Bitbrain
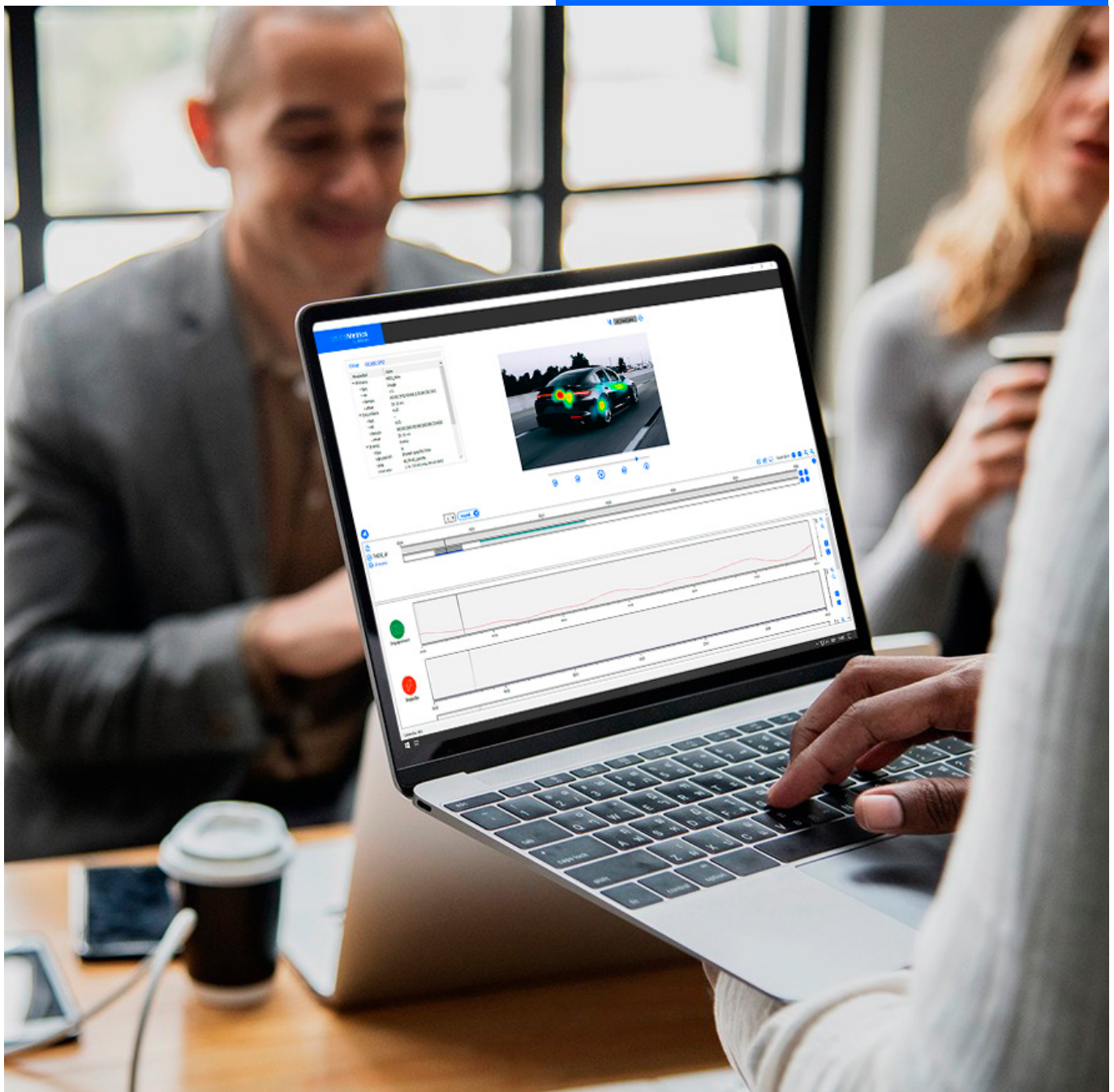
Software tools

Wide range of practical software tools with high compatibility with third parties and with Bitbrain software platforms.

