## Contents – Part I

### Electroencephalography and Brain Activity Measurement

**My Brain Is Out of the Loop: A Neuroergonomic Approach of OOTL Phenomenon** ............................................. 3

*Bruno Berberian, Jonas Gouraud, Bertille Somon, Aisha Sahai, and Kevin Le Goff*

**Testing the Specificity of EEG Neurofeedback Training on First- and Second-Order Measures of Attention** ................. 19

*Eddy J. Davelaar*

**Neural Dynamics of Spontaneous Thought: An Electroencephalographic Study** .................................................. 28

*Manesh Girn, Caitlin Mills, Eric Laycock, Melissa Ellamil, Lawrence Ward, and Kalina Christoff*

**Deep Transfer Learning for Cross-subject and Cross-experiment Prediction of Image Rapid Serial Visual Presentation Events from EEG Data** ................................. 45

*Mehdi Hajinoroozi, Zijing Mao, Yuan-Pin Lin, and Yufei Huang*

**Using Portable EEG to Assess Human Visual Attention** ................................................................. 56

*Olave E. Krigolson, Chad C. Williams, and Francisco L. Colino*

**Investigating Brain Dynamics in Industrial Environment – Integrating Mobile EEG and Kinect for Cognitive State Detection of a Worker** ........................................ 66

*Pavle Mijović, Miloš Milovanović, Ivan Gligorijević, Vanja Ković, Ivana Zivanović-Mačužić, and Bogdan Mijović*

**Characteristic Alpha Reflects Predictive Anticipatory Activity (PAA) in an Auditory-Visual Task** ..................................................... 79

*Julia A. Mossbridge*

**Influence of Spontaneous Rhythm on Movement-Related Cortical Potential - A Preliminary Neurofeedback Study** .................. 90

*Lin Yao, Mei Lin Chen, Xinjun Sheng, Natalie Mrachacz-Kersting, Xiangyang Zhu, Dario Farina, and Ning Jiang*

**Multiple Human EEG Synchronous Analysis in Group Interaction-Prediction Model for Group Involvement and Individual Leadership** ........................................ 99

*Jiacai Zhang and Zixiong Zhou*
Interactive Image Segmentation Method of Eye Movement Data and EEG Data .......................... 109
  Jiacai Zhang, Song Liu, and Jialiang Li

Eye Tracking in Augmented Cognition

Geometry and Gesture-Based Features from Saccadic Eye-Movement as a Biometric in Radiology .......................... 123
  Folami T. Alamudun, Tracy Hammond, Hong-Jun Yoon, and Georgia D. Tourassi

Assessing Workload with Low Cost Eye Tracking During a Supervisory Control Task .......................... 139
  Joseph T. Coyne, Ciara Sibley, Sarah Sherwood, Cyrus K. Foroughi, Tatana Olson, and Eric Vorm

The Analysis and Prediction of Eye Gaze When Viewing Statistical Graphs .......................... 148
  Andre Harrison, Mark A. Livingston, Derek Brock, Jonathan Decker, Dennis Perzanowski, Christopher Van Dolson, Joseph Mathews, Alexander Lulushi, and Adrienne Raglin

Performance Evaluation of the Gazepoint GP3 Eye Tracking Device Based on Pupil Dilation .......................... 166
  Pujitha Mannaru, Balakumar Balasingam, Krishna Pattipati, Ciara Sibley, and Joseph T. Coyne

Patterns of Attention: How Data Visualizations Are Read .......................... 176
  Laura E. Matzen, Michael J. Haass, Kristin M. Divis, and Mallory C. Stites

Eye Tracking for Dynamic, User-Driven Workflows .......................... 192
  Laura A. McNamara, Kristin M. Divis, J. Daniel Morrow, and David Perkins

Investigating Eye Movements in Natural Language and C++ Source Code - A Replication Experiment .......................... 206
  Patrick Peachock, Nicholas Iovino, and Bonita Sharif

Adapting Human-Computer-Interaction of Attentive Smart Glasses to the Trade-Off Conflict in Purchase Decisions: An Experiment in a Virtual Supermarket .......................... 219
  Jella Pfeiffer, Thies Pfeiffer, Anke Greif-Winzrieth, Martin Meißner, Patrick Renner, and Christof Weinhardt
Practical Considerations for Low-Cost Eye Tracking: An Analysis of Data Loss and Presentation of a Solution

