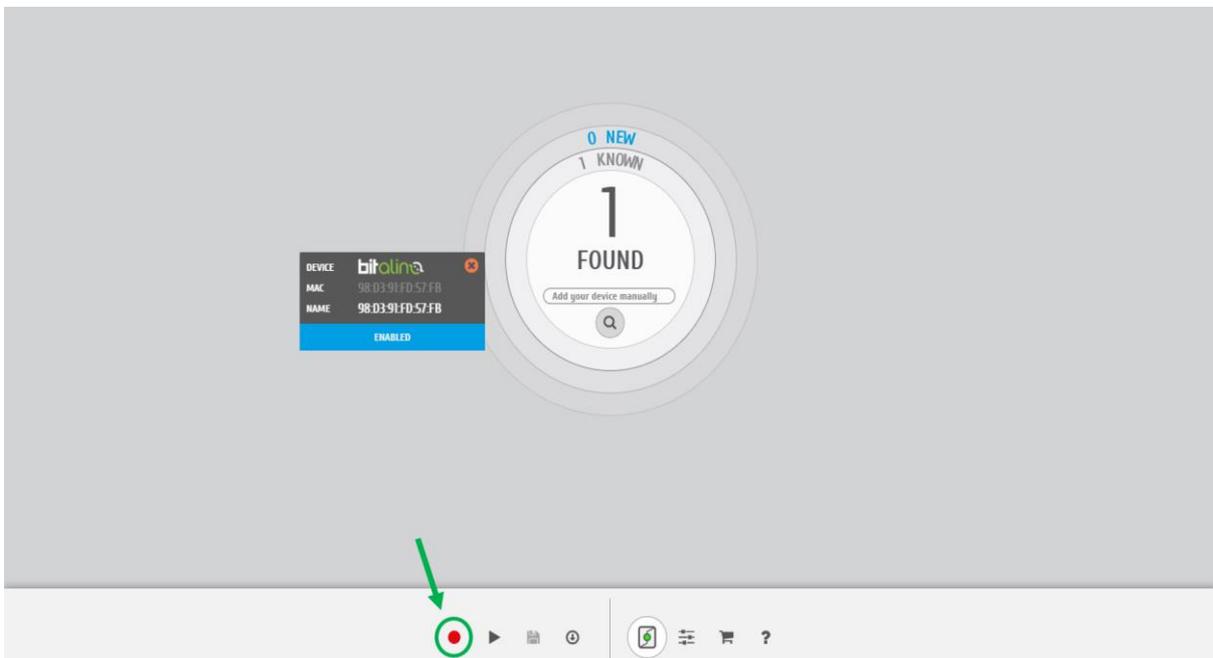


Figure 20: Start the acquisition whenever you're ready.

4. Scientific Publications Using the BITalino Plugged/ Board / Assembled Core

The following scientific is only a small selection extracted from the list of available publications using BITalino. Please visit the following website to access the entire up-to-date list:

<https://bitalino.com/en/community/publications>

Publications

Diana Batista, Hugo Plácido da Silva, Ana Fred, Carlos Moreira, Margarida Reis and Hugo Ferreira, "Benchmarking of the BITalino biomedical toolkit against an established gold standard", in IET Healthcare Technology Letters, pp. 1-5, 2019

Ali Rizwan, Najah Ali, Ahmed Zoha, Metin Ozturk, Akram Alomaniy, Muhammad Imran and Qammer Abbasi, "Non-Invasive Hydration Level Estimation in Human Body Using Galvanic Skin Response", in IEEE Sensors Journal, vol. 9, no. 20, pp. 4891 - 4900, 2020

Cinthya L. Toledo Peral, Gabriel Vega Martínez, Raúl Peralta Hernández, Jaime H. Guadarrama Becerril, J Gilberto Franco Sánchez, Josefina Gutiérrez Martínez, Carlos Alvarado Serrano, Arturo Vera Hernández, Lorenzo Leija Salas, "Experience of Use of the BiTalino Kit for Biomedical Signals Recording during Ergometric Test", in 17th International Conference on Electrical Engineering, Computing Science and Automatic Control (CCE), Mexico City, Mexico, no. 17, 2020

Daniel Eckhoff, Alvaro CassinelliTuo LiuChristian Sandor, "Psychophysical Effects of Experiencing Burning Hands in Augmented Reality", in Virtual Reality and Augmented Reality. EuroVR 2020. Lecture Notes in Computer Science, Springer, Cham., vol. 12499, no. 17, pp. 83-95, 2020

Fábio Mendonça, Sheikh Shanawaz Mostafa, Fernando Morgado-Dias, Gabriel Juliá-Serdá, Antonio G. Ravelo-García, "A Method for Sleep Quality Analysis based on CNN Ensemble with Implementation in a Portable Wireless Device", in IEEE Access, 2020

Fábio Mendonça, Sheikh Mostafa, Fernando Morgado-Dias and Antonio Ravelo-García, "An Oximetry Based Wireless Device for Sleep Apnea Detection", in Sensors, no. 20, pp. 888, 2020

