

Résumé / Curriculum Vitae

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Associate Professor, with tenure

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I. Earned Degrees

Ph.D. in Neurobiology

University of California—Irvine, Department of Neurobiology and Behavior, Oct. 1993

- Conducted dissertation research in the biochemistry of protein aging in mammalian brain, and methylation of isoaspartate by protein L-isoaspartyl methyltransferase.
- Used a variety of techniques including protein purification, high-performance liquid chromatography, gel electrophoresis, biochemical assays, polymerase chain reaction, oocyte microinjection, and neural explant culture.
- Completed curriculum in neural systems, neurophysiology, neurochemistry, animal behavior, learning and memory, neuroanatomy, machine learning, models of the brain, advanced analysis of attention and learning, electronics for biologists, and disorders of the central nervous system.

B.A., *cum laude* in Chemistry/Biochemistry

University of California—San Diego, June 1987

- Undergraduate research in the biochemical analysis of the interaction between cholinergic and dopaminergic systems in rat striatum (UCSD Neuroscience Department).
- Undergraduate internship: Characterization of physical properties of synergistic mixtures of polysaccharide gums (Kelco R & D, San Diego).

II. Employment

- Associate Professor (March 2008-present) and Assistant Professor (March 2002-March 2008), Coulter Department of Biomedical Engineering at the Georgia Institute of Technology and Emory University School of Medicine.
- Senior Research Assistant (2001-2002), Senior Research Fellow (1996-2000) and Research Fellow (1994-1996) in Biology, California Institute of Technology, Laboratories of Jerome Pine and Scott E. Fraser. All of these were non-tenure-track Research Faculty positions.
 - Researched the Silicon Neural Probe, part of the NINDS Neural Prosthesis Program.
 - Constructed one of the first 2-photon laser-scanning microscopes (1994).
 - Was the first to apply 2-photon microscopy to the development of the mouse olfactory system and the drosophila optic system, and rodent hippocampal dendritic spine plasticity.
 - Was the first to image GFP in a living animal with 2-photon microscopy.
 - Designed and constructed digital and analog circuits, including a high-speed (1000 frames/sec) CCD camera, for neural voltage imaging (US patent No. 6,633,331).
 - Developed techniques for dissociated neuron and hippocampal slice culture, multi-electrode electrophysiology and time-lapse 2-photon microscopy.
 - Developed techniques for labeling of neural transplants.
 - Developed automated computer delineation and measurement of dendritic spine morphological dynamics.
 - Invented novel sealed cell culture system (US patent No. 6,521,451).

III. Teaching

A. Individual Student Guidance

At Caltech

Postdocs mentored at Caltech:

Thomas DeMarse, now Assistant Professor, U. of Florida
Axel Blau, now Faculty at the Italian Inst. of Technology

PhD Students mentored at Caltech (as *de facto* advisor):

Daniel Wagenaar, 1999-2005, **Graduated** July 2005, Dissertation title: “Development and Control of Epileptiform Bursting in Dissociated Cortical Cultures.” Now a Broad Fellow at Caltech.
 Albert Wang, PhD 1998, Applied Physics
 Arno Klein (transferred to Columbia University)
 Natalia Lukina (went into industry)

Undergraduates mentored at Caltech:

C. Michael Atkin
 Matthew Vanderzee
 Gray Rybka
 Samuel Thompson
 Andrew Mart
 Miroslav Dudik
 William Findley

At Georgia TechPostdocs mentored at GT

Thomas DeMarse, now Assistant Professor, U. of Florida
 Mark Booth (Oct 2003-Dec 2005, NSF Center for Behavioral Neuroscience Postdoctoral Fellow). Now in the private sector.

