Mads Rovsing Jochumsen
Associate Professor
Department of Health Science and Technology
The Faculty of Medicine
Neural Engineering and Neurophysiology
Neural Engineering and Neurophysiology
Aalborg Robotics Challenge
Aalborg Robotics Challenge
Center for Rehabilitation Robotics
Type of address: Visiting address.
Selma Lagerløfs Vej 249
12-03-018
9260
Gistrup
Denmark
Email: mj@hst.aau.dk
Phone: +4599403789

Research profile

My primary research areas are centered around control of external devices using the electrophysiological signals from the body, especially from the brain and muscles. I am working with Brain-Computer Interfaces for stroke, cerebral palsy and multiple sclerosis rehabilitation and to allow control of assistive devices for individuals with severe motor impairments after e.g. spinal cord injury or ALS (amyotrophic lateral sclerosis). The assistive technology include robots, exoskeletons, and computers. Besides signal processing and pattern recognition, I focus on the application of the control interfaces in terms of induction of plasticity in the human nervous system, rehabilitation (movement restoration and replacement), and gaming for increased motivation in the rehabilitation process. Lastly, my research involves quantifying changes in the brain associated with various neurological conditions (stroke, Mild Cognitive Impairment etc.), and changes throughout the human nervous system in response to various types of interventions for rehabilitation and basic science using magnetic and electrical stimulation.

Qualifications

Biomedical Engineering, PhD, Analysis of Movement-Related Cortical Potentials for Brain-Computer Interfacing in Stroke Rehabilitation
1 Sept 2012 → 15 Oct 2015
Award Date: 15 Oct 2015

Management - CBS, Research Management Course
26 Oct 2021 → 4 Mar 2022

Project management, Project management for Researchers
May 2018 → Aug 2018

University pedagogics for assistant lecturers
1 Nov 2015 → 31 Dec 2016

Biomedical Engineering, Master of Science
1 Sept 2010 → 30 Jun 2012

Entrepreneurship, Student Entrepreneurship at Aalborg University
2010 → 2012

Biomedical Engineering, Bachelor of Science
1 Sept 2007 → 30 Jun 2010

Employment

Associate Professor

Associate Professor
Department of Health Science and Technology
The Faculty of Medicine
Gistrup, Denmark
1 Sept 2012 → 31 Dec 4712

Associate Professor

Associate Professor

The Faculty of Medicine
Gistrup, Denmark
1 Sept 2012 → 31 Dec 4712

Neural Engineering and Neurophysiology
The Faculty of Medicine
Gistrup, Denmark
1 Dec 2015 → present

Associate Professor
Associate Professor
Neural Engineering and Neurophysiology
The Faculty of Medicine
Gistrup, Denmark
1 Sept 2012 → 31 Dec 4712

Aalborg Robotics Challenge
The Faculty of Engineering and Science
1 Sept 2012 → present

Aalborg Robotics Challenge
The Faculty of Engineering and Science
1 Sept 2012 → present

Center for Rehabilitation Robotics
The Faculty of Medicine
Gistrup, Denmark
1 Apr 2021 → present

Research outputs

Comparison of Classifier Calibration Schemes for Movement Intention Detection in Individuals with Cerebral Palsy for Inducing Plasticity with Brain-Computer Interfaces
Jochumsen, M., Sulkjær, C. S. & Dalgaard, K. S., 2 Dec 2025, In: Sensors (Basel, Switzerland). 25, 23, 7347.

Detection of movement-related cortical potentials associated with upper and low limb movements in patients with multiple sclerosis for brain-computer interfacing
Jochumsen, M., Petersen, B. S., Mikkelsen Vestergaard, L., Falborg, N. F., Wisler, L., Olesen, M. V., Andersen, M. S., Sørensen, N. B. & Jørgensen, S. T., 24 Jul 2025, In: Journal of Neural Engineering. 22, 4, 046026.

