CURRICULUM VITAE
Peter Brunner, Ph.D.

PERSONAL INFORMATION

Name: Peter Brunner
Citizenship: Austria, United States Permanent Resident

ADDRESS

Home:
16 Wayland St, Unit 1
Delmar NY, 12054
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Office
Center for Medical Science, Room 2014
150 New Scotland Ave.
Albany, New York 12208
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CURRENT POSITION

07/2014-present **Associate Professor**
Department of Neurology
Department of Neuroscience & Experimental Therapeutics
Albany Medical College, Albany, NY, USA.

07/2019-present **Deputy Director**
National Center for Adaptive Neurotechnologies, Albany NY, USA.

EDUCATION

09/2013 **Ph.D.** **Electrical Engineering and Computer Science**
University of Technology, Graz, Austria, with distinction.

12/2005 **M.Sc.** **Electrical Engineering and Computer Science**
University of Technology, Graz, Austria, with distinction.

10/2004 **B.Sc.** **Electrical Engineering and Computer Science**
University of Technology, Graz, Austria.

RESEARCH INTERESTS

My primary research goals are directed towards understanding the large-scale electrophysiological mechanisms within the nervous system that govern human behavior and cognition. The long-term goal of my research is to develop this understanding into devices that interact with these signals and thereby realize entirely new diagnostic or treatment options for people affected by nervous system injury or disease. To pursue this goal, my research spans the entire range from basic research, technology development and translational research to clinical dissemination.

SKILLS

- Software & Systems Engineering (C/C++, MATLAB, Python, Java, Pascal, Basic, Assembly, 25 years)
- Machine Learning & Computer Vision (16 years)
- Biosignal Processing & Analysis (14 years)
- Cognitive/Systems Neuroscience and Neurophysiology (14 years)
- Clinical & Translational Research (14 years)
- Scientific/Technical Project Management and Coordination (11 years)
- Technology Translation & Intellectual Property Management (11 years)
- Scientific/Technical Personnel Recruitment, Selection and Mentoring (9 years)
- Grant Writing (7 years)

RESEARCH AND PROFESSIONAL APPOINTMENTS

09/2019-present **Associate Professor**
Department of Neuroscience & Experimental Therapeutics, Albany Medical College, Albany, NY, USA.

09/2019-present **Associate Professor (pending)**
Department of Biomedical Sciences, School of Public Health, University at Albany, State University of New York, Albany, NY, USA.

07/2018-present **Associate Professor**
Department of Neurology, Albany Medical College, Albany, NY, USA.

07/2014-07/2018 **Assistant Professor**
Department of Neurology, Albany Medical College, Albany, NY, USA.

09/2013-07/2014 **Postdoctoral Associate**
Neurosciences Institute, Albany Medical College, Albany, NY, USA.

02/2010-09/2013 **Research Associate**
Neurosciences Institute, Albany Medical College, Albany, NY, USA.

02/2006-02/2010 **Graduate Research Assistant**
Laboratory of Neural Injury Repair, Wadsworth Center, Albany, NY, USA.

03/2005-12/2005 **Undergraduate Research Assistant**
Laboratory of Neural Injury Repair, Wadsworth Center, Albany NY, USA.

07/2004-10/2004 **Undergraduate Research Assistant**
Inst. of Computer Vision and Graphics, University of Technology, Graz, Austria.

07/2003-09/2003 **Research Internship**
Siemens Medical Solutions R&D, Erlangen, Germany.

07/2002-09/2002 **Research Internship**
Siemens Medical Solutions R&D, Erlangen, Germany.

05/2000-06/2002 **Industry Internship**
Siemens AG Austria, Graz, Austria.

08/1999-04/2000 **Military Service**
Austrian Armed Forces.

07/1999-08/1999 **Industry Internship**
Electrical Engineering Ofner, Teufenbach, Austria.

07/1997 **Industry Internship**
Siemens AG Austria, Fohnsdorf, Austria.

07/1996 **Industry Internship**
Electrical Engineering Ofner, Teufenbach, Austria.

LANGUAGES

- English (fluent), German (native)

HONORS AND AWARDS

03/2005 Academic Merit Award, Graz University of Technology, Graz, Austria
03/2005 Student Research Grant, Graz University of Technology, Graz, Austria
03/2005 Scholarship for Academic Research Abroad
Graz University of Technology, Graz, Austria
05/2005 Pirelli Internetional Award (member of winning group)
06/2005 Altran Technology Innovation Award (member of winning group)
02/2006 Scholarship for Academic Research Abroad,
Graz University of Technology, Graz, Austria
06/2006 Commissioner's Recognition Award, NY State Dept. of Health
07/2009 Cover Illustration, Epilepsy and Behavior
07/2010 Best Technical Poster Award, 4th International BCI Meeting,
Asilomar, CA, 2010
10/2010 Who's Who in America 2011
03/2011 Journal of Neural Engineering Highlights of 2010
05/2011 Journal of Neural Engineering Top 3th Percentile
04/2012 Journal of Neural Engineering most cited in the last 2 years
09/2014 Annual BCI-Research Award Nominee, Graz, Austria, 2014
10/2015 Annual BCI-Research Award Nominee, Chicago, IL, 2015
10/2017 Annual BCI-Research Award (2nd Place), Graz, Austria, 2017

PATENTS

1. G. Schalk, E.C. Leuthardt, J.R. Wolpaw, P. Brunner. **Method for Analyzing Function of the Brain and Other Complex Systems.** U.S. Patent No. 8,532,756 (published Sep. 10, 2013)
2. J.R. Wolpaw, X.Y. Chen, A.K. Thompson, G. Schalk, P. Brunner. **Method and Device to Restore or Improve Nervous System Functions by Modifying Specific Nervous System Pathways.** U.S. Patent No. 8,862,236, (published Oct 14, 2014)
3. J.R. Wolpaw, G. Schalk, A.K. Thompson, P. Brunner, X.Y. Chen, D.J. McFarland. **Method and Device to Restore and/or Improve Nervous System Functions by Modifying Specific Nervous System Pathways.** U.S. Patent No. 9,138,579, (published Jan 15, 2015)
4. J.R. Wolpaw, G. Schalk, A.K. Thompson, P. Brunner, D.J. McFarland, X.Y. Chen. **System and Related Method to Restore and/or Improve Nervous System Functions by Modifying Specific Nervous System Pathways.** U.S. Patent No. 9,545,515, (published Jan 18, 2017)
5. G. Schalk, P. Brunner, W.G. Coon, A. De Pesters. **Measurement of Cortical Excitability.** U.S. Patent No. 10,478,086 (published Nov 19, 2019)