PhD Students mentored at GT

Radhika Madhavan (PhD student in Bioengineering 2002-2007, Georgia Tech) **Graduated** May 2007, Dissertation title: “Role of Spontaneous Bursts in Functional Plasticity and Spatiotemporal Dynamics of Dissociated Cortical Cultures.” Now postdoc at the National Center for Biological Sciences, Bangalore, India (Bhalla lab).
 Zenas Chao (PhD student in Bioengineering since Spring 2002, Georgia Tech) **Graduated** Oct. 2007, “Modeling of closed-loop neural systems.” Three first-author papers published. Now a postdoc at the Interactive Brain Communication unit at RIKEN Brain Science Institute, Saitama, Japan (Fujii lab).
 Douglas Bakkum (PhD student in Mechanical since Fall 2003 Engineering, Georgia Tech) **Graduated** Oct. 2007, “Learning in neurally-controlled robots.” One first-author book chapter and one paper published. Now a postdoc at the Graduate School of Information Science and Technology, University of Tokyo (Takahashi lab).
 John Rolston (MD/PhD student beginning Summer 2004, Emory U. Sch. of Medicine Neuroscience Program) **Graduated (PhD)** Dec. 2009 “Multielectrode Interactions with the Normal and Epileptic Brain.” Now finishing MD residency at Emory.
 Sharanya Arcot Desai (PhD student in Bioengineering since 2008), co-advised by Robert Gross, Emory Neurosurgery.
 Nathan Killian (PhD student in Biomedical Engineering since 2007), co-advised by Elizabeth Buffalo, Emory Neurology. NSF IGERT Fellow
 Michelle Kuykendal (PhD student in Biomedical Engineering, ECE home school, since 2006), co-advised by Stephen DeWeerth (BME and ECE), and Martha Grover (ChBE). NSF Fellow
 Ming-fai Fong (PhD student in Emory Neuroscience program since 2009), co-advised by Peter Wenner, Emory Physiology. NSF Fellow
 Jonathan Newman (PhD student in Biomedical Engineering since 2007). NSF Fellow
 Robert Ortman (PhD student in Bioengineering, ECE home school, since 2008).
 Riley Zeller-Townson (PhD student in Bioengineering since 2009).
 Alex Calhoun (PhD student in Biomedical Engineering since 2010). NIH Imaging Training Grantee.

Masters Students mentored at GT

Chetna Shastry (2007, College of Computing, Georgia Tech)

Komal Rambani (Masters student in Bioengineering **Graduated** Fall 2006, Georgia Tech) “Thick brain slice cultures and a custom-fabricated multiphoton imaging system: Progress towards development of a 3D hybrid model.”

Nikhilesh Natraj (Bioengineering 2007), Georgia Tech.

Alexander Shkolnik (MS student in Math and Computer Science, 2003, Emory University), **Graduated** Spring 2003, “Neurally Controlled Simulated Robot: Applying Cultured Neurons to Handle and Approach/Avoidance Task in Real Time and a Framework for Studying Learning in Vitro.” Now postdoc at MIT.

Peter Passaro (MS student in Bioengineering 2003-2005, Georgia Tech) “In vitro imaging of neuromodulation and plasticity.” Transferred to University of Sussex, Brighton, U.K.

Undergraduate Researchers mentored at GT

Ted French (2010)

Pranav Mahadevan (2010)

Kevin Lindsay (2010)

Jimmy Williams (2010)

Ushnik Ghosh (2010)

Aaron Morris (2010)

Peter McMenamin (2009)

Chris Davis (2009)

Ben Tsui (2008)

Samantha Russel (2008)

Daniel Fowler (2008)

Ravi Patel (2008)

Richard Gautney (2008)

Chuyong Yi (2007)

Ryan Haynes (2005-2007, BME major) Marshall Scholar, now at Oxford, UK

Yixiao Zou (2006-2009, BME major) Goldwater Scholarship Awardee, now PhD student at Yale)

Matthew MacDougall (2002-2003, Emory University, now MD/PhD student at Caltech/USC)

Alexander Shkolnik (Emory University, now postdoc at MIT)

Blythe Towal (ECE major, Now PhD student at Northwestern U.)

John Brumfield (Fall 2003-Spring 2005, BME major, now in industry)

Bobby Thompson (2004-2006, BME major)

Bhavesh Mehta (2005-2006, BME major, now PhD student at Duke U.)

