

2025 13th International Conference on Brain-Computer Interface (BCI 2025)

**Gangwon, South Korea
24-26 February 2025**



**IEEE Catalog Number: CFP25BCI-POD
ISBN: 979-8-3315-2193-6**

**Copyright © 2025 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP25BCI-POD
ISBN (Print-On-Demand):	979-8-3315-2193-6
ISBN (Online):	979-8-3315-2192-9
ISSN:	2572-7680

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

Deep Learning Meets Source Reconstruction	1
<i>K.-R Müller, M. Morik</i>	
Visual Decoding Using a Learnable Wavelet-Based Spatial-Spectral-Temporal EEG Embedding.....	6
<i>Yebin Choi, Jun-Mo Kim, Woohyeok Choi, Chang-Hoon Ji, Ji-Hye Oh, Tae-Eui Kam</i>	
Identifying Neural Biomarkers of Confirmation Bias	11
<i>Avinash Singh, Jia Liu, Alexey Voinov, Chin-Teng Lin</i>	
Towards a Lightweight Deep Learning Framework for Real-Time Vital Sign Prediction with RGB Cameras	17
<i>Seong-Wook Kim, Hyeong-Yeong Park, In-Gyu Lee, Se-Na Jang, Seong-Hyun Yu, Jun-Young Oh, Gee-Myung Moon, Ji-Hoon Jeong</i>	
Improving Performance in fNIRS Single Trial Analysis: Multidisciplinary Opportunities and Perspective.....	22
<i>Alexander Von Lühmann, Eike Middell, Thomas Fischer, Christian Tesch, Bilal Siddique, Bernhard B. Zimmermann, Shakiba Moradi, David A. Boas, Klaus-Robert Müller</i>	
FNIRS Foundation Model for Few-Shot Based fNIRS Classification	25
<i>Euijin Jung, Hyunmin Lee, Jinung An</i>	
Curriculum Learning with Sampling Scheduler for Imbalanced EEG-Based Seizure Detection	29
<i>Woohyeok Choi, Jun-Mo Kim, Hyeonyeong Nam, Tae-Eui Kam</i>	
Evaluation of Efficient and Performance-Retaining cVEP-BCI Class Augmentation.....	34
<i>Milan Andras Fodor, Atilla Canturk, Thi-Phuong-Ngan Le, Gernot Heisenberg, Ivan Volosyak</i>	
Decoding EEG-Based Motor Imagery of Hand Grasp Types for an Amputee Due to Birth Trauma	40
<i>Seong-Ho Ahn, Zion Kim, Jun Ha Jung, Hyeon-Jun Lee, Heejin Kim, Jungu Cho, Jaeseung Jeong</i>	
Compact Myocardial Infarction Classification for 3-Lead ECG-Based Temporal Convolution with Encoder-Decoder Network	45
<i>Ray Kim, Insung Choi, Gyung Chul Kim, Hee Seok Song, Minji Lee, Yun Kwan Kim</i>	
Towards a Neural ODE Generative Model of Cortical Dynamics.....	51
<i>Pk Douglas</i>	
Personalized Continual EEG Decoding: Retaining and Transferring Knowledge.....	54
<i>Dan Li, Hye-Bin Shin, Kang Yin</i>	
BDANet: A Binary-Dimensional Aware Network with Multi-Wise Attention for Cognitive Workload Recognition.....	58
<i>Yang Shao, Yueying Zhou, Daoqiang Zhang</i>	
Low-Power Feature Extraction for BCI Applications Using Approximate Continuous Wavelet Transform	66
<i>Joe Saad, Adrian Evans, Ivan Miro-Panades, Tetiana Aksenova, Lorena Anghel</i>	
Dynamic Neural Communication: Convergence of Computer Vision and Brain-Computer Interface.....	73
<i>Ji-Ha Park, Seo-Hyun Lee, Soowon Kim, Seong-Whan Lee</i>	

Automated Feature Engineering for Single-Trial EEG and Eye-Tracking Classification in Predictive Text Interfaces	77
<i>Ard Kastrati, R. Michael Winters, Nemanja Djuric, Ivan J. Tashev, Yu-Te Wang</i>	
Activity Prediction for Localizing the Events in Imagined Speech EEG Signals	84
<i>Arun Balasubramanian, Kartik Pandey, Gautam Veer, Debasis Samanta</i>	
EEG-Based Speech Decoding: A Novel Approach Using Multi-Kernel Ensemble Diffusion Models.....	89
<i>Soowon Kim, Eunyeong Ko, Ha-Na Jo</i>	
Optimized Time Window Segmentation for Motor Imagery EEG Classification: An Ant Colony Optimization-Based Approach	93
<i>Rosi Indah Agustin, Pisut Raphisak</i>	
Towards Feasible Deep Learning Approach Using EEG for Neurodegenerative Diseases	98
<i>Dogeun Park, Ho-Jung Kim, Young-Gi Ju, Keun-Tae Kim, Dong-Ok Wont</i>	
100 Years of EEG: Unleashing the Brain's Secrets and Motor of Brain-Computer Interface (BCI) Research	103
<i>Andrea Kübler</i>	
From Post-Median Nerve Stimulation ERD to MI-BCI Expertise Prediction.....	108
<i>Valérie Marissens Cueva, Fabien Lotte, Laurent Bougrain, Sébastien Rimbart</i>	
Feasibility of Secure Transaction Authentication Using a cVEP-Based BCI.....	114
<i>Thi Phuong Ngan Le, Milán András Fodor, Atilla Cantürk, Ivan Volosyak</i>	
Brain Signal-Based Motion Sickness Classification in Automobile Passengers	120
<i>Tae Hun Kim, Hyun Min Lee, Jinung An</i>	
Multimodal Classification of Motion Sickness Using EEG, fNIRS, and IMU Signals.....	124
<i>Hyunmin Lee, Taehun Kim, Jinung An</i>	
EEG-Based Multimodal Representation Learning for Emotion Recognition.....	129
<i>Kang Yin, Hye-Bin Shin, Dan Li, Seong-Whan Lee</i>	
Decoding Fatigue Levels of Pilots Using EEG Signals with Hybrid Deep Neural Networks	133
<i>Dae-Hyeok Lee, Sung-Jin Kim, Si-Hyun Kim</i>	
A Transfer-Learning Approach for Cross-Subjects EEG Data Classification.....	137
<i>Sébastien Angelliaume, Claire Deshayes, Bruno Berberian, Stefania C. Ficarella</i>	
Dataset Refinement for Improving the Generalization Ability of the EEG Decoding Model	141
<i>Sung-Jin Kim, Dae-Hyeok Lee, Hyeon-Taek Han</i>	
Feature Selection Via Dynamic Graph-Based Attention Block in MI-Based EEG Signals	145
<i>Hyeon-Taek Han, Dae-Hyeok Lee, Heon-Gyu Kwak</i>	
Phoneme Classification in Imagined Speech Using Explainable Machine Learning	149
<i>Sejin Kim, Hyunwook Kang, Ji-Hoon Jeong, Minji Lee</i>	
Integrated Word2Vec-Based Speech Annotations for Enhanced EEG Decoding of Speech Intentions	154
<i>Se-Na Jang, Hyeong-Yeong Park, Seong-Wook Kim, Seong-Hyun Yu, Minji Lee, Ji-Hoon Jeong</i>	

