

Jacek P. Dmochowski

Post-Doctoral Research Scholar
Department of Biomedical Engineering
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Education

Ph.D., Telecommunications, 2008

Université du Québec, INRS-EMT, Montréal, Québec
Thesis title: "Array Signal Processing from a Broadband Perspective"
Supervisor and co-supervisor: Jacob Benesty and Sofiène Affes
Awarded Governor General's Academic Gold Medal

M.A.Sc., Electrical Engineering, 2005

Carleton University, Ottawa, Ontario
Thesis title: "Combined Beamforming and Noise Cancellation"
Supervisor: Rafik Goubran

B.Eng. with High Distinction, Communications Engineering, 2003

Carleton University, Ottawa, Ontario

Research Experience

Post-Doctoral Research Scholar, Biomedical Engineering
The City College of the City University of New York, 2008–present

Teaching Experience

Adjunct Instructor, Biomedical Engineering
The City College of the City University of New York, 2010 – present
Courses taught:

- "Medical Imaging and Image Processing"
- "Image and Signal Processing in Biomedicine"

Teaching Assistant, Systems and Computer Engineering
Carleton University, 2004 –2005

Courses assisted:
"Microprocessor Systems"

“Programming Languages”

Research Support under Review

“Narrative Networks”

Role: principal investigator.

Agency/Mechanism: Defense Advanced Research Project Agency (DARPA) / Broad Agency Announcement 12-03.

“Targeted Transcranial Electrical Stimulation”

Role: principal investigator.

Agency/Mechanism: Department of Defense (DoD)/ Psychological Health and Traumatic Brain Injury Research Program.

“A Toolbox for Customized and Individualized Transcranial Direct Current Stimulation”

Role: co-investigator:

Agency/Mechanism: National Institute of Health (NIH) / R01.

Journal Publications

J. P. Dmochowski, P. Sajda, J. Dias, and L. C. Parra, “Brains synchronize when viewers are engaged,” submitted to *Proceedings of the National Academy of Sciences*, 2011.

J. P. Dmochowski, M. Bikson, and L. C. Parra, “A theory for achieving focality in transcranial electrical stimulation based on the spherical harmonic decomposition of the applied current,” submitted to *Brain Stimulation*, 2011.

J. P. Dmochowski, A. Datta, M. Bikson, Y. Su, and L. C. Parra, “Optimized multi-electrode stimulation increases focality and intensity at target,” *Journal of Neural Engineering*, 8(4): 046011, 2011.

J. P. Dmochowski, P. Sajda, and L. C. Parra, “Maximum likelihood in cost-sensitive learning: model specification, approximations, and upper bounds,” *Journal of Machine Learning Research*, 11: 3313-3332, 2010.

P. Sajda, E. Pohlmeier, J. Wang, L. C. Parra, C. Christoforou, **J. Dmochowski**, B. Hanna, C. Bahlmann, M. K. Singh, and S. F. Chang, “In a blink of an eye and a switch of a transistor: cortically coupled computer vision,” *Proc. IEEE*, 98:462–478, 2010.

E. A. P. Habets, J. Benesty, I. Cohen, S. Gannot, and **J. Dmochowski**, “New insights into the MVDR beamformer in room acoustics,” *IEEE Transactions on Audio, Speech, and Language Processing*, 18:157–180, 2010.

J. Dmochowski, J. Benesty, and S. Affes, “On spatial aliasing in microphone arrays”, *IEEE Transactions on Signal Processing*, 57:1383–1395, 2009.

J. Dmochowski, J. Benesty, and S. Affes, “An information-theoretic view of array processing”, *IEEE Transactions on Audio, Speech, and Language Processing*, 17:392–401, 2009.

J. Dmochowski, J. Benesty, and S. Affes, “Linearly constrained minimum variance source localization and spectral estimation”, *IEEE Transactions on Audio, Speech and Language Processing*, 16:1490–1502, 2008.

J. Dmochowski, J. Benesty, and S. Affes, “A generalized steered response power method for computationally viable source localization”, *IEEE Transactions on Audio, Speech and Language Processing*, 15:2510–2526, 2007.

J. Dmochowski, J. Benesty, and S. Affes, “Direction of arrival estimation using the parameterized spatial correlation matrix”, *IEEE Transactions on Audio, Speech and Language Processing*, 15: 1327–1339, 2007.

J. Benesty, J. Chen, Y. Huang, and **J. Dmochowski**, “On microphone-array beamforming from a MIMO acoustic signal processing perspective”, *IEEE Transactions on Speech and Audio Processing*, 15:1053–1065, 2007.

J. Dmochowski and R.A. Goubran, “Decoupled beamforming and noise cancellation: an alternative to classical adaptive beamforming”, *IEEE Transactions on Instrumentation and Measurement*, 56:80–88, 2007.

Peer-Reviewed Conference Publications

J. P. Dmochowski, P. Sajda, and L. C. Parra, “Examining Loss Functions in Cost-Sensitive Learning,” in *Proc. of the Computational and Biological Learning Society Learning Workshop*, 2011.