Santiago Archila (2005-2006, BME major, now PhD student in Emory Neuroscience program, and IGERT Scholar)

Jennifer Salgado (2004, BME major, Now PhD student at Medical College of Georgia)

Summer Interns in the Potter Lab

Christopher McDonald (Summer 2010, visiting high school teacher)

Rose Malinow (Summer 2010)

Sid Tantia (Summer 2009, CBN BRAIN program)

John Slack (Summer 2008, high school student, CBN Institute on Neuroscience program)

Wen Hui Tan (Summer 2007, from MIT; CBN BRAIN program)

Eleanor Ory (Summer 2005, from Smith College; PRAXIS Fellow)

Chris Grubb (Summer 2005, from Rose-Hulman Inst. of Tech.; CBN BRAIN program)

BME Senior Design Students:

Ryan Haynes

Herna Coe

Jennifer Salgado
 Jessica Lott
 Heidi Khalil
 Ima Ebong
 James Hamlin
 Shalin Shah
 Lennie George

B. Other Teaching Activities

As Assistant Professor (Georgia Tech)

- Taught brain-computer interfaces, Neuromorphic Cognition Engineering Workshop, Summer 2010.
- Developed Real-World Curriculum for Introductory Neuroscience, taught since Fall 2005.
- Developed curriculum for graduate Hybrid Neural Microsystems course, taught Fall 2004, 2006, Spring 2009.
- Facilitated Problem-Based Learning in Biomedical Engineering (six semesters).
- Developed lab and lecture curriculum for new NeuroEngineering Fundamentals course, taught since Spring 2004.
- Taught 3D Live Cell Imaging short course, U. of British Columbia, Summers 2002-2004.
- Served as Guest Lecturer in numerous courses at Georgia Tech and Emory.

As Research Faculty (Caltech)

- Served as guest lecturer for CNS 163, Sleep and Dreams (three years).
- Served as guest lecturer for Ph/Bi 103, Neuroscience for Physicists and Engineers (two years).
- Developed curriculum and co-taught Principles of Modern Microscopy, Fall, 2000.
- Taught 3D Live Cell Imaging short course, U. of British Columbia, Summers 2000 and 2001.

As grad student (UC Irvine)

- Served as teaching assistant for undergraduate psychobiology lab course, including curriculum development and writing for the laboratory manual (three years).
- Sole teacher of the department's graduate neurochemistry lab course (two years).

As undergrad (UCSD)

- Served as Teaching Assistant for freshman chemistry (two years).

IV. Scholarly Accomplishments

A. Published Books and Parts of Books

[Times Cited, as of 4/10]

Most recent citation counts for Steve M. Potter: [Click Here](#) (Google Scholar search)

1. Potter, S. M. (2007). "What Can Artificial Intelligence Get From Neuroscience?" In M. Lungarella, F. Iida, J. Bongard, & R. Pfeifer (Eds.), 50 Years of Artificial Intelligence: Essays Dedicated to the 50th Anniversary of Artificial Intelligence. (pp. 174-185). Berlin: Springer. [2]
2. Potter, S. M., Wagenaar, D. A., DeMarse, T. B. (2006) "Closing the Loop: Stimulation Feedback Systems for Embodied MEA Cultures." In Advances in Network Electrophysiology Using Multi-Electrode Arrays, M Taketani, M Baudry eds. New York: Springer [34]
3. Potter, S. M., (2005) "Two-photon microscopy for 4D imaging of living neurons," in Imaging in Neuroscience and Development: A Laboratory Manual, 2nd Edition, R. Yuste and A. Konnerth, eds, Cold Spring Harbor Laboratory Press, pp.8.1–8.12. [31]
4. Bakkum D. J., Shkolnik A. C., Ben-Ary G., Gamblen P., DeMarse T. B., Potter S. M. (2004).

- “Removing some ‘A’ from AI: Embodied Cultured Networks.” In Embodied Artificial Intelligence, F Iida, R Pfeifer, L Steels, Y Kuniyoshi, eds. pp. 130-45. New York: Springer [39]
5. Potter, S. M. (2001). “Distributed processing in cultured neuronal networks,” in Advances in Neural Population Coding. Nicolelis, M. A. L. ed. Amsterdam, Elsevier. 130: 49-62. [81]
 6. Potter, S. M. (2000). “Two-Photon Microscopy for 4D Imaging of Living Neurons” in Imaging Neurons: A Laboratory Manual. Yuste, R., Lanni, F. and Konnerth, A., eds. Cold Spring Harbor, CSHL Press: 20.1-20.16. [31]
 7. Potter, S. M., Pine, J. and Fraser, S. E. (1996). “Neural transplant staining with DiI and vital imaging by 2-photon laser-scanning microscopy,” in The Science of Biological Specimen Preparation for Microscopy. Malecki, M. and Roomans, G. M., eds. Chicago, SMI. 10: 189-199. [11]