Detection of Positive and Negative Video Game Events from Brain Activity Using a Potable EEG-Headset and Source Localization	160
<i>Laura Alejandra Martinez-Tejada, Natsue Yoshimura</i>	
Energy-Guided Topology Mamba for EEG-Based BCI	164
<i>Seungwoo Jeong, Jaehyun Jeon, Heung-Il Suk</i>	
HiRENNet: Novel Convolutional Neural Network Architecture Using Hilbert-Transformed and Raw Electroencephalogram for Subject-Independent Emotion Classification	168
<i>Minsu Kim, Chang-Hwan Im</i>	
Towards a Network Expansion Approach for Reliable Brain-Computer Interface	170
<i>Byeong-Hoo Lee, Kang Yin</i>	
Towards Scalable Handwriting Communication Via EEG Decoding and Latent Embedding Integration	174
<i>Jun-Young Kim, Deok-Seon Kim, Seo-Hyun Lee</i>	
Neurophysiological Analysis in Motor and Sensory Cortices for Improving Motor Imagination.....	178
<i>Si-Hyun Kim, Sung-Jin Kim, Dae-Hyeok Lee</i>	
Development of EEG-Based Optimal Biomarkers for Decoding Fatigue During Motor Imagery Tasks.....	182
<i>Jun-Seok Lee, Seung-Won Lee, Sang-Rok Kim, Han-Jeong Hwang</i>	
Imagined Speech State Classification for Robust Brain-Computer Interface.....	186
<i>Byung-Kwan Ko, Jun-Young Kim, Seo-Hyun Lee</i>	
Towards Personalized Brain-Computer Interface Application Based on Endogenous EEG Paradigms	190
<i>Heon-Gyu Kwak, Gi-Hwan Shin, Yeon-Woo Choi, Dong-Hoon Lee, Yoo-In Jeon, Jun-Su Kang, Seong-Whan Lee</i>	
Imagined Speech and Visual Imagery as Intuitive Paradigms for Brain-Computer Interfaces.....	194
<i>Seo-Hyun Lee, Ji-Ha Park, Deok-Seon Kim</i>	
AI in EEG-Based BCI for the Diagnosis of Mild Cognitive Impairment: A Mini Review	198
<i>Vasilii Zaitsev, Chun-Shu Wei</i>	
EEG Spectral Analysis in Gray Zone Between Healthy and Insomnia	204
<i>Ha-Na Jo, Young-Seok Kweon, Seo-Hyun Lee</i>	
Detection of Alzheimer's Disease and Frontotemporal Dementia: An Explainable Machine Learning Approach Using EEG Signals	208
<i>Hwa-Yeon Lee, Min-Kyung Jung, Choel-Hui Lee, Hakseung Kim, Dong-Joo Kim</i>	
Is Gamification of Neurofeedback Training Effective for ADHD Treatment? a Systematic Review.....	213
<i>Henriette Kohnen, Paris Mavromoustakos-Blom, Maryam Alimardani</i>	
Towards Unified Neural Decoding of Perceived, Spoken and Imagined Speech from EEG Signals.....	222
<i>Jung-Sun Lee, Ha-Na Jo, Seo-Hyun Lee</i>	
Designing an Architecture for a Brain-Computer Interface Operating System: Addressing Neural Input Complexity.....	226
<i>Yunseok Choi</i>	

A Novel Channel Selection Method for Near-Infrared Spectroscopy-based Brain-Computer Interfaces	232
<i>Hyung-Tak Lee, Han-Jeong Hwang</i>	
Classification of Awareness in Disorders of Consciousness Using Common Spatial Pattern	236
<i>Chaewon Lee, Sunho Lee, Jitka Annen, Ji-Hoon Jeong, Marcello Massimini, Silvia Casarotto, Melanie Boly, Olivier Bodart, Aurore Thibaut, Mario Rosanova, Steven Laureys, Olivia Gosseries, Minji Lee</i>	

Author Index