Henrique Silva, Hugo Ferreira, Clemente Rocha and Luís Monteiro Rodrigues, "Texture Analysis is a Useful Tool to Assess the Complexity Profile of Microcirculatory Blood Flow", in Applied Sciences, vol. 3, no. 10, pp. 911, 2020

Andrea Lorena, Aldana Blanco, Marian Weger, Steffen Grautoff, Robert Holdrich and Thomas Hermann, "CardioScope: ECG sonification and auditory augmentation of heart sounds to support cardiac diagnostic and monitoring", in In Proc. of the 6th Interactive Sonification Workshop (iSon), pp. 115-122, 2019

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5. Safety & Maintenance

5.1. Electromagnetic Emissions

See the table below (Table 6) for specific information regarding the BITalino (r)evolution Board electromagnetic emissions. This device is intended for use in the electromagnetic environment(s) specified below. The user of this device must ensure that it is used within the specified environment(s).

Table 6: Electromagnetic emissions. The device is suitable for use in all establishments, including domestic and those directly connected to low-voltage energy public network supply which supplies buildings used for domestic purposes.

Emission Tests	Compliance	Electromagnetic Environment Guidance
RF Emissions CISPR 11	Group 1 Class B	This device must emit electromagnetic energy to perform its function. Electronic equipment near it, may be affected.

5.2. Safety Instructions

Please read the following safety instructions **before** using your *BITalino* system to prevent any damages or problems with the user, test persons and/or *BITalino* devices. Violations of these instructions can lead to inferior signal quality and/or damages to the *BITalino* system and user.

Warning & Precautions



Do not use this device in patients with implanted electronic devices of any kind, including pacemakers, electronic infusions pumps, stimulators, defibrillators or similar.



Do not apply electrodes over damaged skin.



Do not use the system in patients with allergies to silver



See all the documentation that came with the system for instructions on safety and precaution. Also available at <https://bitalino.com/documentation#documentation---tabs>



Do not use this equipment in an environment with operating magnetic imaging devices (MRI).



Do not use the device near the fire or in potentially explosive atmosphere such as atmospheres with flammable gas.



The use of damaged accessories or not recommended by PLUX may result in changes to the technical characteristics and features of your BITalino (r)evolution Board. Use only the approved accessories purchased from PLUX or a PLUX agent.



Use only the detection surfaces (electrodes) provided on the packaging of the system or acquired from PLUX or a PLUX agent.



The detection surfaces (electrodes) are disposable and intended for single use and single user only.



Inspect the BITalino (r)evolution Board before each use to ensure that the device is safe to use.



If you experience any kind of discomfort or skin irritation when using the BITalino (r)evolution Board



Do not place the device in the microwave.



If the BITalino (r)evolution Board or any accessories reach uncomfortable temperatures, turn of the device immediately and contact PLUX's Technical Support via e-mail (support@plux.info) or telephone (+351 211 956 542)



Do not insert objects into the holes of the device, it may affect the operating characteristics and safety.



Do not open the BITalino (r)evolution Board device or any of its accessories. Any repairing of the device must only be done by properly trained and authorized PLUX personnel.



During the charging process, place the device and the charging equipment so that the cable is free, away from places where it can be walked on or damaged. Make sure the cable does not obstruct the passage of people.



Use the charging cable with extreme caution to avoid risk of strangulation.



The BITalino (r)evolution Board device may suffer or cause interference to other equipment with radio receiver/transmitters, even those that comply with international standards and regulations. Keep a safe distance between the BITalino (r)evolution Board and other devices to ensure their proper function.



The BITalino (r)evolution Board should not be used in noisy environments in relation to RF radiation which can cause communication failure.



If your BITalino (r)evolution Board device stops working, please contact PLUX's Technical Support via e-mail (support@plux.info) or telephone (+351 211 956 542) and stop using it until any further notice from PLUX's Technical Support.



Always keep the device and its accessories dry. The presence of liquid contact can compromise the safety operating characteristics of the system.



Fragile. Handle with caution. Do not expose the device or accessories to high accelerations and vibrations.



Type BF Device (IEC 60601-1)



In compliance with the European Directive on Waste of Electrical and Electronic Equipment (WEEE) 2002/96/EC, do not deposit the BITalino (r)evolution Board in the trash. Instead, contact your Reseller or PLUX for properly recycle your BITalino (r)evolution Board. You can get information about the contact nearest to you in <https://bitalino.com/resellers>.



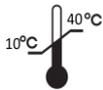
Complies with the requirements for European Normative: Radio Equipment Directive 2014/53/EU Article 3.1(a) Safety e Health Standards - Radio Equipment Directive 2014/53/EU Article 3.1(b) Electromagnetic Compatibility - Radio Equipment Directive 2014/53/EU Article 3.2 Efficient use of Spectrum Standards - Rohs Directive 2011/65/EU



Data of manufacturing (appears on product packaging).



Serial number (appears on product packaging and the BITalino (r)evolution Board device).