PROFESSIONAL SOCIETIES:

1. Society for Neuroscience (since 2005)
2. Sigma Xi (since 2010)
3. BCI Society (since 2015)

ACADEMIC SERVICES AND COMMITTEES:

1. **Selection Committee**, Fourth International BCI Meeting, Asilomar, California, USA, May 2010.
2. **Co-Chair**, Fourth International BCI Meeting Workshop on BCI Software and Hardware, Asilomar, California, USA, May 2010.
3. **Associate Editor**, Brain-Computer Interfaces (since 2015).
4. **Associate Editor**, Frontiers in Neurology and Neuroscience (since 2016).
5. **Review Editor,** Frontiers in Human Neuroscience - Brain-Computer Interfaces (since 2020).

OCCASIONAL REVIEWER FOR SCIENTIFIC JOURNALS:

1. Biomedical Signal Processing and Control
2. Biocybernetics and Biomedical Engineering
3. Brain-Computer Interfaces
4. Cerebral Cortex
5. Clinical EEG & Neuroscience
6. Clinical Neurophysiology
7. Cognitive Neurodynamics
8. Computer Methods and Programs in Biomedicine
9. EURASIP Journal on Advances in Signal Processing
10. Ergonomics
11. IEEE Engineering in Medicine and Biology Society
12. IEEE Journal on Emerging and Selected Topics in Circuits and Systems
13. IEEE Transactions on Biomedical Engineering
14. IEEE Transactions on Human-Machine Systems
15. IEEE Transactions on Neural Systems and Rehabilitation Engineering
16. IEEE Transactions on Systems, Man, and Cybernetics
17. International Journal of Human-Computer Interaction
18. International Journal of Neural Systems
19. Journal of Neural Engineering
20. Journal of NeuroEngineering and Rehabilitation
21. Journal of Neuroinformatics
22. Journal of Neurophysiology
23. Journal of Neuroscience
24. Journal of Neuroscience Methods
25. Frontiers in Neuroscience
26. Frontiers in Neuroprosthetics
27. Fifth International BCI Meeting
28. Fourth International BCI Meeting
29. Lancet
30. Nature Scientific Reports
31. Neural Information Processing Systems
32. Neural Computation
33. NeuroImage
34. Neurology
35. Neuroscience Letters
36. Network: Computation in Neural Systems
37. Micromachines
38. Physiological Measurement
39. PLoS ONE
40. Sensors
41. The Lancet Neurology
42. Transactions on Fuzzy Systems

OCCASIONAL REVIEWER FOR SCIENTIFIC MERIT:

1. Graz University of Technology
2. King's College London
3. National Science Foundation (NSF)
4. National Institutes of Health (NIH)
5. Singapore Agency for Science, Technology and Research (A*STAR)

PEER REVIEWED JOURNAL PUBLICATIONS:

1. Schalk, G., Brunner, P., Gerhardt, L.A., Bischof, H., Wolpaw, J.R., Brain-Computer Interfaces (BCI's): Detection instead of classification. ***Journal of Neuroscience Methods***, 167:51-62, 2008.
2. Schalk, G., Brunner, P., Gerhardt, L.A., Bischof, H., Wolpaw, J.R., Brain-Computer Interfaces (BCI's): Detection instead of classification. ***Journal of Neuroscience Methods***, 167:51-62, 2008.
3. Schalk, G., Leuthardt, E.C., Brunner, P., Ojemann, J.G., Gerhardt, L.A., Wolpaw, J.R., Real-time detection of event-related brain activity. ***NeuroImage***, 43(2):245–249, 2008.
4. Friedrich, E.V., McFarland, D.J., Neuper, C., Vaughan, T.M., Brunner, P., Wolpaw, J.R., A scanning protocol for a sensorimotor rhythm-based brain-computer interface. ***Biological Psychology***, 80(2):169–175, 2009.
5. Brunner, P., Ritaccio, A.L., Lynch, T.M., Emrich, J.F., Wilson, J.A., Williams, J.C., Aarnoutse, E.J., Ramsey, N.F., Leuthardt, E.C., Bischof, H., Schalk, G., A Practical Procedure for Real-Time Functional Mapping of Eloquent Cortex Using Electrocorticographic Signals in Humans. ***Epilepsy and Behavior***, 15(3):278–286, 2009.
6. Klobassa, D.S., Vaughan, T.M., Brunner, P., Schwartz, N.E., Wolpaw, J.R., Neuper, C., Sellers, E.W., Toward A High-Throughput Auditory P300-based Brain-Computer Interface. ***Clinical Neurophysiology***, 120(7): 1252-1261, 2009.
7. Roland, J., Johnston, J., Brunner, P., Schalk, G., Leuthardt, E.C., Passive Real-Time Identification of Speech and Motor Cortex during an Awake Craniotomy, ***Epilepsy and Behavior***, 18(1-2): 123-8, 2010.
8. Brunner, P., Joshi, S. Briskin, S., Wolpaw, J.R., Bischof, H., Schalk, G., Does the "P300" Speller Depend on Eye Gaze?, ***Journal of Neural Engineering***, 7(5):056013, 2010.
9. Pei, X., Leuthardt, E.C., Gaona, C.M., Brunner, P., Wolpaw, J.R., Schalk G., Spatiotemporal Dynamics of ECoG Activity Related to Language Processing, ***NeuroImage***, 54(4): 2960-72, 2011.
10. Brunner, P., Schalk, G., Toward a Gaze-Independent Matrix Speller Brain-Computer Interface, ***Clinical Neurophysiology***, 122(6):1063-4, 2011.
11. Brunner, P., Ritaccio, A.L., Emrich, J.F., Bischof, H., Schalk, G., Rapid Communication With a "P300" Matrix Speller Using Electrocorticographic Signals (ECoG), ***Frontiers in Neuroscience***, 5:5, 2011.
12. Brunner, P., Bianchi, L., Guger, C., Cincotti, F., Schalk, G., Current trends in hardware and software for brain-computer interfaces (BCIs), ***Journal of Neural Engineering***, 8(2):025001, 2011.
13. Gunduz, A., Brunner, P., Daitch, A., Leuthardt, E.C., Ritaccio, A.L., Pesaran, B., Schalk, G., Neural Correlates of Orienting Attention in Electrocorticographic (ECoG) Signals in Humans, ***Frontiers in Human Neuroscience***, 5:89, 2011.
14. Gunduz, A., Brunner, P., Daitch, A., Leuthardt, E.C., Ritaccio, A.L., Pesaran, B., Schalk, G., Decoding Covert Spatial Attention Using Electrocorticographic (ECoG) Signals in Humans, ***NeuroImage***, 60(4): 2285-93, 2012.
15. Potes, C., Gunduz, A., Brunner, P., Schalk, G., Dynamics of Electrocorticographic (ECoG) Activity in Human Temporal and Frontal Cortical Areas During Music Listening, ***NeuroImage***, 61(4):841-8, 2012.
16. Hill, N.J., Gupta, D., Brunner, P., Gunduz, A., Adamo, M.A., Ritaccio, A.L., Schalk, G., Recording Human Electrocorticographic (ECoG) Signals for Neuroscientific Research and Real-time Functional Cortical Mapping, Journal of Visualized Experiments, ***Journal of Visualized Experiments***, e3993, 2012.
17. Wang, Z., Gunduz, A., Brunner, P., Ritaccio, A.L., Ji Q., Schalk G., Decoding Onset and Direction of Movements Using Electrocorticographic (ECoG) Signals in Humans, ***Frontiers in Neuroengineering***, 5**:**15, 2012.
18. Kubanek, J., Brunner, P., Gunduz, A., Poeppel, D., Schalk, G., The tracking of speech envelope in the human cortex, ***PLoS One***, 8(1):e53398, 2012.
19. Brunner, P., Schalk, G., Toward gaze-independent brain-computer interfaces, ***Clinical Neurophysiology***, 124(5):831-3, 2013.
20. Korostenskaja, M., Wilson, A.J., Rose, D.F, Brunner, P., Schalk, G. et al., Real-Time Functional Mapping with Electrocorticography in Pediatric Epilepsy: Comparison with fMRI and ESM Findings, ***Clinical EEG and Neuroscience***, 45:3, 205-11, 2014.
21. Stephen, E.P., Lepage, K.Q., Eden, U.T., Brunner, P., Schalk, G., Brumberg, J.S. et al., Assessing dynamics, spatial scale, and uncertainty in task-related brain network analyses. ***Frontiers in Computational Neuroscience***, 8:31, 2014.
22. Potes, C.M., Brunner, P., Gunduz, A., Knight, R.T., Schalk, G., Spatial and temporal relationships of electrocorticographic alpha and gamma activity during auditory processing. ***NeuroImage***, 97(2014):188-95, 2014.