B. Refereed Publications

1. Rolston, J. D., Laxpati, N. G., Gutekunst, C.-A., Potter, S. M., & Gross, R. E. (2010). Spontaneous and evoked high-frequency oscillations in the tetanus toxin model of epilepsy. *Epilepsia*, 51, 2289-2296.
2. Rolston, J. D., Gross, R. E., & Potter, S. M. (2010). Closed-loop, open-source electrophysiology (Invited Focused Review, peer-reviewed). *Frontiers in Neuroscience*, 4(31), 1-8. doi: 10.3389/fnins.2010.00031
3. Desai, S. A., Rolston, J. D., Guo, L., & Potter, S. M. (2010). Improving impedance of implantable microwire multielectrode arrays by ultrasonic electroplating of durable platinum black. *Frontiers in Neuroengineering*, 3(5), doi: 10.3389/fneng.2010.00005.
4. Hales, C. M., Rolston, J. D., & Potter, S. M. (2010). How to Culture, Record and Stimulate Neuronal Networks on Micro-electrode Arrays (MEAs). *JoVE*, 39, doi: 10.3791/2056.
5. Yuan, X., Trachtenberg, J. T., Potter, S. M., & Roysam, B. (2009). MDL constrained 3-D grayscale skeletonization algorithm for automated extraction of dendrites and spines from fluorescence confocal images. *Neuroinformatics*, 7, 213-232.
6. Rolston, J. D., Gross, R. E., & Potter, S. M. (2009). A low-cost multielectrode system for data acquisition and real-time processing with rapid recovery from stimulation artifacts. *Frontiers in Neuroengineering*, 2(12), 1-17.
7. Rambani, K., Vukasinovic, J., Glezer, A., & Potter, S. M. (2009). Culturing thick brain slices: An interstitial 3D microperfusion system for enhanced viability. *J. Neurosci. Methods* 180, 243-254.
8. Esposti, F., Signorini, M. G., Potter, S. M., & Cerutti, S. (2009). Statistical long-term correlations in dissociated cortical neuron recordings. *IEEE Transactions on Neural Systems & Rehabilitation Engineering*, 17, 364-369.
9. Bakkum, D. J., Chao, C. H., & Potter, S. M. (2008). Spatio-temporal electrical stimuli shape behavior of an embodied cortical network in a goal-directed learning task. *Journal of Neural Engineering*, 5, 310-323. [5]
10. Chao, Z. C., Bakkum, D. J., & Potter, S. M. (2008). Shaping Embodied Neural Networks for Adaptive Goal-directed Behavior. *PLoS Computational Biology*, 4(3): e1000042. [15]
11. Bakkum, D. J., Chao, C. H., & Potter, S. M. (2008). Long-term activity-dependent plasticity of action potential propagation delay and amplitude in cortical networks. *PLoS One*, 3(5), e2088. [8]
12. Bakkum, D. J., Gamblen, P. M., Ben-Ary, G., Chao, Z. C., & Potter, S. M. (2007). MEART: The Semi-living Artist. *Frontiers in NeuroRobotics*, vol. 1, article 5, 1-10. [9]
13. Madhavan, R., Chao, Z. C., & Potter, S. M. (2007). Plasticity of recurring spatiotemporal activity patterns in cortical networks. *Physical Biology*, 4:181-193. [21]
14. Rolston, J. D., Wagenaar, D. A., & Potter, S. M. (2007). Precisely timed spatiotemporal patterns of neural activity in dissociated cortical cultures. *Neuroscience*, 148, 294-303. [32]
15. Chao, Z. C., Bakkum, D. J., & Potter, S. M. (2007). Region-specific network plasticity in simulated and living cortical networks: Comparison of the center of activity trajectory (CAT) with other statistics. *Journal of Neural Engineering*, 4, 294-308. [18]