Ciara Sibley, Cyrus K. Foroughi, Tatana Olson, Cory Moclaire, and Joseph T. Coyne

A Comparison of an Attention Acknowledgement Measure and Eye Tracking: Application of the as Low as Reasonable Assessment (ALARA) Discount Usability Principle for Control System Studies

Thomas A. Ulrich, Ronald L. Boring, Steffen Werner, and Roger Lew

Physiological Measuring and Bio-sensing

Rim-to-Rim Wearables at the Canyon for Health (R2R WATCH):

Experimental Design and Methodology

Glory Emmanuel Aviña, Robert Abbott, Cliff Anderson-Bergman, Catherine Branda, Kristin M. Divis, Lucie Jelinkova, Victoria Newton, Emily Pearce, and Jon Femling

Investigation of Breath Counting, Abdominal Breathing and Physiological Responses in Relation to Cognitive Load

Hubert K. Brumback

Investigating the Role of Biofeedback and Haptic Stimulation in Mobile Paced Breathing Tools

Antoinette Bumatay and Jinsil Hwaryoung Seo

Pupil Dilation and Task Adaptation

Cyrus K. Foroughi, Joseph T. Coyne, Ciara Sibley, Tatana Olson, Cory Moclaire, and Noelle Brown

Rim-to-Rim Wearables at the Canyon for Health (R2R WATCH):

Correlation of Clinical Markers of Stress with Physiological COTS Data

Lucie Jelinkova, Emily Pearce, Christopher Bossart, Risa Garcia, and Jon Femling

Grounded Approach for Understanding Changes in Human Emotional States in Real Time Using Psychophysiological Sensory Apparatuses

Ryan A. Kirk

Augmented Cognition for Continuous Authentication

Nancy Mogire, Michael-Brian Ogawa, Brent Auernheimer, and Martha E. Crosby

Analysis of Social Interaction Narratives in Unaffected Siblings of Children with ASD Through Latent Dirichlet Allocation

