



THE ANNUAL BCI AWARD 2017

For the world's most innovative Brain-Computer Interface Project

Ceremony: September 21st, 2017 at the 7th International BCI Conference in Graz, Austria.

Jury: Natalie Mrachacz-Kersting (Chair), Gaurav Sharma (Winner 2016), Reinhold Scherer, Jose Pons, Femke Nijboer, Kenji Kansaku, Aaron Batista, Jing Jin

BCI prosthetic hand to control phantom limb pain

Takufumi Yanagisawa^{1-6*}, Ryohei Fukuma^{1,3,4,7}, Ben Seymour^{8,9}, Koichi Hosomi^{1,10}, Haruhiko Kishima¹, Takeshi Shimizu^{1,10}, Hiroshi Yokoi¹¹, Masayuki Hirata^{1,4}, Toshiaki Yoshimine^{1,4}, Yukiyasu Kamitani^{3,7,12}, Youichi Saitoh^{1,10}

- 1 Osaka University Graduate School of Medicine, Osaka, Japan.
- 2 Osaka University Graduate School of Medicine, Osaka, Japan.
- 3 ATR Computational Neuroscience Laboratories, Kyoto, Japan.
- 4 CiNet Computational Neuroscience Laboratories, Osaka, Japan.
- 5 JST PRESTO, Osaka, Japan.
- 6 Osaka University, Japan.
- 7 Nara Institute of Science and Technology, Nara, Japan.
- 8 University of Cambridge, UK.
- 9 National Institute for Information and Communications Technology, Osaka, Japan.
- 10 Osaka University Graduate School of Medicine, Osaka, Japan.
- 11 The University of Electro-Communications, Tokyo, Japan.
- 12 Kyoto University, Japan.

Implantable Communication Brain-Computer Interface for Home-Use in Locked-In Syndrome

Mariska J Vansteensel¹, Elmar GM Pels¹, Martin G. Bleichner², Mariana P. Branco¹, Timothy Denison³, Zachary V. Freudenburger¹, Peter Gosselaar¹, Sacha Leinders¹, Thomas H. Ottens⁴, Max A Van Den Boom¹, Peter C. Van Rijen¹, Erik J. Aarnoutse¹, Nick F Ramsey¹

- 1 Brain Center Rudolf Magnus, University Medical Center Utrecht, Dept Neurology and Neurosurgery, Utrecht, The Netherlands.
- 2 Neuropsychology Lab, Department of Psychology, European Medical School, Cluster of Excellence Hearing4all, University of Oldenburg, Oldenburg, Germany.
- 3 Neuromodulation Core Technology, 7000 Central Ave NE, Medtronic PLC, Minneapolis, USA.
- 4 University Medical Center Utrecht, Dept Anesthesiology, Utrecht, The Netherlands.

A brain-spine interface to alleviate gait deficits after spinal cord injury

Tomislav Milekovic^{1,*}, Marco Capogrosso^{1,2,*}, David Borton^{1,3,*}, Fabien Wagner^{1,E}, Eduardo Martin Moraud^{2,E}, Jean-Baptiste Mignardot¹, Nicolas Buse⁴, Jerome Gandar¹, Quentin Barraud¹, David Xing³, Elodie Rey¹, Simone Duis¹, Yang Jianzhong⁵, Wai Kin D. Ko⁵, Qin Li^{5,6}, Peter Detemple⁶, Tim Denison⁴, Silvestro Micera^{2,8,&}, Erwan Bezdard^{5,6,9,10,&}, Jocelyne Bloch^{11,&}, Grégoire Courtine^{1,11}

- 1 International foundation for Research in Paraplegia chair in Spinal Cord Repair, Center for Neuroprosthetics and Brain Mind Institute, School of Life Sciences, EPFL, Switzerland.
 - 2 Bertarelli Foundation Chair in Translational Neuroengineering, Center for Neuroprosthetics and Institute of Bioengineering, School of Bioengineering, EPFL, Switzerland.
 - 3 School of Engineering, Brown University, USA.
 - 4 Medtronic, USA.
 - 5 Motac neuroscience Ltd., UK.
 - 6 Institute of Lab Animal Sciences, China Academy of Medical Sciences, China.
 - 7 Fraunhofer ICT-IMM, Germany.
 - 8 The BioRobotics Institute, Scuola Superiore Sant'Anna, Italy.
 - 9 University of Bordeaux, Institut des Maladies Neurodégénératives, UMR 5293, France.
 - 10 CNRS, Institut des Maladies Neurodégénératives, UMR 5293, France; 11 Centre Hospitalier Universitaire Vaudois, Switzerland.
- * , E, & contributed equally to this work.

Brain Computer Interface for Communication with Patients in Completely Locked-in State

Ujwal Chaudhary^{1,2}, Aygul Rana¹, Azim Malekshahi¹, Stefano Silvon³, Niels Birbaumer^{1,2}

- 1 Institute of Medical Psychology and Behavioral Neurobiology, University of Tuebingen.
- 2 Wyss Center for Bio and Neuroengineering, Geneva, Switzerland.
- 3 Department of Cognitive and Clinical Neuroscience, Central Institute of Mental Health, Mannheim, Germany.

