OpenViBE Software for Brain-Computer Interfaces

Anatole Lécuyer (INRIA)

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Resume

Dr. Anatole Lécuyer
INRIA Research scientist
Bunraku team, INRIA Rennes
• 50 people
• Topic: Virtual Reality

Research interest: Interaction with Virtual worlds
• Force-feedback Interfaces
• Brain-Computer Interfaces

www.irisa.fr/bunraku/anatole.lecuyer
www.inria.fr/tactiles
Brain-Computer Interfaces (BCI)?

Communication system
Messages via cerebral activity
Activity measured with electroencephalography (EEG)
OpenViBE software

- A software platform to design and use Brain-Computer Interfaces
- A software platform for *real-time* and *on-line* processing of cerebral data (EEG, ECoG, MEG, etc)
  - >> acquisition, pre-processing, processing and display of cerebral data
OpenViBE development

Initial consortium:
INRIA (leader), INSERM, CEA, GIPSA-LAB, AFM, FRANCE-TELECOM R&D

Manpower: 9 m.y (INRIA, INSERM)

Applications:
- Disabled people,
- Research (cognitive processes, neuroscience, signal-processing, computer-human interaction, etc),
- Medical applications: diagnosis, therapy (neurofeedback, rehabilitation)
- Multimedia: videogames, virtual reality, computer-human interaction
- Robotics, Domotics,
- etc

http://openvibe.inria.fr
Key features

Modularity and re-usability
set of software modules, >> easily add new modules and extend functionalities

Multiple-users facilities
programmers vs. non-programmers >> researchers in signal-processing, medical doctors, videogame designers, etc

Portability
independent from hardware, acquisition machine, operating systems, etc

High-performance
should take advantage from multithread or multi-core architectures or computer clusters to decrease computation time

Connection with virtual reality (VR)
compatible with VR software and hardware, includes virtual reality displays
OpenVibe functionalities

A generic signal acquisition server

- Compatible with several machines
  - VSM-CTF (MEG 275 channels)
  - NeXus32 (EEG 32 channels)
  - BrainAmps (EEG 64 channels)
OpenViBE functionalities

A scenario designer

- Non-programmers
- Graphical User Interface
- User-friendly
- To create, monitor and tune BCI scenarios
OpenViBE functionalities

Visualization tools

- 2D and 3D displays of cerebral activity
Demonstrators

Entertaining applications
Mental speller
Neurofeedback
http://openvibe.inria.fr

Demo

>> Demo
FAQ

Available on INRIA gForge


License LGPL V2+

C++, GTK, OGRE3D

Hardware independent; LINUX, Windows; EEG, MEG, etc

Usable with MATLAB

On-line documentation, FAQ

www.irisa.fr/bunraku/OpenViBE/openvibe-x.x.x-documentation/index.html

Installation kits (>> designer.exe for windows)

Tutorials (videos, examples)
OpenViBE Users

INRIA Renne - Bretagne Atlantique, France (Bunraku team)
INRIA Nancy - Grand Est Research Centre, France (Cortex team)
INRIA Sophia Antipolis - Mediterranee, France (Odysee team)
INSERM, France
GIPSA-Lab, France
CEA-List, France
LAGIS, France
College de France, France
INSA Rouen, France
Fraunhofer, Germany
I2R A-Star, Singapore
LENA, France
Swinburne University of Technology, Australia
University of Sharjah, United Arab Emirates
University of Twente, Netherlands
Université de Bordeaux 2, France
Etc

First training to OpenViBE software
(Rennes, January 15-16 2009)
OpenViBE2

ARN Project
Topic: BCI and Videogames
Ten Partners:

• INRIA, INSERM, CEA, GIPSA-Lab, CHART, CLARTE, BLACKSHEEP, KYLOTONN, CGAMES, UBISOFT

3 years
Start Dec. 2009
Supported by « pôles de compétitivité Images & Réseaux et Cap Digital »

>> To be continued..
Thank you!

Contact
anatole.lecuyer@irisa.fr

Website
http://openvibe.inria.fr

>> Questions?