Bitbrain

Software tools

Wide range of practical software tools with high compatibility with third parties and Bitbrain platforms.

All Bitbrain's equipment includes a software kit with programming and data acquisition tools, which are compatible with third parties and Bitbrain software solutions.

The **Bitbrain Viewer Software** allows the researcher to work at a user level (acquire, visualize and export data). It provides straightforward connectivity with real-time third parties based on LabStreamingLayer (LSL), or offline data analysis tools based on Matlab or Python.

The Bitbrain Software Development Kit, consists of different scripts that allow communication and control of the hardware used. It is a starting point for the development of brain-computer interface applications.

The Human Behavior Research Lab simplifies the synchronized data collection from different Bitbrain and Tobii devices and provides a biometric analysis.

The Bitbrain SensLite Software enables data synchronization and will be included in all devices. *Coming soon*

Products

Bitbrain Viewer Software

Software for data visualization and recording, with large compatibility with real-time I/O and data processing third parties.

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Bitbrain Software Development Kit

Software kit consisting of different scripts that allow communication and control of the hardware used. It is a starting point for the development of brain-computer interface applications.
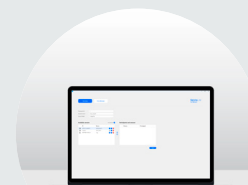
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Human Behaviour Research Lab

Experimental design and data collection with 30+ sensor modalities seamless synchronized, and data analysis including a wide range of emotional and cognitive biometrics.

P.50

Bitbrain SensLite Software

Coming soon

Included with all devices, the software allows data visualization and collection of more than 30 biosensors seamlessly synchronized.

P.50

Bitbrain

Key features

Advanced software easy to use
Adaptation of the software for different users' profiles as the key to building innovative and advanced technology, but simplified for each context of use.

State of the art
All the hardware and software technologies have been developed under R&D projects that follow the most strict European standards (FP6/FP7), and implemented by a R&D team that has produced 300+ research papers.
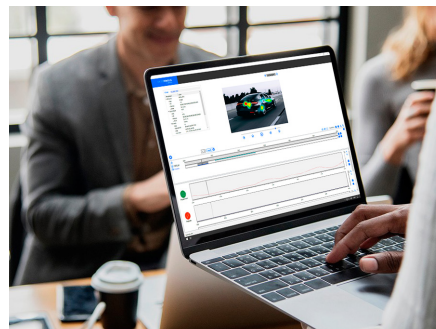
Practical neurotechnology
Innovative and practical Hw and Sw for real-world applications: 1) Comfortable, mobile, wireless and ergonomically designed for the user; 2) Fast and simple - easy to set up almost everywhere in few minutes; 3) Reliable - with outstanding signal quality.

Software adapted for different use cases
Complete software solutions adapted for each user and research context, simplifying the experimental design, synchronized data collection and analysis. For human behaviour research, cognitive training and programming.


One provider with expert support
Bitbrain is the manufacturer of all the hardware technologies (except Tobii Pro products) and all the software technologies. This ensures you have the most advanced partner interlocutor for your support.

Software multimodal programming
Develop software tools to boost neurotech applications, supporting a wide variety of hardware and software plugins for acquisition, processing and interaction.
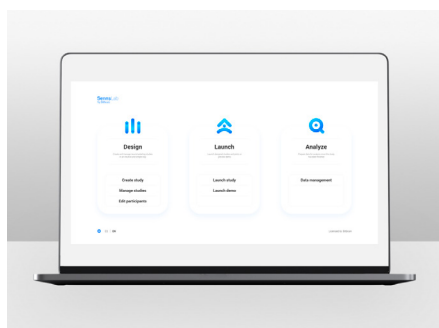

Software for scientific research
Advanced labs for experimental design and data collection with 30+ sensor modalities seamlessly synchronized, with hardware and software technology that is practical and simplified to enable real-world research.