Individual word classification during imagined speech

Stephanie Martin^{1,2}, Peter Brunner^{3,4}, Iñaki Iturrate¹, José del R. Millán¹, Gerwin Schaik^{3,4}, Robert T. Knight^{2,5} & Brian N. Pasley

- 1 Defitech Chair in Brain-Machine Interface, Center for Neuroprosthetics, Ecole Polytechnique Fédérale de Lausanne, Switzerland
- 2 Helen Wills Neuroscience Institute, University of California, Berkeley, CA, USA
- 3 National Center for Adaptive Neurotechnologies, Wadsworth Center, New York State Department of Health, Albany, NY, USA
- 4 Department of Neurology, Albany Medical College, Albany, NY, USA
- 5 Department of Psychology, University of California, Berkeley, CA, USA

Restoration of finger movements in everyday life environments using a hybrid brain/neural hand exoskeleton

Surjo R. Soekadar, Matthias Witkowski, Cristina Gómez, Eloy Opisso, Josep Medina, Mario Cortese, Marco Cempini, Maria Chiara Carrozza, Leonardo G. Cohen, Niels Birbaumer, Nicola Vitiello
University Hospital of Tübingen, Germany.

Rethinking BCI Paradigm and Machine Learning Algorithm as a Symbiosis: Zero Calibration, Guaranteed Convergence and High Decoding Performance

David Hübner^{*1}, Pieter-Jan Kindermans^{*2}, Thibault Verhoeven³, Klaus-Robert Müller^{2,4,5}, Michael Tangermann¹

- 1 Albert-Ludwigs Universität Freiburg, Germany.
 - 2 Berlin Institute of Technology, Germany.
 - 3 Ghent University, Belgium.
 - 4 Korea University, Seoul, Korea.
 - 5 Max-Planck Institute for Intelligent Systems, Tübingen, Germany.
- * These authors contributed equally.

Targeted up-conditioning of contralesional corticospinal pathways promotes motor recovery in poststroke patients with severe chronic hemiplegia

Takasaki K¹, Liu F², Hiramato M², Okuyama K², Kawakami M², Mizuno K², Kasuga S^{1,3}, Noda T⁴, Morimoto J⁴, Fujiwara T⁵, Ushiba J^{1,3,*}, Liu M²

- 1 Department of Biosciences and Informatics, Faculty of Science and Technology, Keio University, Japan.
 - 2 Department of Rehabilitation Medicine, Keio University School of Medicine, Japan.
 - 3 Keio Institute of Pure and Applied Science (KIPAS), Japan.
 - 4 ATR Computational Neuroscience Labs, Japan.
 - 5 Department of Rehabilitation Medicine, Juntendo University School of Medicine, Japan.
- * Corresponding author.

Gold Standard for epilepsy/tumor surgery coupled with deep learning offers independence to a promising functional mapping modality

Korostenskaja, M.^{1,2,3}, RaviPrakash, H.⁴, Bagci, U.⁴, Lee, K.H.³, Chen, P.C.^{1,3}, Salinas, C.³, Baumgartner, J.³, Castillo, E.^{2,3}

- 1 Functional Brain Mapping and Brain Computer Interface Lab, Florida Hospital for Children, Orlando, FL, USA.
- 2 MEG Lab, Florida Hospital for Children, Orlando, FL, USA.
- 3 Florida Epilepsy Center, Florida Hospital, Orlando, FL, USA.
- 4 Center for Research in Computer Vision, University of Central Florida, Orlando, FL, USA.

High Performance BCI in Controlling an Avatar Using the Missing Hand Representation in Long Term Amputees

Ori Cohen^{1,2}, Dana Doron³, Moshe Koppel³, Rafael Malach⁴, Doron Friedman¹

- 1 The Advanced Reality Lab, Interdisciplinary Center Herzliya (IDC H.), Israel.
- 2 The Department of Computer Science, Bar-Ilan University Ramat-Gan, Israel.
- 3 The Department of Brain Injury Rehabilitation, Sheba Medical Center, Tel-Hashomer, Israel.
- 4 The Department of Neurobiology, Weizmann Institute of Science, Israel.

Online adaptive brain-computer interface with attention variations

S. Aliakbarhosseinabadi¹, E. N. Kamavuako¹, N. Jiang², D. Farina³, N. Mrachacz-Kersting¹

- 1 Center for Sensory-Motor Interaction, Department of Health Science and Technology, Aalborg University, DK-9220 Aalborg, Denmark.
- 2 Department of Systems Design Engineering, Faculty of Engineering, University of Waterloo, Waterloo, Canada.
- 3 Imperial College London, London, UK.

Which BCI paradigm is better to induce agency or sense of control over movements?

Birgit Nierula^{1,2}, Maria V. Sanchez-Vives^{1,2,3,4}

- 1 Institut d'Investigacions Biomèdiques August Pi i Suñer (IDIBAPS), Rosselló 149-153, 08036 Barcelona, Spain.
- 2 Event-Lab, Department of Clinical Psychology and Psychobiology, Universitat de Barcelona, Spain.
- 3 Institució Catalana Recerca i Estudis Avançats (ICREA), Barcelona, Spain.
- 4 Departamento de Psicología Básica, Universitat de Barcelona, Spain.

www.bci-award.com

Awarded by

Sponsored by



AALBORG UNIVERSITY
DENMARK



GUGER
TECHNOLOGIES