Kommunikation med tankens kraft
Jochumsen, M. R. (Producer), 4 Feb 2025

Single-trial movement intention detection estimation in patients with Parkinson's disease: a movement-related cortical potential study
Jochumsen, M., Poulsen, K. B., Sørensen, S. L., Sulkjær, C. S., Corydon, F. K., Strauss, L. S. & Roos, J. B., 1 Aug 2024, In: Journal of Neural Engineering. 21, 4, 046036.

The Effect of Caffeine on Movement-Related Cortical Potential Morphology and Detection
Jochumsen, M., Lavesen, E. R., Griem, A. B., Falkenberg-Andersen, C. & Jensen, S. K. G., 20 Jun 2024, In: Sensors (Basel, Switzerland). 24, 12, 4030.

Implementing Performance Accommodation Mechanisms in Online BCI for Stroke Rehabilitation: A Study on Perceived Control and Frustration

Jochumsen, M. R., Hougaard, B. I., Kristensen, M. S. & Knoche, H., 22 Nov 2022, In: Sensors. 22, 23, 9051.

Detection of Attempted Stroke Hand Motions from Surface EMG

Jochumsen, M. R., Waris, A. & Niazi, I. K., 2022, *Converging Clinical and Engineering Research on Neurorehabilitation IV: Proceedings of the 5th International Conference on Neurorehabilitation (ICNR2020), October 13–16, 2020.* Springer, p. 47-52 6 p. (Biosystems and Biorobotics, Vol. 28).

Subject-Independent Detection of Movement-Related Cortical Potentials and Classifier Adaptation from Single-Channel EEG

Jochumsen, M. R., 2022, *Converging Clinical and Engineering Research on Neurorehabilitation IV: Proceedings of the 5th International Conference on Neurorehabilitation (ICNR2020), October 13–16, 2020.* Torricelli, D., Akay, M. & L. Pons, J. (eds.). Springer, p. 77-81 5 p. (Biosystems and Biorobotics, Vol. 28).

Induction of Neural Plasticity Using a Low-Cost Open Source Brain-Computer Interface and a 3D-Printed Wrist Exoskeleton

Jochumsen, M. R., Janjua, T., Arceo Luzanilla, J. C., Lauber, J., Simoneau-Buessinger, E. & Kæseler, R. L., 15 Jan 2021, In: Sensors. 21, 2, p. 1-14 14 p., 572.

Decoding Attempted Hand Movements in Stroke Patients Using Surface Electromyography

Jochumsen, M., Niazi, I. K., Zia ur Rehman, M., Amjad, I., Shafique, M., Gilani, S. O. & Waris, A., 26 Nov 2020, In: Sensors. 20, 23, p. 1-14 14 p., 6763.

Detection and classification of single-trial movement-related cortical potentials associated with functional lower limb movements

Jochumsen, M. & Niazi, I. K., 3 Jul 2020, In: Journal of Neural Engineering. 17, 3, 035009.

EEG Headset Evaluation for Detection of Single-Trial Movement Intention for Brain-Computer Interfaces

Jochumsen, M., Knoche, H., Kjaer, T. W., Dinesen, B. & Kidmose, P., 14 May 2020, In: Sensors (Basel, Switzerland). 20, 10, 2804.

Evaluation of EEG Headset Mounting for Brain-Computer Interface-Based Stroke Rehabilitation by Patients, Therapists, and Relatives

Jochumsen, M., Knoche, H., Kidmose, P., Kjær, T. W. & Dinesen, B. I., 2020, In: Frontiers in Human Neuroscience. 14, 10 p., 13.

EMG-versus EEG-Triggered Electrical Stimulation for Inducing Corticospinal Plasticity

Jochumsen, M., Navid, M. S., Rashid, U., Haavik, H. & Niazi, I. K., 1 Sept 2019, In: IEEE Transactions on Neural Systems and Rehabilitation Engineering. 27, 9, p. 1901-1908 8 p.

Self-Paced Online vs. Cue-Based Offline Brain–Computer Interfaces for Inducing Neural Plasticity

Jochumsen, M., Navid, M. S., Nedergaard, R. W., Signal, N., Rashid, M. U., Hassan, A., Haavik, H., Taylor, D. & Niazi, I. K., 2019, In: Brain Sciences. 9, 6, 13 p., 127.