16. Wagenaar, D. A., Pine, J., & Potter, S. M. (2006). Searching for plasticity in dissociated cortical cultures on multi-electrode arrays. *Journal of Negative Results in BioMedicine* 5:16. [35]
17. Wagenaar, D. A., Nadasdy, Z., & Potter, S. M. (2006). Persistent dynamic attractors in activity patterns of cultured neuronal networks. *Physical Review E*. 73:51907.1-8 [33]
18. Wagenaar, D. A., Pine, J., & Potter, S. M. (2006). An extremely rich repertoire of bursting patterns during the development of cortical cultures. *BMC Neuroscience*, 7: 11. [119]
19. Wagenaar, D. A., Madhavan, R., Pine, J. and Potter, S. M. (2005). Controlling bursting in cortical cultures with closed-loop multi-electrode stimulation. *J. Neuroscience* 25:680-688. [100]
20. Chao, Z. C., Wagenaar, D. A. and Potter, S. M. (2005). Effects of random external background stimulation on network synaptic stability after tetanization: a modeling study. *Neuroinformatics* 3:263-280. [27]
21. Wagenaar, D. A., Pine, J. and Potter, S. M. (2004). Effective parameters for stimulation of dissociated cultures using multi-electrode arrays. *Journal of Neuroscience Methods* 138: 27-37. [99]
22. Wagenaar, D. A. and Potter, S. M. (2004) A versatile all-channel stimulator for electrode arrays, with real-time control. *J. Neural Engineering* 1:39-45. [57]
23. Wagenaar, D. A. and Potter, S. M. (2002). Real-time multi-channel stimulus artifact suppression by local curve fitting. *J. Neurosci. Methods*: 12:113-120. [65]
24. Potter, S. M., DeMarse, T. B. (2001) A new approach to neural cell culture for long-term studies. *J. Neurosci. Methods* 110:17-24. [191]
25. DeMarse, T. B., Wagenaar, D. A., Blau, A. W. and Potter, S. M. (2001). The Neurally Controlled Animat: Biological brains acting with simulated bodies. *Autonomous Robots* 11:305-310. [113]
26. Potter, S. M., (2001) Distributed processing in cultured neuronal networks, *Progress in Brain Research*, 130: 49—62. [81]
27. Potter, S. M., Zheng, C., Koos, D. S., Feinstein, P., Fraser, S. E., Mombaerts, P. (2001). Structure and emergence of specific olfactory glomeruli in the mouse. *Journal of Neuroscience* 21:9713-9723.[Cover article] [104]
28. Potter, S. M., Pine, J. and Fraser, S. E. (1996) Neural transplant staining with DiI and vital imaging by 2-photon laser-scanning microscopy, *Scanning Microscopy Supplement*, 10:189—199. [11]
29. Potter, S. M., Wang, C. M., Garrity, P. A. and Fraser, S. E. (1996) Intravital imaging of green fluorescent protein using 2-photon laser-scanning microscopy, *Gene*, 173:25—31. [83]
30. Potter, S. M., Henzel, W. J. and Aswad, D. W. (1993) In-vitro aging of calmodulin generates isoaspartate at multiple asn-gly and asp-gly sites in calcium-binding domain-II, domain-III, and domain-IV, *Protein Science*, 2:1648—1663. [44]
31. Potter, S. M., Johnson, B. A., Henschen, A., Aswad, D. W. and Guzzetta, A. W. (1992) The type-II isoform of bovine brain protein L-isoaspartyl methyltransferase has an endoplasmic-reticulum retention signal (...RDEL) at its C-terminus, *Biochemistry*, 31:6339—6347. [19]

C. Other Publications

Invited Reviews

1. Rolston, J. D., Gross, R. E., & Potter, S. M. (2010). Closed-loop, open-source electrophysiology (Invited Focused Review, peer-reviewed). *Frontiers in Neuroscience*, 4(31), 1-8.
2. Potter, S. M. (2010). Closing the loop between neurons and neurotechnology. *Frontiers in Neuroscience*, 4, 15.
3. Potter, S. M. (2003). When Technology Becomes Us: Review of 'Natural-Born Cyborgs' by Andy Clark. *Cerebrum* 5: 88-95.
4. Potter, S. M., (1996) Vital imaging: Two photons are better than one, *Current Biology*, 6, 1595—1598. [74]