23. Martin, S.*, Brunner, P.*, C. Holdgraf, H. Heinze, N. Crone, J. Rieger, G. Schalk, R.T. Knight, B. Pasley. Decoding spectrotemporal features of overt and covert speech from the human cortex. ***Frontiers in Neuroengineering***, 7:14, 2014.
24. Korostenskaja, M., Chen, P., Salinas, C.M., Westerveld, M., Brunner, P., Schalk, G. et al., Real-time functional mapping: potential tool for improving language outcome in pediatric epilepsy surgery. Case report, ***Journal of Neurosurgery: Pediatrics***, 14:3, 287-95, 2014.
25. Gupta, D., Hill N.J., Brunner, P., Gunduz, A., Ritaccio, A.L., Schalk, G., Simultaneous Real-Time Monitoring of Multiple Cortical Systems. ***Journal of Neural Engineering***, 11(2014):056001, 2014.
26. Lotte, F., Brumberg, J.S., Brunner, P., Gunduz, A., Ritaccio, A.L., Guan, C., Schalk, G., Electrocorticographic representations of segmental features in continuous speech. ***Frontiers in Human Neuroscience***, 9:97, 2015.
27. Liu, Y., Coon, W.G., de Pesters , A., Brunner, P., Schalk, G., The effects of spatial filtering and artifacts on electrocorticographic signals. ***Journal of Neural Engineering***, 12(5):056008, 2015.
28. Herff, C., Heger, D., de Pesters, A., Telaar, D., Brunner, P., Schalk, G., Schultz, T., Brain-to-text: decoding spoken phrases from phone representations in the brain. ***Frontiers in Neuroscience***, 9:217, 2015.
29. Dijkstra, K.V., *Brunner, P.*, Gunduz, A., Coon, W., Ritaccio, A.L., Farquhar, J., Schalk, G., Identifying the attended speaker using electrocorticographic (ECoG) signals. ***Brain-Computer Interfaces***, 2:4, 2015.
30. Coon, W.G., Gunduz, A., Brunner, P., Ritaccio, A.L., Pesaran, B., Schalk, G., Oscillatory phase modulates the timing of neuronal activations and resulting behavior. ***NeuroImage,*** 133, 294–301, 2016.
31. de Pesters, A., Coon, W.G., *Brunner, P.*, Gunduz, A., Ritaccio, A.L., Brunet, N.M., de Weerd, P., Roberts, M.J., Oostenveld, R., Fries, P., Schalk, G., Alpha power indexes task-related networks on large and small scales: A multimodal ECoG study in humans and a non-human primate. ***NeuroImage***, 134, 122–131, 2016.
32. Martin, S., *Brunner, P.*, Iturrate, I., del R. Millán, J., Schalk, G., Knight, R.T., Pasley, B.N., Word pair classification during imagined speech using direct brain recordings. Scientific Reports, ***Scientific Reports***, 6:25803, 2016.
33. Taplin, A.M., de Pesters, A., Brunner, P., Hermes, D., Dalfino, J.C., Adamo, M.A., Ritaccio, A.L., Schalk, G., Intraoperative mapping of expressive language cortex using passive real-time electrocorticography, ***Epilepsy & Behavior Case Reports***, 16:5-46, 2016.
34. Fedorenko, E., Scott, T.L., Brunner, P., Coon, W.G., Pritchett, B., Schalk, G., Kanwisher, N., Neural correlate of the construction of sentence meaning. ***Proceedings of the National Academy of Sciences***, 113(41):E6256–E6262, 2016.
35. Brumberg, J.S., Krusienski, D.J., Chakrabarti, S., Gunduz, A., Brunner, P., Ritaccio, A.L., Schalk, G., Spatio-Temporal Progression of Cortical Activity Related to Continuous Overt and Covert Speech Production in a Reading Task. ***PLoS One***, 1(11): e0166872, 2016.
36. Gunduz, A., Brunner, P., Sharma, M., Leuthardt, E.C., Ritaccio, A.L., Pesaran, B., Schalk, G., Differential roles of high gamma and local motor potentials for movement preparation and execution, ***Brain-Computer Interfaces***, 88:102, 2016.
37. Ries, S.K., Dhillon, R.K., Clarke, A., King-Stephens, D., Laxer, K.D., Weber, P.B., Kuperman, R.A., Auguste, K.I., Brunner, P., Schalk, G., Lin, J.J., Parvizi, J., Crone, N.E., Dronkers, N.F., Knight, R.T., Spatiotemporal dynamics of word retrieval in speech production revealed by cortical high frequency band activity, ***Proceedings of the National Academy of Sciences***, 114(23):E4530-E4538, 2017.
38. Ritaccio, A.L., Brunner, P., Schalk, G., Electrical Stimulation Mapping of the Brain: Basic Principles and Emerging Alternatives. Invited lead article ***Journal of Clinical Neurophysiology***, 35(2):86-97, 2018.
39. Swift, J.R., Coon, W.G., Guger, C., Brunner, P., Bunch, M., Lynch, T.M., Frawley, B., Ritaccio, A.L., Schalk, G., Passive Functional Mapping of Receptive Language Areas using Electrocorticographic Signals. **Clinical *Neurophysiology***, 129(12):2517-2524, 2019.
40. Crowther, L.J., Brunner, P., Kapeller, C., Guger, C., Kamada, K., Bunch, M.E., Frawley, B.K., Lynch, T.M., Ritaccio, A.L., Schalk, G.A., Quantitative Method for Evaluating Cortical Responses to Electrical Stimulation. **Journal of *Neuroscience Methods***, 311:67-75, 2019
41. Li, G., Jiang, S., Chen., C, Brunner, P., Wu, Z., Schalk, G., Chen, L., Zhang, D., iEEGview: An open-source multifunction GUI-based Matlab Toolbox for localization and visualization of human intracranial electrodes. ***Journal of Neural Engineering***, 23;17(1):016016, 2019.
42. ReFaey, K., Tripathi, S., Bhargav, A.G., Grewal, S.S., Middlebrooks, E.H., Sabsevitz, D.S., Jentoft, M.J., Brunner, P. Wu, A., Tatum, W.O., Ritaccio, A.L., Chaichana, K.L., Quinones-Hinojosa, A., Potential differences between monolingual and bilingual patients in approach and outcome after awake brain surgery. **Journal of Neuro-Oncology**, 2020.

PENDING PEER REVIEWED JOURNAL PUBLICATIONS:

1. Adamek, M., Schalk, G., Moheimanian L., Scherer R., Brunner, P., Instantaneous voltage of electroencephalographic oscillatory activity: an alternative to power and phase measurements.
2. Cho, H. , Schalk G., Moheimanian, L., Jun, S.C. , Brunner, P., Physiological origin of scalp recorded evoked responses.
3. Cho, H. , Schalk G., Brunner, P., Simulating Large-Scale Cortical Function and Resulting Behavior.
4. Paraskevopoulou, S.E., Coon, W.G., Brunner, P., Miller, K.J., Schalk, G., Cortical networks expose variability in reaction time.
5. Moheimanian, L., Paraskevopoulou, S.E., Schalk, G., Brunner, P., Characteristics of phase resetting in low-frequency oscillatory activity during a reaction time task.
6. Moheimanian, L., Paraskevopoulou, S.E., Schalk, G., Brunner, P., Why Don't Humans Always Respond to a Stimulus?
7. Nourmohammadi, A., de Pesters, A., Schalk, G., Knuth J., Ritaccio, A.L., Brunner, P., Passive mapping of receptive language function under general anesthesia.
8. Norman-Haignere, S.V, Feather, J., Brunner, P., Ritaccio, A.L., McDermott, J.H., Schalk, G., Kanwisher, N., Neural Selectivity for Music, Speech, and Song in Human Auditory Cortex.
9. Fonken, Y.M., Kosik, E.L., Lin, J., Brunner, P., Schalk, G., Knight, R.T., Contributions of auditory posterior STG in signaling temporal violations and salience, evidence from high-gamma and ERP's.
10. Xie, T., Wu, Z., Vato, Schalk, G., A., Raviv, N., Guo, Q., Ye, H., Sheng, X., Chen, L., Brunner, P., Automated central sulcus identification and functional mapping after median nerve stimulation.
11. Vato, A., Schalk, G., Brunner, P., Asymmetric Amplitude Distributions in Low-Frequency Oscillatory Activity.
12. Swift, J., Schalk, G., Nourmohammadi, A., Adamek, J., Brunner, P., Temporal Sequencing in the Human Auditory System Reveals Caudal to Rostral Activity Progression During Language Tasks.