Programming platform
Bitbrain has the ability to work with a programming platform where our engineers can help researchers integrate their own code and develop their applications.
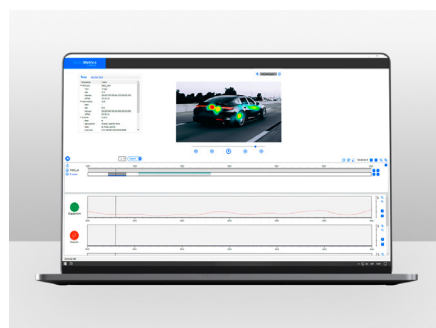

Software for biometrics analysis
Complete research labs adapted for consumer behaviour and UX research, which provide a wide range of experimental protocols already designed and advanced data analysis including behavioural, emotional and cognitive biometrics.

Bitbrain Viewer Software

Software for data acquisition and visualization, with large compatibility with real-time I/O and data processing third parties.

- **Simplified data acquisition and setup**
  Collect data with the help of visual cues to ensure a proper setup and high-quality monitoring.
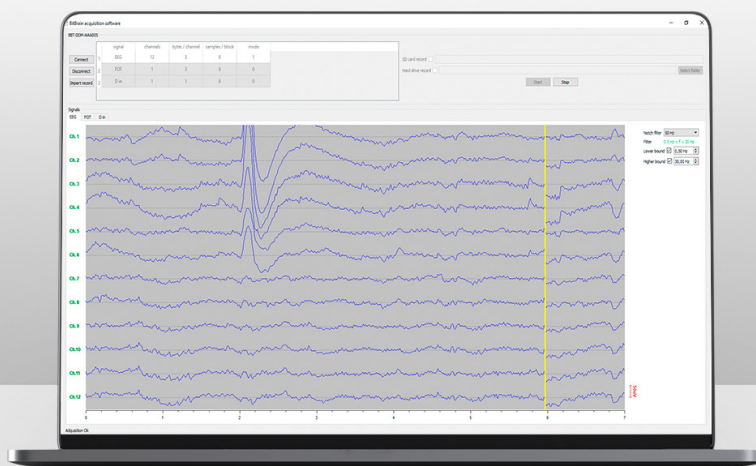
- **Powerful real-time applications**
  LSL compatibility ensures real-time data recording from any platform.

- **In-depth data analysis**
  Compatible with advanced platforms such as Matlab, EEGLab, Python, or MNE among others. VR compatibility with Unreal and Unity.

Some applications

Practical data collection. Easy to use visualization software with stationary and mobile devices.

Highly accurate recording of data from different devices for later export in timestamped CSV files
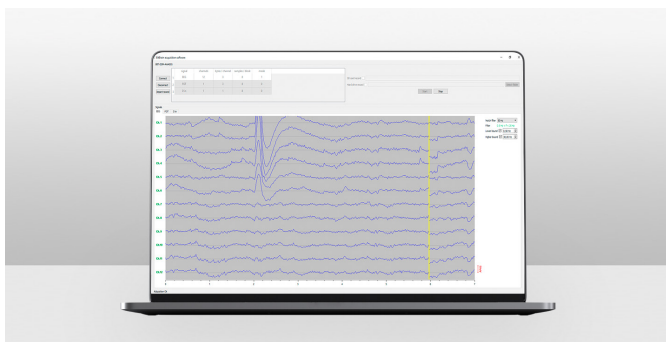
Connect your device with real-time third party scientific platforms based on LabStreamLayer (LSL) such as BCI2000, OpenVibe, etc.
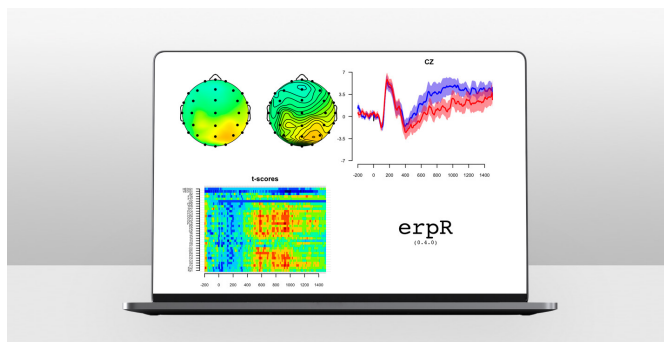
Analyze your data with standard data analysis scientific platforms based on Matlab and Python, among others.