D. Presentations

Distinguished Invited Talks

1. Keynote Lecture, Joint Southeast Nerve Net/Georgia-South Carolina Neuroscience Consortium conference, Atlanta, March 5, 2010.
2. Brain-Machine Interfaces panel, IEEE Systems, Man, & Cybernetics conference, San Antonio, Oct. 12, 2009.
3. Keynote Lecture, Institute on Neuroscience Summer Research Program, Emory University, Aug. 1, 2008.
4. Plenary Lecture, "In the Presence of the Body" conference at the Center for Biotechnology and Interdisciplinary Studies: Rensselaer Polytechnic Institute, Troy, NY, April 23, 2007.
5. Panel Leader, 50th Anniversary Summit of Artificial Intelligence, Ascona, Switzerland, July 10, 2006.
6. Keynote Lecture, MEA Symposium: Multielectrode array studies and neuronal plasticity, Free University Amsterdam, July 3, 2006.
7. Plenary Speaker, Optical Society of America, Ft. Lauderdale, March 23, 2006.
8. Distinguished Lecture, Brains & Behavior Program, Georgia State University, April 11, 2006.
9. Plenary Lecture, Society of Biological Psychiatry Annual Meeting, San Francisco, May 17, 2003.
10. Inaugural Lecture, Georgia Tech Tuesday Talks, Feb. 22, 2005.
11. Plenary Lecture, Vanguard Conference: "Where Life Meets Technology" Madrid, July 22, 2003.
12. Keynote Lecture, Southeast Multiphoton User Group Meeting, Atlanta, Aug. 30, 2002.
13. Keynote Lecture, Harvey Mudd College Presentation Days, Claremont, April 23, 2001.
14. Keynote Lecture, Information Science Innovations 2001, Natural & Artificial Intelligent Systems Organization, Dubai, U.A.E., March 18, 2001.

Other Invited Talks

1. Neuromorphic Cognition Engineering Workshop, Telluride, Colorado, June 28, 2010.
2. University of Manchester School of Computer Science, Manchester, U. K., June 17, 2010.
3. Ruhr University, Bochum Research Department of Neuroscience, Bochum, Germany, June 10, 2010.
4. Max Planck Institute Bernstein Center for Computational Neuroscience, Göttingen, Germany, June 23, 2009.
5. Purdue University, Biomedical Engineering Seminar, Lafayette, IN, Dec. 10, 2008.
6. Technion University, Center for Network Biology, Haifa, Israel, July 14, 2008.
7. UC Davis, Department of Biomedical Engineering, Davis, CA, May 23, 2008.
8. Georgetown University, Department of Physics, Washington, DC, April 16, 2008
9. "Whence the Self" Aspen Consciousness Research Retreat, Mind Science Foundation, Aug. 4, 2007
10. Gordon Conference on Nonlinear Science, Colby College, Maine, June 27, 2007.
11. General Motors Research, Sigma Xi Lecture, Warren, MI, March 16, 2007.
12. Investigators of Mind, Brain, & Intelligent Artifacts Student Group, U. of GA, Athens, March 7, 2007.
13. University of Illinois, Bioengineering Seminar, Urbana-Champaign, Feb. 8, 2007.
14. Johns Hopkins University Mind-Brain Inst. Bodian Seminar, Baltimore, Feb. 5, 2007.
15. Emory Frontiers in Neuroscience, Emory Neuroscience Graduate Program, Atlanta, Dec. 1, 2006.
16. Winship Cancer Inst. Georgia Imaging and Microscopy Symposium, Atlanta, Aug. 24, 2006.
17. Southeast Multiphoton Excitation User Group Meeting, Atlanta, Aug. 11, 2006.
18. Biology Graduate Seminar, Georgia State University, April 21, 2006.
19. Physics Colloquium, University of South Florida, Tampa, March 24, 2006.
20. Northwestern University Biomedical Engineering Seminars, May 12, 2005.
21. Arizona State University Soft Matter Seminars, April 27, 2005.
22. Center for Theoretical Biophysics, UC San Diego, Jan. 21, 2005
23. Microscopy and Microanalysis Conference, Savannah, Aug. 3, 2004.
24. Biocomplexity Seminar Series, Indiana University, Bloomington, May 10, 2004.
25. Canadian Undergraduate Technology Conference, Toronto, Jan. 23, 2004.
26. National Institute on Drug Abuse, NIH, Nov. 17, 2003.