Victoria Newton, Isabel Solis, Glory Emmanuel Aviña, Jonathan T. McClain, Cynthia King, and Kristina T. Rewin Ciesielski
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart Watch Potential to Support Augmented Cognition for Health-Related Decision Making</td>
<td>372</td>
</tr>
<tr>
<td><em>Blaine Reeder, Paul F. Cook, Paula M. Meek, and Mustafa Ozkaynak</em></td>
<td></td>
</tr>
<tr>
<td>Multidimensional Real-Time Assessment of User State and Performance to Trigger Dynamic System Adaptation</td>
<td>383</td>
</tr>
<tr>
<td><em>Jessica Schwarz and Sven Fuchs</em></td>
<td></td>
</tr>
<tr>
<td>An Affordable Bio-Sensing and Activity Tagging Platform for HCI Research</td>
<td>399</td>
</tr>
<tr>
<td><em>Siddharth, Aashish Patel, Tzyy-Ping Jung, and Terrence J. Sejnowski</em></td>
<td></td>
</tr>
<tr>
<td>Machine Learning in Augmented Cognition</td>
<td></td>
</tr>
<tr>
<td>Facial Expression Recognition from Still Images</td>
<td>413</td>
</tr>
<tr>
<td><em>Bilge Süheyla Akkoca Gazoğlu and Muhittin Gökmen</em></td>
<td></td>
</tr>
<tr>
<td>CHISSL: A Human-Machine Collaboration Space for Unsupervised Learning</td>
<td>429</td>
</tr>
<tr>
<td><em>Dustin Arendt, Caner Komurlu, and Leslie M. Blaha</em></td>
<td></td>
</tr>
<tr>
<td>Toward an Open Data Repository and Meta-Analysis of Cognitive Data Using fNIRS Studies of Emotion</td>
<td>449</td>
</tr>
<tr>
<td><em>Sarah Bratt</em></td>
<td></td>
</tr>
<tr>
<td>Establishing Ground Truth on Psychophysiological Models for Training Machine Learning Algorithms: Options for Ground Truth Proxies</td>
<td>468</td>
</tr>
<tr>
<td><em>Keith Brawner and Michael W. Boyce</em></td>
<td></td>
</tr>
<tr>
<td>The Impact of Streaming Data on Sensemaking with Mixed-Initiative Visual Analytics</td>
<td>478</td>
</tr>
<tr>
<td><em>Nick Cramer, Grant Nakamura, and Alex Endert</em></td>
<td></td>
</tr>
<tr>
<td>Some Syntax-Only Text Feature Extraction and Analysis Methods for Social Media Data</td>
<td>499</td>
</tr>
<tr>
<td><em>Monte Hancock, Charles Li, Shakeel Rajwani, Payton Brown, Olivia Hancock, Corinne Lee, Yaniv Savir, Nicolas Nuon, and Francesca Michaels</em></td>
<td></td>
</tr>
<tr>
<td>Using the Hash Tag Histogram and Social Kinematics for Semantic Clustering in Social Media</td>
<td>510</td>
</tr>
<tr>
<td><em>Monte Hancock, Chloe Lo, Shakeel Rajwani, Shai Neumann, Dale Franklin, Esnet Gros Negre, Tracy Hollis, Steven Knight, Vikram Tutupalli, Vineet Chintamaneni, Sheila Daniels, Brian Gabak, Venkata Undavalli, Payton Brown, and Olivia Hancock</em></td>
<td></td>
</tr>
<tr>
<td>Interface Metaphors for Interactive Machine Learning</td>
<td>521</td>
</tr>
<tr>
<td><em>Robert J. Jasper and Leslie M. Blaha</em></td>
<td></td>
</tr>
</tbody>
</table>
Classifying Tweets Using User Account Information ........................................ 535
John Khoury, Charles Li, Chloe Lo, Corinne Lee, Shakeel Rajwani,
David Woolfolk, Alexis-Walid Ahmed, Loredana Crusov,
Arnold Pérez-Goicochea, Christopher Romero, Rob French,
and Vasco Ribeiro

Machine Learning-Based Prediction of Changes in Behavioral Outcomes
Using Functional Connectivity and Clinical Measures in Brain-Computer
Interface Stroke Rehabilitation ................................................................. 543
Rosaleena Mohanty, Anita Sinha, Alexander Remsik, Janerra Allen,
Veena Nair, Kristin Caldera, Justin Sattin, Dorothy Edwards,
Justin C. Williams, and Vivek Prabhakaran

Content Feature Extraction in the Context of Social Media Behavior .............. 558
Shai Neumann, Charles Li, Chloe Lo, Corinne Lee, Shakeel Rajwani,
Suraj Sood, Buttons A. Foster, Toni Hadgis, Yaniv Savir,
Frankie Michaels, Alexis-Walid Ahmed, Nikki Bernobic,
and Markus Hollander

Detecting Mislabeled Data Using Supervised Machine
Learning Techniques .......................................................... 571
Mannes Poel

Author Index ................................................................. 583
## Contents – Part II

### Cognitive Load and Performance

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparing Capacity Coefficient and Dual Task Assessment of Visual Multitasking Workload</td>
<td>3</td>
</tr>
<tr>
<td><em>Leslie M. Blaha</em></td>
<td></td>
</tr>
<tr>
<td>Moving Vigilance Out of the Laboratory: Dynamic Scenarios for UAS Operator Vigilance Training</td>
<td>20</td>
</tr>
<tr>
<td><em>Tarah Daly, Jennifer Murphy, Katlin Anglin, James Szalma,</em></td>
<td></td>
</tr>
<tr>
<td><em>Max Acree, Carla Landsberg, and Laticia Bowens</em></td>
<td></td>
</tr>
<tr>
<td>Cognitive Augmentation Metrics Using Representational Information Theory</td>
<td>36</td>
</tr>
<tr>
<td><em>Ron Fulbright</em></td>
<td></td>
</tr>
<tr>
<td>Neurophysiological Impact of Software Design Processes on Software Developers</td>
<td>56</td>
</tr>
<tr>
<td><em>Randall K. Minas, Rick Kazman, and Ewan Tempero</em></td>
<td></td>
</tr>
<tr>
<td>Text Simplification and Pupilometry: An Exploratory Study</td>
<td>65</td>
</tr>
<tr>
<td><em>Mina Shojaeizadeh, Soussan Djamasbi, Ping Chen, and John Rochford</em></td>
<td></td>
</tr>
<tr>
<td>Attentional Trade-Offs Under Resource Scarcity</td>
<td>78</td>
</tr>
<tr>
<td><em>Jiaying Zhao and Brandon M. Tomm</em></td>
<td></td>
</tr>
</tbody>
</table>