Movement intention detection in adolescents with cerebral palsy from single-trial EEG

Jochumsen, M., Shafique, M., Hassan, A. & Niazi, I. K., Dec 2018, In: Journal of Neural Engineering. 15, 6, 8 p., 066030.

Investigation of optimal afferent feedback modality for inducing neural plasticity with a self-paced brain-computer interface

Jochumsen, M., Cremoux, S., Robinault, L., Lauber, J., Arceo, J. C., Navid, M. S., Nedergaard, R. W., Rashid, U., Haavik, H. & Niazi, I. K., 3 Nov 2018, In: Sensors (Switzerland). 18, 11, 13 p., 3761.

Effect of subject training on a movement-related cortical potential-based brain-computer interface

Jochumsen, M., Niazi, I. K., Nedergaard, R. W., Navid, M. S. & Dremstrup, K., 2018, In: Biomedical Signal Processing and Control. 41, p. 63-68 6 p.

Single-channel movement prediction in stroke and cerebral palsy patients from single-trial EEG
Jochumsen, M., Oppermann, H. & Dremstrup, K., 2018.

The effect of arm position on classification of hand gestures with intramuscular EMG
Jochumsen, M., Waris, A. & Kamavuako, E. N., 2018, In: Biomedical Signal Processing and Control. 43, p. 1-8 8 p.

Classification of hand grasp kinetics and types using movement-related cortical potentials and EEG rhythms
Jochumsen, M., Rovsing, C., Rovsing, H., Niazi, I. K., Dremstrup, K. & Kamavuako, E. N., 2017, In: Computational Intelligence and Neuroscience. 2017, 10 p., 7470864.

Effect of arm position on hand gesture classification using intramuscular EMG
Jochumsen, M., Waris, A. & Kamavuako, E. N., 2017.

Quantification of movement-related EEG correlates associated with motor training: A study on movement-related cortical potentials and sensorimotor rhythms
Jochumsen, M., Rovsing, C., Rovsing, H., Cremoux, S., Signal, N., Allen, K., Taylor, D. & Niazi, I. K., 2017, In: Frontiers in Human Neuroscience. 11, 12 p., 604.

Detecting and classifying three different hand movement types through electroencephalography recordings for neurorehabilitation
Jochumsen, M., Niazi, I. K., Dremstrup, K. & Kamavuako, E. N., 2016, In: Medical & Biological Engineering & Computing. 54, 10, p. 1491-1501

Pairing voluntary movement and muscle-located electrical stimulation increases cortical excitability
Jochumsen, M., Niazi, I. K., Signal, N., Nedergaard, R. W., Holt, K., Haavik, H. & Taylor, D., 2016, In: Frontiers in Human Neuroscience. 10, 8 p., 482.

The effect of detection time on movement intention detection
Jochumsen, M., Rovsing, C., Rovsing, H., Kamavuako, E. N. & Dremstrup, K., 2016, *38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, EMBC, 16-20 August 2016, Orlando, FL, USA*. IEEE (Institute of Electrical and Electronics Engineers)

Analysis of Movement-Related Cortical Potentials for Brain-Computer Interfacing in Stroke Rehabilitation
Jochumsen, M., 2015, Aalborg Universitetsforlag.

Comparison of spatial filters and features for the detection and classification of movement-related cortical potentials in healthy individuals and stroke patients
Jochumsen, M., Niazi, I. K., Mrachacz-Kersting, N., Jiang, N., Farina, D. & Dremstrup, K., 2015, In: Journal of Neural Engineering. 12, 5, 10 p., 056003.

Decoding movement intentions from single-trial EEG
Jochumsen, M., Nørgaard, A. C., Stausholm, M. N., Skals, R. K., Dahl, S. C. & Kamavuako, E. N., 2015, *Abstracts, 33. Danske Medicotekniske Landsmøde, 15-17 September 2015, Brædstrup, Denmark*. Dansk Medicoteknisk Selskab

Detecting and classifying movement-related cortical potentials associated with hand movements in healthy subjects and stroke patients from single-electrode, single-trial EEG
Jochumsen, M., Niazi, I. K., Taylor, D., Farina, D. & Dremstrup, K., 2015, In: Journal of Neural Engineering. 12, 5, 11 p., 056013.