BOOK CHAPTERS:

1. Brunner, P., Dijkstra, K., Coon, W. G., Mellinger, J., Ritaccio, A., and Schalk, G., **Brain-Computer Interface Research: A State-of-the-Art Summary, Towards an Auditory Attention BCI.** Eds: Guger, C., Mueller-Putz, G., and Allison, B., pages 29–42. Springer, Cham, New York, NY, USA, ISBN 9783319251882, 2015.
2. Brunner, P., Dijkstra, K., Coon, W. G., Mellinger, J., Ritaccio, A., and Schalk, G., **Brain-Computer Interface Research: A State-of-the-Art Summary, An ECoG-Based BCI Based on Auditory Attention to Natural Speech.** Eds: Guger, C., Allison, B., and Ushiba, J., pages 7–19. Springer, Cham, New York, NY, USA, ISBN 9783319571317, 2017.
3. Brunner, P., Schalk, G., **Brain-Computer Interfaces Handbook: Technological and Theoretical Advances: BCI Software.** Eds: Chang Soo Nam, Anton Nijholt, and Fabien Lotte, pages 323–336, CRC Press, Taylor & Francis, Cambridge, MA, USA., ISBN 9781498773430, 2018.
4. Ritaccio, A.L., Brunner, P., Schalk, G., **Cortical and Subcortical Mapping.** In: Functional Neurosurgery: The Essentials. Eds: Brown, Pilitsis, and Schulder, in press.

PEER REVIEWED CONFERENCE PROCEEDINGS:

1. Schachter, S.C., Guttag, J., Schiff, S., Schomer, D.L., and Summit Contributors (incl. Brunner, P.). Advances in the Application of Technology to Epilepsy: The CIMIT/NIO., ***Epilepsy and Behavior***, 16(1): 3-46, 2009.
2. Brunner, P., Schalk, G., Brain-Computer Interaction. **Proceedings to the 5th Intl. Conference on Augmented Cognition**. In: Foundations of Augmented Cognition. Neuroergonomics and Operational Neuroscience. Springer Lecture Notes in Computer Science, 5638:719-723, 2009.
3. Ritaccio, A.L., Brunner, P., Cervenka, M.C., Crone, N., Guger, C., Leuthardt, E.C., Oostenveld, R., Stacey, W., Schalk, G., Proceedings of the First International Workshop on Advances in Electrocorticography, ***Epilepsy and Behavior***, 19(3):204–215, 2010.
4. Hill, J., Brunner, P., Vaughan, T., Brain-Computer Interaction. ***Proceedings to the 6th Intl. Conference on Augmented Cognition***. In: Foundations of Augmented Cognition. Neuroergonomics and Operational Neuroscience. Springer Lecture Notes in Computer Science, 2011.
5. Ritaccio, A., Boatman-Reich, D., Brunner, P., Cervenka, M.C., Schalk, G. et al., Proceedings of the Second International Workshop on Advances in Electrocorticography, ***Epilepsy and Behavior***, 22(4): 641-50, 2011.

6. Ritaccio, A., Beauchamp, M., Bosman, C., Brunner, P., Schalk, G. et al., Proceedings of the Third International Workshop on Advances in Electrocorticography, ***Epilepsy and Behavior***, 25(4): 605-13, 2012.
7. Ritaccio, A., Brunner, P., Crone, N., Williams, J., Schalk, G. et al., Proceedings of the Fourth International Workshop on Advances in Electrocorticography, ***Epilepsy and Behavior***, 29(2): 259-68, 2013.
8. Ritaccio, A., Brunner, P., Gunduz, A., Schalk, G. et al., Proceedings of the Fifth International Workshop on Advances in Electrocorticography, ***Epilepsy and Behavior***, 41(1): 183-92, 2014.

INVITED EXTRAMURAL LECTURES AND SEMINARS

1. **Configuration, Conduction, and Analysis of P300 Experiments.** 4th BCI2000 Workshop, Utrecht, The Netherlands, July 5-6, 2008.
2. **BCI2000: A General-Purpose Brain-Computer Interface System.** Cognitive Neuroscience BCI Workshop, San Francisco, CA, March 21, 2009.
3. **Instrumentation for Emerging Clinical Applications.** 5th BCI2000 Workshop and International Workshop on Advances in Electrocorticography, Bolton Landing, NY, USA, October 1-3, 2009.
4. **Configuration, Conduction, and Analysis of mu/beta-Rhythm Experiments.** 5th BCI2000 Workshop and International Workshop on Advances in Electrocorticography, Bolton Landing, NY, USA, October 1-3, 2009.
5. **Configuration, Conduction, and Analysis of P300 Experiments.** 5th BCI2000 Workshop and International Workshop on Advances in Electrocorticography, Bolton Landing, NY, USA, October 1-3, 2009.
6. **Does the P300 Speller Depend on Eye-Gaze?** Tools for Brain-Computer Interaction (TOBI) Workshop, Graz, Austria, February 3-4, 2010.
7. **Configuration, Conduction, and Analysis of mu/beta-Rhythm Experiments.** 7th BCI2000 Workshop Asilomar, CA, USA, May 30-31, 2010.
8. **Configuration, Conduction, and Analysis of P300 Experiments.** 7th BCI2000 Workshop, Asilomar, CA, USA, May 30-31, 2010.
9. **Brain-Machine Interfacing.** Telluride Neuromorphic Cognition Workshop, Telluride, Colorado, USA, June 27 - July 17, 2010.
10. **Recent Advances in ECoG BCI Systems.** Nineteenth Annual Computational Neuroscience Meeting CNS, San Antonio, TX, USA, July, 24-30, 2010.
11. **Instrumentation for Emerging Clinical Applications.** 2nd International Workshop on Advances in Electrocorticography, San Diego, CA, USA, November 11-12, 2010.
12. **Recent Advances in ECoG BCI Systems.** 6th Intl. Conference on Augmented Cognition, Orlando, FL, USA, July 11, 2011.
13. **Brain-Computer Interface Designs that use External Stimuli.** 6th Intl. Conference on Augmented Cognition, Orlando, FL, USA, July 12, 2011.
14. **ECoG Based BCI Systems.** 33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC '11), Boston, MA, USA, August 30, 2011.
15. **Instrumentation for Emerging Clinical Applications.** 3rd International Workshop on Advances in Electrocorticography, Washington, DC, USA, November 10-11, 2011.
16. **Real-time Functional Mapping using ECoG and BCI2000.** Brain-Computer Interface (BCI) Workshop & Hands-on Seminar, Orlando, FL, USA, May 10-11, 2012.
17. **Basics of ECoG Signal Acquisition.** 4th International Workshop on Advances in Electrocorticography, New Orleans, LA, USA, October 11-12, 2012.
18. **Brain-Computer Interfacing.** Winter School and Conference on Computational Aspects of Neural Engineering, Bangalore, India, December 10-21, 2012.
19. **Configuration, Conduction, and Analysis of P300 Experiments, Assembling of EEG Electrodes.** 10th BCI2000 Workshop, Asilomar, CA, USA, June 2-3, 2013.
20. **Clinical Primer.** 5th International Workshop on Advances in Electrocorticography, San Diego, CA, USA, November 7-8, 2013.