Technical overview
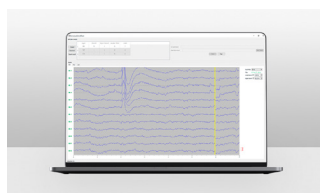
Live data acquisition, on/off line data visualization and export in CSV format.

Real-time C/C++ SDK for Windows and Linux including Python bindings.

Compatible with real-time third parties based on LSL (BCI2000, OpenVibe, NeuroPype, and more).

Import data into analysis tools based on Matlab (EEGLAB, BCILAB,etc), Python (MNE, etc), Neuroguide and more.

Bitbrain data acquisition suite

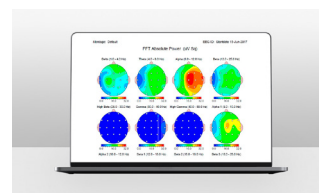| Compatible equipments	
Bitbrain devices	All Bitbrain devices (EEG, Biosignals).

Data acquisition	
Simultaneous streaming / local recording	Local and remote recording in the computer.
Local data integrity	Data can be stored in a SD card with no losses. Sequence and flag fields available to check integrity.
Remote data integrity	Sequence and flag fields and checksum to verify the data integrity during recording and transmission.
Online data connectivity	Discontinuous connectivity allowed with smart reconnection for live visualization and remote recording. Local data recorded in SD card without losses.

Data stream and storage	
Data files	Timestamped CSV files for remote recording.
Importable SD card data	Optimized SD card recordings can be imported into CSV files.

Data visualization/record of EEG and Biosignals	
Raw data	Online and offline visualization.
EEG impedance level	Online and offline visualization with a color code to facilitate montage and re-montage. Record of values.
Available data with filters	Customizable frequency filters, data scale, time scale, channel selection

Third Party compatibility

Third parties real-time I/O	
LabStreamLayer (LSL)	BCI2000, OpenVibe, NeuroPype, etc.
Third parties data processing	
Matlab	EEGLAB, FieldTrip, BCILAB and more.
Python	MNE, numpy, pandas, ...
Neuroguide	QEEG Versatile family (fully integrated).

Software kit includes

- Installer of data acquisition suite
- Data acquisition suite documentation

Note: Minimum hardware requirements -- Intel Celeron/AMD Athlon processor, Bluetooth 2.1 (Cysmart 4.0 bluetooth dongle for indoor localization). Software requirements -- Linux (any with bluetooth and Qt supported) and Windows (7 and newer).

Additional services

Installation and Initial Training
Our team provides a training course that includes the online installation and basic software training.
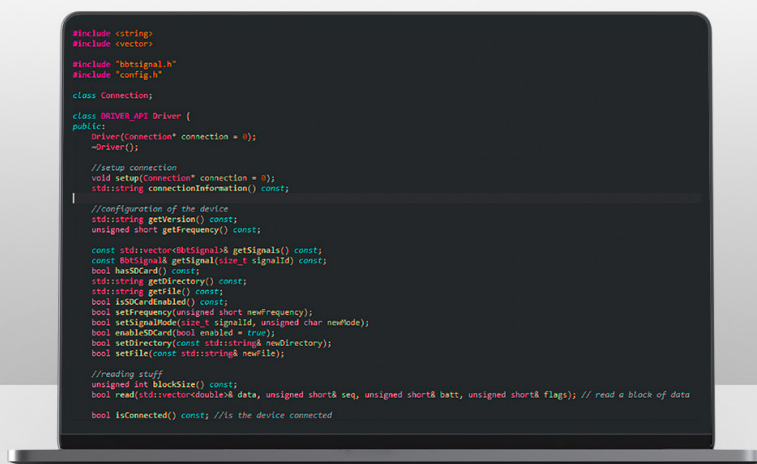
![Bitbrain logo]