Induction of long-term depression-like plasticity by pairings of motor imagination and peripheral electrical stimulation
Jochumsen, M., Signal, N., Nedergaard, R. W., Taylor, D., Haavik, H. & Niazi, I. K., 2015, In: Frontiers in Human Neuroscience. 9, 8 p., 644.

Online multi-class brain-computer interface for detection and classification of lower limb movement intentions and kinetics for stroke rehabilitation

Jochumsen, M., Niazi, I. K., Navid, M. S., Anwar, M. N., Farina, D. & Dremstrup, K., 2015, In: Brain-Computer Interfaces. 2 , 4, p. 202-210

Detection of movement intentions through a single channel of electroencephalography

Jochumsen, M., Niazi, I. K., Rovsing, H., Rovsing, C., Nielsen, G. A. R., Andersen, T. K., Dong, N. P. T., Sørensen, M. E., Mrachacz-Kersting, N., Jiang, N., Farina, D. & Dremstrup, K., 2014, *Replace, Repair, Restore, Relieve : Bridging Clinical and Engineering Solutions in Neurorehabilitation: Proceedings of the 2nd International Conference on NeuroRehabilitation, ICNR2014, 24-26 June 2014, Aalborg, Denmark.* Jensen, W., Andersen, O. K. & Akay, M. (eds.). Springer, p. 465-472 (Biosystems and Biorobotics; No. 7).

Online detection and classification of movement kinetics

Jochumsen, M., Navid, M. S., Nedergaard, R. W., Anwar, M. N., Niazi, I. K. & Dremstrup, K., 2014, *Proceedings of the 6th International Brain-Computer Interface Conference, 16-19 September 2014, Graz, Austria: The Future of Brain-Computer Interaction : Basics, Shortcomings, Users.* Müller-Putz, G., Bauernfeind, G., Brunner, C., Steyrl, D., Wriessnegger, S. & Scherer, R. (eds.). Verlag der Technischen Universität Graz, 4 p. 035-1

Classifying speed and force from movement intentions using entropy and a support vector machine

Jochumsen, M., Niazi, I. K., Farina, D. & Dremstrup, K., 2013, *Proceedings of the Fifth International Brain-Computer Interface Meeting : Defining the Future, 3-7 June 2013, Pacific Grove, CA, USA.* Millán, J. D. R., Gao, S., Müller-Putz, G. R., Wolpaw, J. R. & Huggins, J. E. (eds.). Verlag der Technischen Universität Graz, p. Article No. 136

Detection and classification of movement-related cortical potentials associated with task force and speed

Jochumsen, M., Niazi, I. K., Mrachacz-Kersting, N., Farina, D. & Dremstrup, K., 2013, In: Journal of Neural Engineering. 10, 5, 9 p., 056015.

Detection and classification of movement-related cortical potentials for variations in speed and force for use in rehabilitation

Jochumsen, M., Mrachacz-Kersting, N., Niazi, I. K., Farina, D. & Dremstrup, K., 2012, *30. Danske Medicotekniske Landsmøde, 18.-20. september 2012, Brædstrup, Danmark.* Dansk Medicoteknisk Selskab, p. 2, No. 4

Activities

The Elsass Foundation Research Day

Jochumsen, M. R. (Participant), Hougaard, B. I. (Participant) & Dalgaard, K. S. (Participant)
29 Oct 2024

Frontiers in Neuroscience (Journal)

Struijk, L. N. S. A. (Editor), Jochumsen, M. R. (Editor), Hansen, J. P. (Editor) & Kamavuako, E. N. (Editor)
14 Jan 2021 → Apr 2021

Faculté des Sciences et Métiers du Sport, University of Valenciennes

Jochumsen, M. R. (Visiting researcher)
2017 → 2018

Auckland University of Technology

Jochumsen, M. R. (Visiting researcher)
2015

64th Lindau Nobel Laureate Meeting on Physiology or Medicine.