21. **Technical Basis of Brain-Computer Interactions.** International Workshop, New Frontiers in Neurotechnology, Naples, Italy, September 12-13, 2014.
22. **Stimulating within the Brain.** Short Course in Adaptive Neurotechnologies, Albany, NY, USA, July 13, 2016.
23. **Adaptive Neurotechnologies that Restore Function.** Short Course in Adaptive Neurotechnologies, Albany, NY, USA, July 16, 2016.
24. **Application of BCI2000.** Short Course in Adaptive Neurotechnologies, Albany, NY, USA, July 18-22, 2016.
25. **Adaptive Neurotechnologies that Restore Function.** Short Course in Adaptive Neurotechnologies, Albany, NY, USA, July 15, 2017.
26. **Application of BCI2000.** Short Course in Adaptive Neurotechnologies, Albany, NY, USA, July 17-21, 2017.
27. **Rapid Passive Functional Mapping of Eloquent Cortex.** Christopher Davidson Forum, St. Louis, MO, USA, October 27, 2017.
28. **Advancing Passive ECoG-Based Brain Mapping.** Annual Congress of the Japan Epilepsy Society. Kyoto, Japan, November 5, 2017.
29. **Decoding Speech from Electrocorticographic (ECoG) Signals.** 12th International Symposium of MEI Center Osaka University: Medical Engineering of Orofacial Laryngopharyngeal Functions, Osaka, Japan, May 31, 2019.
30. **Stimulating within the Brain.** Short Course in Adaptive Neurotechnologies, Albany, NY, USA, July 10, 2019.
31. **Adaptive Neurotechnologies that Restore Function.** Short Course in Adaptive Neurotechnologies, Albany, NY, USA, July 13, 2019.
32. **Application of BCI2000.** Short Course in Adaptive Neurotechnologies, Albany, NY, USA, July 15-19, 2019.
33. **Advancing Passive ECoG-Based Brain Mapping.** Mayo Clinic, Jacksonville, FL, December 17, 2019.
34. **National Center for Adaptive Neurotechnologies**. Next-Generation Brain-Computer-Brain Platform - Technical Review Panel/Scientific Workshop. Agency for Science, Technology and Research (A*STAR), Singapore, January 14, 2020.
35. **Advancing Passive ECoG-Based Brain Mapping.** Department of Computer Science and Engineering. Nanyang Technological University, Singapore, January 17, 2020.
36. **High-gamma Mapping and Gamma Echo.** Functional Brain Mapping Workshop. Virtual Meeting. April 16, 2020.

TEACHING

1. **Telluride Neuromorphic Cognition Workshop**, Telluride, Colorado, USA, June 27 - July 17, 2010.
   - Course on Brain-Machine Interfacing (18 days, intensive laboratory course, 30 participants).
2. **Winter School and Conference on Computational Aspects of Neural Engineering**, Bangalore, India, December 10-21, 2012.
   - Course on Brain-Computer Interfacing (9 days, intensive laboratory course, 35 participants).
3. **Short Course in Adaptive Neurotechnologies**, Albany, New York, USA, July 11-29, 2016.
   - Lecture on Stimulating within the brain (1.5 hours, 24 participants).
   - Lecture on Adaptive Neurotechnologies that Restore Function (1.5 hours, 24 participants).
   - Course on Brain-Computer Interfacing (4.5 days, 24 participants).
4. **Short Course in Adaptive Neurotechnologies**, Albany, New York, USA, July 9-28, 2017.
   - Lecture on Adaptive Neurotechnologies that Restore Function (1.5 hours, 24 participants)
   - Course on Brain-Computer Interfacing (4.5 days, 24 participants).
5. **Short Course in Adaptive Neurotechnologies**, Albany, New York, USA, July 8-26, 2019.
   - Lecture on Stimulating within the brain (1.5 hours, 24 participants).
   - Lecture on Adaptive Neurotechnologies that Restore Function (1.5 hours, 24 participants)
   - Course on Brain-Computer Interfacing (4.5 days, 24 participants).

CLINICAL SERVICES

1. Electrode localization in patients implanted with electrocorticographic grids (98 cases).
2. Passive functional mapping in patients undergoing resective brain surgery (98 cases).
3. Electrical cortical stimulation mapping in patients undergoing resective brain surgery (98 cases).