The BITalino (r)evolution Board device should be used at temperatures between 10° and 40°C and stored at temperatures between 10° and 30°C because it has rechargeable Li-Ion batteries and detection surfaces with limitations on operating temperatures. Operating or storing the device outside this range may compromise the integrity and security of it.



This equipment complies with International Standard CEM é a EN 60601-1-2:2015 for electromagnetic compatibility for medical equipment and systems. This pattern is used to provide reasonable protection against harmful interference in a typical medical environment.

PLUX Wireless Biosignals SA



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Portugal

5.3. Transportation and Storage

Please follow these recommendations to ensure safe transportation and storage of your *BITalino* equipment and sensors to prevent any damaging of your system.

The *BITalino* equipment and sensors should be stored in the original box in a dry place when those are not being used.

- Relative humidity: up to 95% with no condensation
- Ambient temperature: 10°C to 30°C
- Atmospheric pressure between 500hPa and 1060hPa

Whenever the equipment needs to be transported, it should be placed in the original box, since this was designed and tested to ensure the equipment and accessories are securely stored.

Take care while handling the transportation of the system and avoid dropping it, since the device is not shock-proof and should not be placed under stress or sudden acceleration.

5.4. Cleaning

Please follow these cleaning instructions to prevent any damage of the system or the user because of conducting cleaning methods that may cause any damage.

- The *BITalino* and sensors should be visually checked before each use and cleaning process to ensure that no mechanical damage occurred.
- The *BITalino* equipment and sensors (including the cables) should be cleaned with a slightly damp cloth or suitable absorbent paper, ensuring no liquid enters the equipment of sensors. Do not use detergent or any type of cleaning liquid as these may damage your equipment and/or sensor.
- Do not clean or re-use detection surfaces (electrodes). They are only suitable for single use and should be disposed of after usage except indicated otherwise.

6. Ordering Guides, Regulatory & Legal Information

6.1. Ordering Guide

Please follow the following ordering guide when submitting orders of BITalino plugged (core/assembled) or board to orders@plux.info. If no specification is provided, the standard version of the sensor will be delivered.

BITalino plugged (core/ assembled) / board

SKU Reference	PLUX Code	UPC	Description
KIT-REV-BOARD-BT-UCE6	810121001	641945959048	Board BT
KIT-REV-PLUGGED-BT-UCE6	810121003	641945959055	Plugged BT
KIT-REV-BOARD-BLE-UCE6	810121002	641945959079	Board BLE/BT
KIT-REV-PLUGGED-BLE-UCE6	810121004	641945959086	Plugged BLE/BT
BUNDLE-REV-CORE-BT	810122201	785614265082	Assembled BITalino Core BT
COMP-CORE-BT	810121705	641945957877	BITalino Core (MCU+BT+Power)
COMP-CORE-BLE	810121706	641945957884	BITalino Core (MCU+BLE/ BT+Power)

Electrodes & Accessories

For a full list of available and compatible electrodes, please visit the [BITalino store](#).

6.2. Guarantee of Quality & Warranty

BITalino sensors have two years quality guarantee from the date of purchase. PLUX guarantees that the system, sensors and accessories will be free from material or manufacturing defects for the mentioned time periods following date of purchase.

If PLUX receives notification of any such defects within the guarantee period, it will repair or substitute with the same unit\model, any products with proven defects at no cost to the client. During the repair period PLUX promises to provide a temporary replacement under the same specification. Repairs will be carried out at PLUX's premises after the equipment has been received.

6.3. Warranty Voidance

Usage of the device that is not in accordance with the handling instructions indicated in the manual or use with accessories other than those manufactured by PLUX will invalidate the warranty of your devices.

Be careful when connecting your BITalino devices, sensors and/or accessories to any third-party device including the usage of the 3rd party connection components that are available for BITalino systems as **the usage of these components will void the electrical warranty of your BITalino device and sensors and, if not indicated otherwise, the warranty of the 3rd party system you're connecting to the device.** Check the electrical specifications of both systems you want to connect to prevent any damage of the user(s) or the systems.

In the case of warranty voidance, the same applies that we expressly disclaim any liability whatsoever for any direct, indirect, consequential, incidental or special damages, including, without limitation, lost revenues, lost profits, losses resulting from business interruption or loss of data, regardless of the form of action or legal theory under which the liability may be asserted, even if advised of the possibility of such damages.

6.4. Contact & Support

Contact us if you are experiencing any problems that cannot be solved with the information given in the [BITalino documentation](#).

Please send us an e-mail with precise information about the error occurrence, device configuration, and, if possible, screenshots of the problem to support@plux.info.

6.5. Regulatory Disclaimer / Intended Use

BITalino products are intended for use in life science education and research applications; they are not medical devices nor are they intended for medical diagnosis, cure, mitigation, treatment or prevention of disease. we expressly disclaim any liability whatsoever for any direct, indirect, consequential, incidental or special damages, including, without limitation, lost revenues, lost profits, losses resulting from business interruption or loss of data, regardless of the form of action or legal theory under which the liability may be asserted, even if advised of the possibility of such damages.

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