Bitbrain Software Development kit

Software kit consisting of different scripts that allow communication and control of the hardware used. It is a starting point for the development of brain-computer interface applications.

- **Start from the state-of-the-art** From a wide variety of hardware and software plugins for acquisition, processing and interaction.

```cpp
#include <string>
#include <vector>

#include "bbtsignal.h"
#include "config.h"

class Connection;

class DRIVER_API Driver {
public:
    Driver(Connection* connection = 0);
    ~Driver();

    //setup connection
    void setup(Connection* connection = 0);
    std::string connectionInformation() const;

    //configuration of the device
    std::string getVersion() const;
    unsigned short getFrequency() const;

    const std::vector<BbtSignal>& getSignals() const;
    const BbtSignal& getSignal(size_t signalId) const;
    bool hasSDCard() const;
    std::string getDirectory() const;
    std::string getFile() const;
    bool isSDCardEnabled() const;
    bool setFrequency(unsigned short newFrequency);
    bool setSignalMode(size_t signalId, unsigned char newMode);
    bool enableSDCard(bool enabled = true);
    bool setDirectory(const std::string& newDirectory);
    bool setFile(const std::string& newFile);

    //reading stuff
    unsigned int blockSize() const;
    bool read(std::vector<double>& data, unsigned short& seq, unsigned short& batt, unsigned short& flags); // read a block of data

    bool isConnected() const; //is the device connected
```

- **Compatibility and scalability** Real-time integration of 30+ complementary technologies within Windows OS and Linux, and compatible with Matlab, Python, Unity and Unreal.
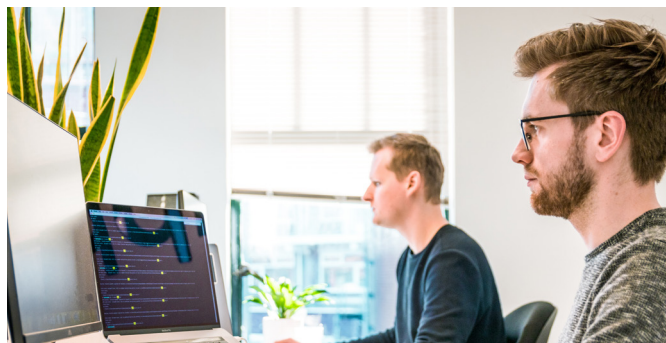
- **Professional support** Professionally maintained with efficient support, periodical updates, and services to minimize development time, such as training or development of customized units.

Some applications

![People working at computers with multiple monitors]

Start your brain-computer interface project with a perfect integration of **30+ complementary technologies**. Compatibility with Matlab, Python and Unity, among others.

![Two men discussing at a computer]

Speed up the development relying on the **real-time data processing** of scientific programming languages like Matlab and Python.

![Man wearing headset looking at a phone]

Use our tools to build **straightforward interaction** with immersive technologies or gaming (Unity and Unreal), or communication with other devices (cellphones, tablets) or cloud services.

![Two people in a meeting with documents]

Professionally **maintained by efficient support, periodical updates and services** to minimize development time, such as training or development of customized units.

More info: www.bitbrain.com

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info@bitbrain.com

Bitbrain

Technical overview

Parameterized set up and configurations of applications based on the acquisition, data processing and interaction.