HUMAN RESEARCH (IRB) PROTOCOLS

3953 **Brunner (PI)**
Mapping of the sensory and language modalities in the human brain under general anesthesia using electrocorticography
Status: Recruiting, Experiments, Data Analysis and Manuscript Preparation

2061 **Brunner (PI)**
Brain Computer Interface (BCI) and Electrocorticography (ECoG) Based Mapping of Sensori-Motor and Language Modalities Utilizing Subdural Electrodes in the Human Brains
Status: Recruiting, Experiments, Data Analysis and Manuscript Preparation

ANIMAL RESEARCH (IACUC) PROTOCOLS

19-06001 **Brunner (PI)**
BrainInterchange Neuromodulation
Review: Modifications Required to Secure Approval
Status: Approved

MENTORING

1. Cristhian Potes, Graduate Student (2009-2014)
2. William Coon, Graduate Student (2010-2016)
3. Adriana de Pesters, Graduate Student (2012-2017)
4. Amilyn Taplin, Neurosurgical Resident (2014-2017)
5. Lawrence Crowther, Postdoctoral Researcher (2015-2019)
6. Ladan Moheimanian, Graduate Student (2015-2020)
7. Amin Nourmohammadi, Graduate Student (since 2016)
8. Hohyun Cho, Graduate Student (since 2017)
9. Alessandro Vato, Junior Faculty (since 2017)
10. Markus Adamek, Graduate Student (since 2017)
11. Ilknur Telkes, Postdoc (since 2018)
12. Nataly Raviv, Neurosurgical Resident (since 2018)
13. Zehan Wu, Postdoc (since 2019)
14. Karim ReFaey, Postdoc (since 2019)

MEDIA COVERAGE

1. **National Television.** "Science fiction is now reality", NBC Today, New York City, New York, USA, November 2005.
2. **Exhibition.** European Research and Innovation Exhibition, Paris Expo, Porte de Versailles, Paris, France, June 8-11, 2006.
3. **Press Release.** "Mind over matter' no longer science fiction", European Research and Innovation Exhibition, Paris, France, June 14, 2006.
4. **Press Book.** Annual Meeting of Society for Neuroscience. One of the 700 (out of 16000) attendees selected. November 2007.
5. **National Television.** "Brain Power", CBS 60 Minutes, New York City, New York, USA, November 2008.
6. **Press Release.** "Catch a Brain Wave and Teach it to Communicate", Albany, New York, USA, July 22, 2009.
7. **Press Release.** "Albany Medical College Team Develops Unique Real-Time Brain Mapping System", Albany, New York, USA, August 18, 2009.

8. **National Television.** "Mind over matter", CNN EDGE of discovery, New York City, New York, USA, September 2009.
9. **Press Release.** "Study Shows Fast, Accurate Method for Communicating Using Brain Waves", Times Union, Albany, New York, USA, December 29, 2009.
10. **Exhibition.** "Brain: The Inside Story", Museum of National History, New York City, New York, USA, November 20, 2010–August 14, 2011.
11. **Science Magazine.** "Silent Warrior", Discover Magazine, Kalmbach Publishing, Milwaukee, Wisconsin, USA, April, 2011.
12. **National Radio.** "Mind Reading: Technology Turns Thought Into Action", Washington, DC, USA, May 12, 2011.
13. **National Newspaper.** "The Cyborg in Us All", The New York Times Magazine, New York City, New York, USA, September 18, 2011.
14. **National Television.** "The next step in bionics", CBS Sunday Morning, New York City, New York, USA, October 9, 2011.
15. **Press Release.** "Merging Minds with Machines, Albany Med Leads International Academic Partnership", Albany, New York, USA, July 25, 2012.
16. **Press Release.** "Mind Readers at Work", UC Berkeley Social Science Matrix, Berkeley, CA, USA**,** July 28, 2014.
17. **International Internet Media**. "This Device Reads Your Mind and Types Your Thoughts", Motherboard, Vice News, New York City, USA, June 19, 2015.
18. **International Internet Media**. "Mind-Reading Program Translates Thoughts Into Text", Popular Science, Harlan, IA, USA, June 22, 2015.
19. **Press Release.** "Albany Med-Led Brain Mapping Research Showcased at International Workshop", Albany, NY, October 14, 2015.
20. **International Internet Media**. "Researchers Are One Step Closer to Mind Reading in Real Time", Motherboard, Vice News, New York City, USA, January 29, 2016.
21. **International Television**. "The Human Guinea Pig", Channel 4, United Kingdom, 2019.

ONGOING RESEARCH SUPPORT

P41-EB018783 **Wolpaw (PI)** **09/10/2019 – 06/30/2024**
National Institute of Biomedical Imaging and Bioengineering (NIBIB)
National Center for Adaptive Neurotechnologies
The goal of this research is to develop and disseminate adaptive neurotechnologies.
Total Cost: $7m ($4.2m direct / $2.8m indirect)
Role: TR&D Project Leader & Deputy Director

U24-NS109103 **Brunner (PI)** **05/01/2019 – 04/30/2024**
National Institute of Neurological Disorders and Stroke (NINDS)
BCI2000: Software Resource for Adaptive Neurotechnology Research
The goal of this research is to provide and to widely disseminate BCI2000 as a software resource that greatly simplifies the development process, and thereby accelerates the realization of new adaptive neurotechnologies that will improve diagnosis and treatment of many devastating neurological disorders.
Total Cost: $2.3m ($1.9m direct / $0.4m indirect)
Role: PI

R01-EB026439 **Brunner (PI)** **07/15/2018 – 06/30/2022**
National Institute of Biomedical Imaging and Bioengineering (NIBIB)
BCI2000+: A Software Platform for Adaptive Neurotechnologies:
The goal of this research is to transform BCI2000 into BCI2000+, a hardened, expanded, easy-to-use, and fully documented software platform for a broad range of adaptive neurotechnologies.
Total Cost: $1.6m ($1m direct / $0.6m indirect)
Role: PI

U01-NS108916 **Wolpaw & Brunner (PI)** **09/30/2018 – 08/31/2020**
National Institute of Neurological Disorders and Stroke (NINDS)
Dynamics and Causal Functions of Large-Scale Cortical and Subcortical Networks
The goal of this research is to formalize research program that seeks to begin to reveal the detailed connectivity, causality, and dynamic neural processes supporting human speech perception disorders.
Total Cost: $1.4m ($0.9m direct / $0.5m indirect)
Role: Joint-PI & Site-PI