27. Neuroscience Program Seminar, UC San Francisco, Oct. 16, 2003.
28. IEEE Engineering in Medicine & Biology Society MiniSymposium Invited Speaker, Cancun, Sept. 19, 2003.
29. Microscopy & Microanalysis Conference, San Antonio, Aug. 6, 2003.
30. Department of Information Technology, U. of Zurich, Switzerland, July 15, 2003.
31. Embodied AI, Schloss Dagstuhl, Germany, July 9, 2003.
32. Computational Neuroscience Seminar, Duke University, Durham, NC, May 22, 2003.
33. Keck Laboratory for Biological Imaging and Department of Anatomy, U. of Wisconsin, Madison, May 6, 2003.
34. Cognitive Science Seminar, Emory University, April 2, 2003.
35. Substrate-Integrated Microelectrode Arrays Conf., Denton, Texas, March 6, 2003.
36. Emory University School of Medicine, Dept. of Pathology, Feb. 18, 2003.
37. Emory Mini-Medical School, Atlanta, Oct. 22, 2002.
38. Cognitive Science Program, Georgia Institute of Technology, Oct. 11, 2002.
39. Frontiers in Neuroscience, Emory University, Atlanta, Oct. 4, 2002.
40. Department of Cellular Biology, University of Georgia, Athens, Aug. 27, 2002.
41. Multi-Dimensional Microscopy 2001, Melbourne, Nov. 26, 2001.
42. Department of Anatomy and Human Biology, University of Western Australia, Perth, Nov. 29, 2001.
43. Health Sciences & Technology Division, Harvard/MIT, May 31, 2001.
44. Department of Bioengineering, University of California, Berkeley, April 30, 2001.
45. Department of Bioengineering, University of Pennsylvania, Feb. 8, 2001.
46. Multiphoton Microscopy in the Biomedical Sciences, SPIE, San Jose, Jan. 22, 2001.
47. Department of Cell Biology, University of Texas Southwestern Medical Center, Dallas, Dec. 12, 2000.
48. Multi-Unit Symposium, Society for Neuroscience, New Orleans, Nov. 7, 2000.
49. Department of Biomedical Engineering, Emory University/Georgia Tech, Atlanta, Aug. 24, 2000.
50. Department of Neurology, Washington University, St. Louis, April 17, 2000.
51. SilicoNeural Group Meeting, University of Stirling, Scotland, April 6, 2000.
52. Computational Molecular Biology Seminar Series, Caltech, Feb. 7, 2000.
53. Department of Brain and Cognitive Sciences, MIT, Jan. 6, 2000.
54. Massachusetts General Hospital Neuroimaging Group, Jan. 5, 2000.
55. Bioengineering Department and Institute for Medicine and Engineering, University of Pennsylvania, Philadelphia, Nov. 16, 1999.
56. Developments in Multichannel Recording III, Miami, Oct. 23, 1999.
57. Neuroengineering Group, Georgia Tech, Atlanta, Oct. 12, 1999.
58. 2nd International Symposium on GFP, San Diego, May 25, 1999.
59. Neural Information Processing Systems, Population Coding Workshop, Breckenridge, Colorado, Dec. 5, 1998.
60. Jet Propulsion Lab, Center for Integrated Space Microsystems, Nov. 3, 1998.
61. 5th International Congress of Neuroethology, San Diego, Aug. 23, 1998.
62. Multiphoton Microscopy Symposium, Microscopy Society of America, Atlanta, July 11, 1998.
63. Department of Veterinary Pathobiology, Texas A&M University, March 31, 1998.
64. Keystone Symposium on Synapse Formation and Function, Park City, Utah, March 12, 1998.
65. Department of Neuroscience, University of California San Diego, Dec. 9, 1997.
66. Symposium on Applications of Multiphoton Imaging, Cleveland, Aug. 10, 1997.
67. Southern California Society for Microscopy, Pasadena, May 16, 1996.
68. 3-D Microscopy of Living Cells Symposium, Scanning96, Monterey, April 10, 1996.
69. British Society for Cellular Biology, GFP Symposium, York, England, March 1996.
70. Functional Imaging and Optical Manipulation of Living Cells, San Jose, Feb. 2, 1996.
71. 14th Pfefferkorn Conference on Biological Specimen Preparation, Belleville, Illinois, Aug. 8, 1995.

