Inria Research & Development for the Cybathlon BCI series

To cite this version:
Fabien Lotte, Maureen Clerc, Aurélien Appriou, Amandine Audino, Camille Benaroch, et al.. Inria Research & Development for the Cybathlon BCI series. 8th Graz Brain-Computer Interface Conference 2019, Sep 2019, Graz, Austria. 2019. hal-02433970

HAL Id: hal-02433970
https://hal-univ-rennes1.archives-ouvertes.fr/hal-02433970
Submitted on 9 Jan 2020

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INTRODUCTION

• Team NITRO, from Inria (French national research institute for digital technologies), gathers 2 Inria research teams: Potioc (Bordeaux) and Athena (Sophia-Antipolis).
• Team NITRO trains two Cybathlon BCI pilots, one in Bordeaux and one in Sophia-Antipolis.
• Both research teams work together on the BCI design [1] and implementation, based on OpenViBE [2].
• We introduce each pilot, as well as their BCI system and training procedure below.

PILOT 1 - Presentation

• Wilfried Panatier, Graphic Designer, president of Pratikable (http://www.pratikable.com), an association to highlight disabilities through boarding, skating and extreme sports for all. He is himself tetraplegic and a rider!

BCI system & training protocol

• 4-class mental imagery BCI
  – Left/right hand motor imagery, mental subtraction, rest
• 46 active EEG channels, g.tec gUSBamp
• Classification: Adaptive Riemannian classifier [3]
  – Features: Spatial covariance matrices in 8-24Hz
  – Classifier: geodesic filter MDM with adaptive Rebias
• Progressive user training [4]
  – Pairs of 2 classes => 4 classes => Game control
  – 1 session/week => 2 sessions/week => 3 sessions/week

References

[3] Kumar, Yger, Lotte, BCI Winter conf, 2019