PENDING RESEARCH SUPPORT

U01-NS113374 **Schalk, Vato & Brunner (joint-PIs)** **02/01/2021 – 01/31/2025**
National Institute of Neurological Disorders and Stroke (NINDS)
A Flexible Hardware/Software Platform for Invasive Human Closed-loop Neuromodulation Research
The goal of this research is to develop and validate a new hardware/software platform that is optimized for the needs of invasive basic and clinical neuromodulation research in humans.
Total Cost: $4.4m ($3.0m direct / $1.4m indirect)
Role: Joint-PI (20% effort)
Review: Impact Score 54
Funding Decision: Resubmission (05/2020)

R13-NS118932 **Ritaccio & Brunner (joint-PIs)** **07/01/2020 – 06/30/2021**
National Institute of Neurological Disorders and Stroke (NINDS)
International Workshop on Advances in Electrocorticography
The goal of this workshop is to review the latest technology, science and clinical advances in electrocorticography.
Total Cost: $13k ($13k direct)
Role: Joint-PI
Status: Submitted (12/2019)

COMPLETED RESEARCH SUPPORT

Fondazione Neurone Onlus (Italy) **Ritaccio (PI)** **09/01/2012 – 09/01/2017**
Brain Computer Interface Research Collaboration
The goal of this project was to facilitate academic and scholarly exchange between Albany Medical College, Fondazione Neurone, and IRCCS Neuromed and to share abilities in innovative human brain mapping and brain computer interface technology, with the aim of eventual autonomy of the Italian site.
Total Cost: €3.6m
Role: Sub-Investigator

W911NF-08-1-0216 **Schalk (PI)** **06/04/2008 – 06/03/2014**
US Army Research Institute
A Brain-Based Communication and Orientation System
The goal of this project was to perform research to enable the design of a brain-based system for communication and orientation.
Total Cost: $2.2m
Role: Graduate Research Assistant and Software Engineer

W911NF-07-1-0415 **Schalk (PI)** **07/01/2007 – 06/30/2011**
US Army Research Institute
Brain-Based Communication System Using Imagined Speech
The goal of this project was to demonstrate the feasibility of a practical and intuitive brain-based communication device based on imagined speech
Total Cost: $405k
Role: Graduate Research Assistant and Software Engineer

ONGOING COLLABORATIONS

Nancy Kanwisher, Ph.D. (Massachusetts Institute of Technology)
- Music and Speech Selective Neural Population in Human Auditory Cortex
- Dynamics and Causal Functions of Large-Scale Cortical and Subcortical Networks

Evelina Fedorenko, Ph.D. (Massachusetts General Hospital & Harvard Medical School)
- Neural Correlate of the Construction of Sentence Meaning
- Dynamics and Causal Functions of Large-Scale Cortical and Subcortical Networks

Robert T. Knight, M.D. (University of California, Berkeley)
- Decoding Speech from ECoG Signals
- Neural Encoding of Speech
- Predictive Coding of Speech
- Spatiotemporal Dynamics of Word Retrieval in Speech Production
- Dynamics and Causal Functions of Large-Scale Cortical and Subcortical Networks

Anthony L. Ritaccio, M.D. (Mayo Clinic, Jacksonville)
- Dynamics and Causal Functions of Large-Scale Cortical and Subcortical Networks
- International Workshop on Advances in Electrocorticography

Jeffrey G. Ojemann, M.D. (University of Washington, Seattle Harborview & Childrens)
- Dynamics and Causal Functions of Large-Scale Cortical and Subcortical Networks

Jack J. Lin, M.D. (University of California, Irvine)
- Dynamics and Causal Functions of Large-Scale Cortical and Subcortical Networks

Andrew Geronimo, M.D. (Penn State Hershey Medical Center)
- Dynamics and Causal Functions of Large-Scale Cortical and Subcortical Networks

Jonathan Wolpaw, M.D. (Wadsworth Center, New York State Department of Health)
- National Center for Adaptive Neurotechnologies
- Short Course in Adaptive Neurotechnologies
- Dynamics and Causal Functions of Large-Scale Cortical and Subcortical Networks

Giulio Nicolò Meldolesi, M.D. (Fondazione Neurone & NeuroMed, Italy)
- Brain-Computer Interface Technology in Italy (Cyberbrain Project)

Nader Pouratian, M.D., Ph.D. (University of California, Los Angeles)
- Decoding Imagined Speech from ECoG Signals

Jérémie Mattout, Ph.D. (French National Institute of Health and Medical Research)
- Bayesian Modeling of Mismatch Negativity in ECoG Signals

Jan Kubanek, Ph.D. (University of Utah)
- Optimal Decision Making and Evidence Accumulation in ECoG Signals

Jonathan S. Brumberg, Ph.D. (Kansas University)
- Decoding of Continuous Overt and Covert Speech from ECoG Signals
- Assessing Dynamics, Spatial Scale, and Uncertainty in Task-Related Brain Networks
- Dynamics and Causal Functions of Large-Scale Cortical and Subcortical Networks

Adam Rouse, M.D., Ph.D. (Kansas University Medical Center)
- Dynamics and Causal Functions of Large-Scale Cortical and Subcortical Networks

Ignacio Saez, Ph.D. (University of California, Davis)
- Dynamics and Causal Functions of Large-Scale Cortical and Subcortical Networks

Bryan McLaughlin, Ph.D. (Micro-Leads Inc.)
- BCI2000-Based Laboratory and Clinical Systems

Bryan Voytek, Ph.D. (University of California, San Diego)
- Waveform and Shape of Non-Sinusoidal Oscillatory Electrocorticographic Signals

COMPLETED COLLABORATIONS

Tanja Schultz, Ph.D. (Karlsruhe Institute of Technology)

- Decoding Spoken Phrases from Phone Representations in the Brain

Ki Hyeong Lee, M.D. (Florida Hospital)

- Real-time Functional Mapping in Pediatric Patients