Real-time acquisition and synchronization of more than 30 complementary multimodal technologies.

Near real-time distributed processing in C++, including Matlab and Python plugins.

Interaction with immersive technologies, streaming, and cloud services, and other devices (cellphones, tablets).

Bitbrain data acquisition suite

Compatible equipments	
Bitbrain devices	All Bitbrain devices (EEG and Biosignals).
Eye tracking devices	Tobii Pro stationary or mobile (Tobii Pro Glasses 2 and 3) devices.

General features	
Closed-loop applications	Out-of-the-box support for multimodal closed-loop applications.
Configurable pipeline	Configurable pipeline of elements through scripts.
Support high processing demands	Platform can be distributed through various computers in a local area network.
Automatic file saving	Data is automatically saved to a proprietary format.
Offline data processing	Data saved can be loaded and offline analysed using scientific programming languages: Matlab, Python.
Modular design	Designed as a set of modules (OS processes) and programming units with a message-passing architecture.
Multiplatform, desktop solution	Windows and Linux.

Modules for data acquisition	
Simultaneous recording	Simultaneous recording of multiple data streams.
Real time sync	Timestamped recordings for synchronization.
Interoperability standard	Allows inter-operability from third parties devices using Lab Streaming Layer (LSL).

Modules for processing	
Serial / parallel processing	Allows for serial or parallel processing.
Sync. processing	Timestamped recordings are transferred for online synchronization.
Scientific programming prototyping	Processing algorithms can be easily integrated using state-of-the-art scientific programming languages such as Matlab and Python (or native C++).

Programming SDK

SDK	
Supported SO	Linux (any with bluetooth and Qt supported) and Windows (7 and newer).
Programming language	Real-time C/C++ SDK for Windows and Linux including Python bindings.
Main functionalities	Programming interface common for all devices, with full control of device configuration, real-time data acquisition and record, and RTT estimation.

Modules for interaction	
Interconnectivity	Available near real-time TCP/IP communication protocol with third party platforms, to send/receive data streams or messages.

Software bundle includes

- Software libraries for development
- Software examples
- Documentation

Note: the programming framework is usually adapted to the client's needs to reduce the learning curve and speed up development.

Services

Installation and Initial Training
Our team provides a training course that includes the online installation and Bitbrain platform programming training. You and your team will gain a basic understanding of how to operate the system.

Software Customization
Customization of the software in terms of specific requirements of the applications usually in terms of functionality (pre-configuration of system dynamics, modules and communications). You will receive a made-to-order technology for your research or business.

Bitbrain

Human Behaviour Research Lab

Software for experimental design and data collection with 35+ sensor modalities seamlessly synchronized, and data analysis including a wide range of emotional and cognitive biometrics.

- **35+ sensor modalities**
  Synchronizes EEG, GSR, ExG, eye trackers and more in one software and one computer.
- **Variety of stimuli presentation**
  Images, videos, websites, surveys and much more.
- **Sophisticated study design**
  Flexibility to create specific presentations, randomizations, block designs, and more.
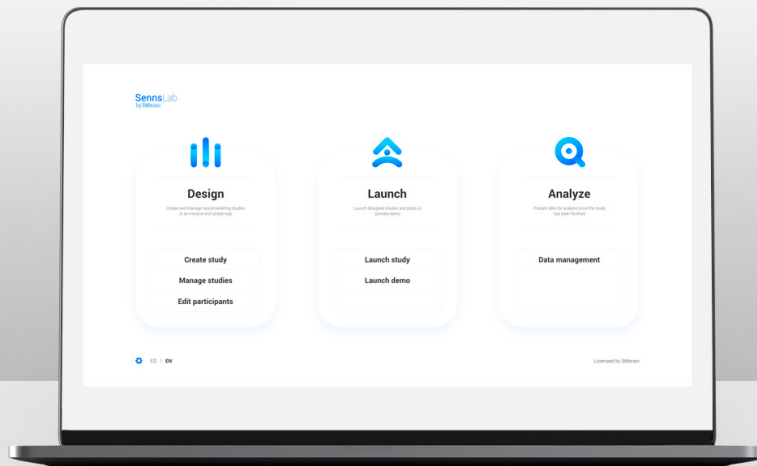
- **Wide range of biometrics**
  Emotional valence, impact and activation, memorization, attention, engagement and more.
- **Powerful visualizations**
  In depth data analysis with all technologies individually or aggregated in groups.
- **Predesigned studies**
  Built-in stimuli presentations to speed up the project design by standard and validated experimental protocols.