### Adaptive Learning Systems

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Towards a Dynamic Selection and Configuration of Adaptation Strategies in Augmented Cognition</td>
<td>101</td>
</tr>
<tr>
<td><em>Sven Fuchs and Jessica Schwarz</em></td>
<td></td>
</tr>
<tr>
<td>Adaptive Training Across Simulations in Support of a Crawl-Walk-Run Model of Interaction</td>
<td>116</td>
</tr>
<tr>
<td><em>Benjamin Goldberg, Fleet Davis, Jennifer M. Riley,</em></td>
<td></td>
</tr>
<tr>
<td><em>and Michael W. Boyce</em></td>
<td></td>
</tr>
<tr>
<td>Modeling Training Efficiency in GIFT</td>
<td>131</td>
</tr>
<tr>
<td><em>Gregory A. Goodwin, James Niehaus, and Jong W. Kim</em></td>
<td></td>
</tr>
</tbody>
</table>
Personalizing Training to Acquire and Sustain Competence Through Use of a Cognitive Model

Tiffany S. Jastrzembski, Matthew Walsh, Michael Krusmark, Suzan Kardong-Edgren, Marilyn Oermann, Karey Dufour, Teresa Millwater, Kevin A. Gluck, Glenn Gunzelmann, Jack Harris, and Dimitrios Stefanidis

A Cognitive Modeling Approach - Does Tactical Breathing in a Psychomotor Task Influence Skill Development during Adaptive Instruction?

Jong W. Kim, Christopher Dancy, Benjamin Goldberg, and Robert Sottilare

Assessing Motivation to Individualize Reinforcement and Reinforcers for an Intelligent Tutor

Elizabeth Lameier, Lauren Reinerman-Jones, Michael W. Boyce, and Elizabeth Biddle

Flow Experience in AR Application: Perceived Reality and Perceived Naturalness

Hansol Lee and Sangmi Chai

Using Mobile Technology to Generate Learning Content for an Intelligent Tutoring System

Rodney A. Long, Jennifer M. Riley, and Christina K. Padron

A Conceptual Assessment Model (CAM) for Operationalizing Constructs in Technology-Augmented Assessments

Mark E. Riecken, Clayton W. Burford, Grace Teo, Joseph McDonnell, Lauren Reinerman-Jones, and Kara Orvis

Recommendations for Use of Adaptive Tutoring Systems in the Classroom and in Educational Research

Anne M. Sinatra, Scott Ososky, Robert Sottilare, and Jason Moss

Defining Complexity in the Authoring Process for Adaptive Instruction

Robert Sottilare and Scott Ososky

Brain-Computer Interfaces

Validation of a Brain-Computer Interface (BCI) System Designed for Patients with Disorders of Consciousness (DOC): Regular and Sham Testing with Healthy Participants

Brendan Z. Allison, Woosang Cho, Rupert Ortner, Alexander Heilinger, Guenter Edlinger, and Christoph Guger
Wheels Within Wheels: Brain-Computer Interfaces as Tools for Artistic Practice as Research ................................................................. 266

Andrés Aparicio and Rodrigo F. Cádiz

Using Brain Painting at Home for 5 Years: Stability of the P300 During Prolonged BCI Usage by Two End-Users with ALS ......................... 282

Loïc Botrel, Elisa Mira Holz, and Andrea Kübler

Music Imagery for Brain-Computer Interface Control ...................... 293

Mei Lin Chen, Lin Yao, and Ning Jiang

An Experimental Study on Usability of Brain-Computer Interaction Technology in Human Spaceflight ................................................. 301