Jochumsen, M. R. (Participant)
2014

New Zealand College of Chiropractic

Jochumsen, M. R. (Visiting researcher)
2014 → 2015

Press/Media

Aktuelle navne: Rejsestipendier til unge forskere
Skov, I. R., Birkbak, A. & Jochumsen, M.
14/02/2014
1 item of Media coverage

Banebrydende studie: Lam mand går ved hjælp af trådløs forbindelse
Jochumsen, M. R.
24/05/2023 → 26/05/2023
3 items of Media coverage

Chips i hjernen
Jochumsen, M. R.
23/06/2024
2 items of Media coverage

Computere, der vil lære at læse vores tanker
Jochumsen, M. R.
14/06/2024 → 17/06/2024
2 items of Media coverage

Computere kan læse dine tanker
Jochumsen, M.
25/02/2018
1 item of Media coverage

Computer i hjernen forvandler lam kvindes tanker til tale i realtid
Jochumsen, M. R.
02/04/2025 → 06/04/2025
3 items of Media coverage

Det Frie Forskningsråd sender to unge forskere til årets nobeltræf i Tyskland
Jochumsen, M.
25/06/2014
1 item of Media coverage

De vandt foredragskonkurrencen
Jochumsen, M.
28/11/2017
1 item of Media coverage

De vandt foredrags- og poster-konkurrencerne
Jochumsen, M.
02/11/2015
1 item of Media coverage

Elektroder gav lam mand bevægelse
Jochumsen, M.
29/11/2015
1 item of Media coverage

Elektroder i hjernen giver lam mand bevægelsen igen
Jochumsen, M.
20/11/2015

2 items of Media coverage

Elon Musk vil være tankelæser og forbinde din hjerne til en computer, men inden da vil han få lamme til at gå igen
Jochumsen, M. R.
17/04/2021
2 items of Media coverage

"Hjerne-streaming": Implantat forvandler lam kvindes tanker til tale
Jochumsen, M. R.
23/04/2025
1 item of Media coverage

Hjernestyrede exoskeletter kan give lammede bevægelsen tilbage
Jochumsen, M. R.
15/12/2023
1 item of Media coverage

Kan vi ændre i kriminelles hjerner og forhindre mord?
Jochumsen, M. R.
08/12/2023
1 item of Media coverage

Lam mand går igen
Stevenson, A. J. T. & Jochumsen, M.
24/09/2018
9 items of Media coverage

Med en chip i hjernen kan man få ting til at ske med tankens kraft
Jochumsen, M. R.
25/05/2024
1 item of Media coverage

Navne i noter
Jochumsen, M.
23/03/2014
1 item of Media coverage

Niveauet var højt i årets konkurrence
Jochumsen, M. R.
05/12/2023
1 item of Media coverage

Når tanke bliver til handling
Jochumsen, M.
14/01/2017
3 items of Media coverage

Priser til forskere
Jochumsen, M.
06/02/2014
1 item of Media coverage

Professoren giver håb for demente
Jochumsen, M.
06/02/2014
3 items of Media coverage

På bølgelængde med hjernen
Stevenson, A. J. T., Jochumsen, M. R. & Gervasio, S.
08/02/2024 → 08/02/2024
2 items of Media coverage

Robotarm læser lam mands tanker
Jochumsen, M.
22/05/2015
2 items of Media coverage

Siemens Fonden gives DKK 289,800 to a series of projects with perspective within technology and science
Bak, B. L. V., Jochumsen, M. R. & Sinkjær, T.
31/05/2024
1 item of Media coverage

Store stipendier til tre AAU-forskere
Jochumsen, M., Skov, I. R. & Birkbak, A.
06/02/2014
7 items of Media coverage

Tankelæser kan få lamme aber til at gå igen
Jochumsen, M.
09/11/2016
7 items of Media coverage

Tankelæser lader lam mand gribe gaffel og made sig selv
Jochumsen, M.
29/03/2017
3 items of Media coverage