Some applications

Enhance your research in **psychology, neuroscience and sociology** in real-world contexts with a technology that integrates +30 practical sensor modalities.

Get in depth biometric insights in **neuromarketing, UX, and gaming** through participants' visual, behavioural, emotional and cognitive states.

Perform complex data experiments with many types of stimuli such as **videos, images, webs, or free tasks** among many others.
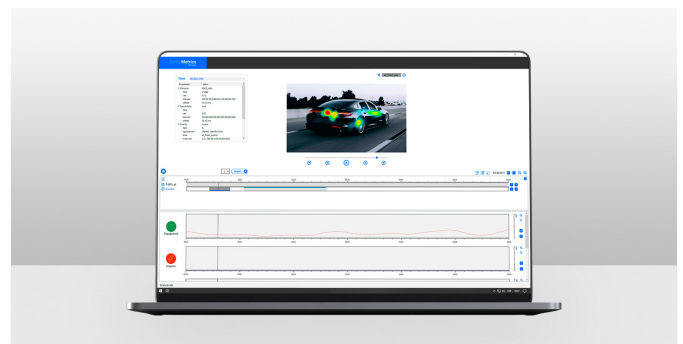
Data analysis with research tools that allows you to work on **raw data or biometrics**, at individual or group levels.
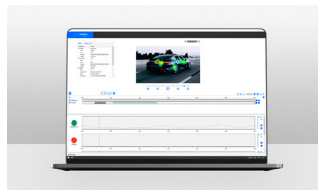
More info: www.bitbrain.com

info@bitbrain.com

Technical overview

Data collection with more than 30 sensor modalities seamlessly sync and integrated (EEG, biosignals, etc).

Experimental design with presentations of videos, images, and many other stimuli.

Simplified data collection with visual guides to facilitate the set up and online visualization of the data.

Export data to third parties or use the biometrics plugin to obtain emotional and cognitive biometrics for further analysis.

Human Behaviour Research Lab

Sync Data collection (Hardware)	
EEG	Dry-EEG and Semi-dry EEG Bitbrain families.
Biosignals	GSR, ECG, EMG, EOG, Respiratory effort band, Air flow, Temperature, BVP/SPO2, Snore sensor, Optical trigger.
Movement	Inertial motion units (9 d.o.f.).
Behaviour	1/3/7 buttons box, 1 pedal button.
Eye tracking	All screen-based and mobile (Tobii Pro Glasses 2 and 3).
Cameras + micros	USB camera and micro, screen capture (PC/mobile devices).
Tests	Questionnaires, implicit association/response tests.

Management	
Database	Participants and studies

Experimental protocols	
Basic stimuli	Images, videos, audio, free tasks.
Advanced stimuli	Webpages, apps, focus groups, interviews, surveys, experiences.
Protocol settings	Randomizations, rotations, events, TCP/IP event recording.
Compatibility with stimulation platforms	E-Prime, Tobii Pro Lab

Data analysis and export	
Supported files	CSV.
Compatibility with data analysis platforms	Compatible with data analysis tools based on Matlab (EEGLAB, BCILAB,etc), Python (MNE, etc), Tobii Pro Lab, Neuroguide QEEG and more.