Shanguang Chen, Jin Jiang, Jiabei Tang, Xuejun Jiao, Hongzhi Qi, Yong Cao, Chunhui Wang, and Dong Ming

A Brain-Computer Interface Based on Abstract Visual and Auditory Imagery: Evidence for an Effect of Artistic Training ................... 313

Kiret Dhindsa, Dean Carcone, and Suzanna Becker

Brain-Computer Interfaces (BCI) Based 3D Computer-Aided Design (CAD): To Improve the Efficiency of 3D Modeling for New Users ...... 333

Yu-Chun Huang and Kuan-Lin Chen

NeuroSnap: Expressing the User’s Affective State with Facial Filters .... 345

Ryan Lieblein, Camille Hunter, Sarah Garcia, Marvin Andujar, Chris S. Crawford, and Juan E. Gilbert

Tactile Stimulation Training to Enhance MRCP Detection in Chronic Stroke Patients ................................................................. 354

Natalie Mrachacz-Kersting, Susan Aliakbaryhosseinabadi, Martin Pedersen, Ning Jiang, and Dario Farina

Digital Interface Brain Computer Interaction Method Based on Icon Control ...................................................................................... 364

Yafeng Niu, Chengqi Xue, Haiyan Wang, Wenzhe Tang, Xinyu Zhang, Tao Jin, and Yingjie Victor Chen

Differences in Motor Imagery Activity Between the Paretic and Non-paretic Hands in Stroke Patients Using an EEG BCI ....................... 378

Zhaoyang Qiu, Shugeng Chen, Brendan Z. Allison, Jie Jia, Xingyu Wang, and Jing Jin

Multimodal Neural Interfaces for Augmenting Human Cognition ...... 389

William J. Tyler
Human Cognition and Behavior in Complex Tasks and Environments

Using Assessment to Provide Application in Human Factors Engineering to USMA Cadets ................................................................. 411
  Michael W. Boyce, Charles P. Rowan, Devonte L. Baity, and Michael K. Yoshino

Towards Technologically Assisted Mindfulness Meditation Practice in Older Adults: An Analysis of Difficulties Faced and Design Suggestions for Neurofeedback ................................................................. 423
  Simon Cook, Ronald M. Baecker, Cosmin Munteanu, and Andrew Walker

Dynamic Task Sharing Within Human-UxS Teams: Computational Situation Awareness ................................................................. 443
  Scott Grigsby, Jacob Crossman, Ben Purman, Rich Frederiksen, and Dylan Schmorrow

Developing a High-Speed Craft Route Monitor Window ................................................................. 461
  Odd Sveinung Hareide, Frode Voll Mjelde, Oeystein Glomsvoll, and Runar Ostnes

A Review of Personnel Selection Approaches for the Skill of Decision Making ................................................................. 474
  Irwin Hudson, Lauren Reinerman-Jones, and Grace Teo

Macrocognition Applied to the Hybrid Space: Team Environment, Functions and Processes in Cyber Operations ................................................................. 486
  Øyvind Jøsok, Benjamin J. Knox, Kirsi Helkala, Kyle Wilson, Stefan Sütterlin, Ricardo G. Lugo, and Terje Ødegaard

Nuclear Reactor Crew Evaluation of a Computerized Operator Support System HMI for Chemical and Volume Control System ................................................................. 501
  Roger Lew, Thomas A. Ulrich, and Ronald L. Boring

Understanding the Success of Pokémon Go: Impact of Immersion on Players’ Continuance Intention ................................................................. 514
  Lili Liu, Christian Wagner, and Ayoung Suh

Extempore Emergency Response Technique with Virtual Reality Gaming ................................................................. 524
  Trinh Nguyen and Godwin Nyong

Author Index ......................................................................................... 537
Augmented Cognition. Neurocognition and Machine Learning
11th International Conference, AC 2017, Held as Part of
HCI International 2017, Vancouver, BC, Canada, July
9-14, 2017, Proceedings, Part I
Schmorrow, D.D.; Fidopiastis, C.M. (Eds.)
2017, XXIV, 586 p. 189 illus., Softcover
ISBN: 978-3-319-58627-4