J. P. Dmochowski, M. Bikson, and L. C. Parra, “A Multiple Electrode Scheme for Optimal Non-Invasive Electrical Stimulation,” in *Proc. IEEE Engineering in Medicine and Biology Society Conference*, 2011.

J. Dmochowski, J. Benesty, and S. Affes, “Calibrated acoustic source localization,” in *Proc. IEEE Biennial Symposium on Communications*, 2008.

J. Dmochowski, J. Benesty, and S. Affes, "On autoregressive modeling for the localization of speech," in *Proc. IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM)*, 2008.

J. Dmochowski, Z. Liu, and P. A. Chou, "Blind source separation in a distributed microphone meeting for improved teleconferencing," in *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2008.

J. Dmochowski, J. Benesty, and S. Affes, "Fast steered response power source localization using inverse mapping of relative delays," in *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2008.

J. Dmochowski, J. Benesty, and S. Affes, "Broadband MUSIC: challenges and opportunities for multiple source localization," in *Proc. IEEE Workshop on the Applications of Signal Processing to Audio and Acoustics (WASPAA)*, 2007.

J. Dmochowski, J. Benesty, and S. Affes, "The generalization of narrowband localization methods to broadband environments via parametrization of the spatial correlation matrix," in *Proc. European Signal Processing Conference (EUSIPCO)*, 2007.

J. Dmochowski, J. Benesty, and S. Affes, "Direction of arrival estimation using eigenanalysis of the parameterized spatial correlation matrix," in *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2007.
Best Student Paper Award.

W. Dmochowski and **J. Dmochowski**, "Frequency dependent dynamic properties of tilting pad journal bearing: experimental results and uncertainty analysis," in *Proc. World Tribology Congress*, 2005.

J. Dmochowski and R.A. Goubran, "Combined beamforming and noise cancellation," in *Proc. of the IEEE Instrumentation and Measurement Technology Conference*, 2005.

J. Dmochowski and R.A. Goubran, "Noise cancellation using fixed beamforming," in *Proc. of the IEEE Workshop on Haptic, Audio and Visual Environments and their Applications (HAVE)*, 2004.

Book Chapters

J. Dmochowski and J. Benesty, "Microphone arrays: fundamental concepts", *Speech Processing in Modern Communication: Challenges and Perspectives*, Berlin: Springer, 2010, pp. 199–223.

J. Dmochowski and J. Benesty, "Steered beamforming approaches to source localization", *Speech Processing in Modern Communication: Challenges and Perspectives*, Berlin: Springer, 2010, pp. 307–337.

Research Interests

multichannel neural and neurally-inspired signal processing and machine learning with particular emphasis on:

- decoding brain state in natural settings
- elucidating, informing, and developing novel paradigms for electrotherapy

Industry Experience

Broadcom Corporation, Richmond, B.C.

Intern, Audio Center for Excellence, 2008

Developed and implemented echo cancellation, noise reduction, and source localization algorithms for Bluetooth and VoIP terminals.

Microsoft Research, Redmond, WA

Intern, Communications and Collaboration Services, 2007

Researched, developed, and implemented a novel paradigm for blind separation of speech signals using distributed microphone arrays with application to teleconferencing.

Awards

Governor General's Academic Gold Medal, 2009

NSERC/CRSNG Post Doctoral Fellowship, 2008

\$80,000 / 2 years

ICASSP 2007 Best Student Paper Award

NSERC/CRSNG Post Graduate Scholarship, 2005

\$63,000 / 3 years

Ontario Graduate Scholarship, 2004

\$15,000 / 1 year

Intellectual Property

M. Bikson, L. C. Parra, **J. P. Dmochowski**, Y. Su, and A. Datta, "Optimizing Dosage in Transcranial Electrical Stimulation," filed to USPTO, 2011.

M. Bikson, L. C. Parra, **J. P. Dmochowski**, V. Bansal, and A. Datta, "Transcranial Electrical Stimulation: Method, System, and Device," filed to USPTO, 2010.

Z. Liu, P. A. Chou, and **J. Dmochowski**, "Speech Separation with Microphone Arrays", US Pat. 12035439, 2008.

Invited Talks

York University, Centre for Vision Research: “Canonical correlates of EEG during movie viewing”, September 2011.

City College of New York, Cognitive Neuroscience Colloquium: “Canonical correlates of EEG during movie viewing”, September 2011.

Professional Activities

Participant, Special Course in Neuroinformatics, Marine Biological Laboratory, Woods Hole, MA, 2009.

Reviewer, IEEE Transactions on Signal Processing.

Reviewer, IEEE Transactions on Audio, Speech, and Language Processing.

Reviewer, IEEE Transactions on Biomedical Engineering.

Reviewer, IEEE Workshop on the Applications of Signal Processing to Audio and Acoustics (WASPAA), 2009.

Reviewer, International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), 2010.