Real time I/O connectivity	
Compatibility with real-time platforms	Compatible with real-time third parties based on LabStreamLayer LSL (BCI2000, OpenVibe, NeuroPype, and more).
Real-time API	Yes (bidirectional). Streams data and registers external events.

Biometrics plugin

Human behaviour metrics	
Emotional biometrics	Valence, emotional activation, emotional impact.
Cognitive biometrics	Attention, memorization, engagement.
Behavioural metrics	Mouse tracking, time.
Eye tracking metrics	Visual attention, fixations.
Implicit motivation and attitudes	Implicit association response tests (IAT and Priming).

Metrics representations	
Individual	For biometrics, time and implicit association: Bar charts & statistical differences tables. For eye tracking, mouse localization and indoor localization: heat maps, ratio maps, time maps, trajectory maps, areas of interest (Time to First Fixation, Time spent, Ratio, Revisits, Average Time of Fixations, Previous Fixations) & aggregated fixation video.
Combined	Emotional positioning maps, videos combining metrics, stimuli, cameras & microphones (aggregated, aggregated by segment or individual).

Output format	
Files	All biometrics (individual and aggregated) in CSV format, compatible with third party tools (Matlab, Excell, etc).
Visualization software	Bitbrain biometrics visualization software. Analysis of intervals and areas of interest.
Multimedia materials	Representations and videos included for reporting.

Services

Many services are available. These range from adaptation of the Human Behaviour Research Lab software and its biometrics up to several applied neuroscience services.

About Bitbrain

We fusion neuroscience and engineering to develop the latest generation of practical neurotechnology integrated in solutions with high value for our society.

Bitbrain was founded in 2010 as a spin-off company of a research team from the University of Zaragoza (Spain), a pioneer in approaching brain-computer interface applications outside research labs. Its DNA holds all knowledge in neurotechnology, biomedical engineering, artificial intelligence and data science accumulated at the university since 1998.

Today, the company is a reference with over 600 individual institutions in more than 35 countries relying on our products to advance the penetration of neurotech research and development in our society.

Equipment

Innovative and practical EEG, biosignals, eye trackers and other complementary human monitoring technologies to approach real world research.

Bitbrain Viewer Software

Software for data acquisition and visualization, with large compatibility with real-time I/O and data processing third parties.

Bitbrain Software Development kit

Software kit consisting of different scripts that allow communication and control of the hardware used. It is a starting point for the development of brain-computer interface applications.

Human Behaviour Research Lab

Labs for experimental design and data collection with 30+ sensor modalities seamlessly synchronized, and data analysis including a wide range of emotional and cognitive biometrics.

Clients & Partners

Bitbrain products are favored by leading universities, government research and development funding, and forward-thinking companies around the world — with over 600 individual institutions relying on our products for the best in physiological and neurological research.

Academy

MIT · Stanford University · ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE · Imperial College London · UNIVERSITÄT HEIDELBERG · TU Graz

VUB VRIJE UNIVERSITEIT BRUSSEL · University of Glasgow · Radboud Universiteit Nijmegen · The University of Nottingham · UAM UNIVERSIDAD AUTÓNOMA · UNIVERSITAT DE BARCELONA

CSIC · CNRS · OTAGO · ie BUSINESS SCHOOL · University of Reading

Private institutions

Bupa · Coca-Cola · NISSAN · Johnson & Johnson · IBM · L'ORÉAL PARIS

SEAT · intel · Hero · Disney · Telefónica · FUNDACIÓN Realmadrid

GfK · KANTAR MillWARDBROWN · Ogilvy · everis · AMC GROUP · PUIG

Funding

European Commission · Horizon 2020 European Union funding for Research & Innovation · SEVENTH FRAMEWORK PROGRAMME · GOBIERNO DE ESPAÑA MINISTERIO DE ECONOMÍA, INDUSTRIA Y COMPETITIVIDAD · GOBIERNO DE ESPAÑA MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

Real-world research and applications

Bitbrain