To projekter vil forske i ny teknologi til genoptræning
Jochumsen, M.
03/07/2018
1 item of Media coverage

To projekter vil forske i ny teknologi til genoptræning
Jochumsen, M.
03/07/2018
1 item of Media coverage

Vidste du det?
Jochumsen, M.
30/12/2015
1 item of Media coverage

Projects

Brain-controlled exoskeletons for stroke rehabilitation: Technology transfer from prototype to home use
Jochumsen, M. R. (PI), Dinesen, B. (Project Participant), Hougaard, B. I. (Project Participant), Kjær, T. W. (Project Participant), Knoche, H. (Project Participant), Kidmose, P. (Project Participant) & Kristensen, M. S. (Project Participant)
Velux Foundation
01/09/2018 → 31/03/2022

Center for Rehabilitation Robotics
Struijk, L. N. S. A. (PI), Dremstrup, K. (Project Participant), Jochumsen, M. R. (Project Participant), Moeslund, T. B. (Project Participant), Rasmussen, J. (Project Participant), Gaihede, M. (Project Participant), Obál, I. (Project Participant),

Bai, S. (Project Participant), Bak, T. (Project Participant), Kanstrup, A. M. (Project Participant), Vinge, L. (Project Participant), Mohammadi, M. (Project Participant), Bengtson, S. H. (Project Participant), Kobbelgaard, F. V. (Project Participant), Kæseler, R. L. (Project Participant), Thøgersen, M. (Project Participant), Leerskov, K. (Project Participant), Bentsen, B. (Project Participant), Johansen, D. (Project Participant), Pálsdóttir, Á. A. (Project Participant) & Kirtas, O. (Project Participant)
24/03/2021 → …

Gamified brain-controlled electrical stimulation for improving hand function in individuals with Cerebral Palsy
Jochumsen, M. R. (PI), Knoche, H. (Project Participant), Hougaard, B. I. (Project Participant), Dalgaard, K. S. (Project Participant) & Sulkjær, C. (Project Participant)
The Elsass Foundation
01/04/2023 → 31/03/2025

CRERoB: Grant form Louis-Hansen fonden: Center for Rehabilitation Robotics - phase II
Struijk, L. N. S. A. (PI), Moeslund, T. B. (Project Participant), Rasmussen, J. (Project Participant), Jochumsen, M. R. (Project Participant), Jochum, E. (Project Participant), Glintborg, C. (Project Participant), Gaihede, M. (Project Participant), Blicher, J. U. (Project Participant), Obál, I. (Project Participant), Mohammadi, M. (Project Participant), Kæseler, R. L. (Project Participant), Bengtson, S. H. (Project Participant), Cardoso, A. S. S. (Project Participant), Khan, J. S. (Project Participant), Leerskov, K. (Project Participant), Kirtas, O. (Project Participant) & Bentsen, B. (Project Participant)
01/08/2024 → 01/10/2027

MultiRob: Independent Research Fund Denmark (grant): Multimodal control of assistive robotic arms for severely disabled individuals
Struijk, L. N. S. A. (Project Licensee), Johansen, D. (Project Participant), Pálsdóttir, Á. A. (Project Participant), Kæseler, R. L. (Project Participant), Jochumsen, M. R. (Project Participant), Dremstrup, K. (Project Participant), Dosen, S. (Project Participant), Cipriani, C. (Project Participant) & Farina, D. (Project Participant)
Independent Research Fund Denmark | Technology and Production sciences
01/10/2018 → 31/12/2022

Intelligent Hybrid Light Weight Tendon Based Exoskeleton for Severely Disabled Individuals
Struijk, L. N. S. A. (PI), Dremstrup, K. (Project Participant), Mohammadi, M. (Project Participant), Jochumsen, M. R. (Project Participant), Moeslund, T. B. (Project Participant), Rasmussen, J. (Project Participant), Gaihede, M. (Project Participant), Kanstrup, A. M. (Project Participant), Bak, T. (Project Participant), Bai, S. (Project Participant), Obál, I. (Project Participant) & Vinge, L. (Project Participant)
24/03/2021 → …