[*Non-invited* presentations are represented in Conference Papers or Abstracts, below]

Conference Papers

1. Kuykendal, M. L., Guvanasen, G., Grover, M. A., Potter, S. M., & DeWeerth, S. P. (2010). Real-time Characterization of Neuronal Response for Selective Stimulation. 7th International Meeting on Substrate-Integrated Microelectrode Arrays, 7, 212-213.
2. Rolston, J. D., Gross, R. E., & Potter, S. M. (2009). NeuroRighter: Closed-loop Multielectrode Stimulation and Recording for Freely Moving Animals and Cell Cultures. Proc. IEEE EMBS, 31, 6489-6492.
3. Rolston, J. D., Gross, R. E., & Potter, S. M. (2009). Common median referencing for improved action potential detection with multielectrode arrays. Proc. IEEE EMBS, 31, 1604-1607.
4. Bakkum, D. J., Chao, Z. C., & Potter, S. M. (2009). Homeostasis of Neuronal Network Firing Rate During the Induction of Plasticity. 4th International IEEE EMBS Conference on Neural Engineering. 4, 661-664.
5. Potter, S. M. (2008). How Should We Think About Bursts? 6th International Meeting on Substrate-Integrated Micro-Electrode Arrays, 6, 22-25.
6. Rolston, J. D., Gross, R. E., & Potter, S. M. (2008). A Low-Cost System for Simultaneous Recording and Stimulation with Multi-microelectrode Arrays. 6th International Meeting on Substrate-Integrated Micro Electrode Arrays, 335-336.
7. Madhavan, R., Chao, Z. C., & Potter, S. M. (2008). Artificial Background Sensory Input Aids Functional Plasticity in Cultured Cortical Networks. 6th International Meeting on Substrate-Integrated Micro Electrode Arrays, 68-69.
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 21. Potter, S. M., DeMarse, T. B., Bakkum, D. J., Booth, M. C., Brumfield, J. R., Chao, Z. C., Madhavan, R., Passaro, P. A., Rambani, K., Shkolnik, A. C. and Towal, R. B. (2004). Hybrots: hybrids of living neurons and robots for studying neural computation. Brain Inspired Cognitive Systems, Stirling, Scotland.
 22. Potter, S. M., Booth, M. C., Brumfield, J. R., Passaro, P. A., Rambani, K. and Towal, R. B. (2004). Combining Time-lapse Optical Microscopy and Multi-electrode Arrays to Study Learning in Vitro. *Microscopy and Microanalysis*, Savannah. (Invited)
 23. Potter, S. M. (2004). Hybrots: hybrids of living neurons and robots for studying distributed neural dynamics. *Simulation of Adaptive Behavior: Neurobotic Models in Neuroscience and Neuroinformatics*, Santa Monica (Invited)
 24. Potter S. M., DeMarse T. B., Blau A. W., Wagenaar D. A. (2003). Multi-photon time-lapse microscopy and optical recording to study neural processing and plasticity. *Microscopy and Microanalysis* 9(2): 184-5 (Invited).
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Conference Abstracts

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2. Rolston, J. D., Potter, S. M., & Gross, R. E. (2009). Increased CA1/CA3 coherence of high-frequency oscillations during interictal spikes and seizures in the tetanus toxin epilepsy model. *Soc. Neurosci. Abstr.*, 331.24.
3. Rolston, J. D., Potter, S. M., & Gross, R. E. (2009). Multimicroelectrode Microstimulation for the Treatment of Focal Epilepsy in the Tetanus-Toxin Rat Model. Poster presented at the World

- Society for Stereotactic and Functional Neurosurgery, Toronto.
4. Rolston, J. D., Gross, R. E., & Potter, S. M. (2008). An Integrated, Low-Cost System for Closed-Loop Multielectrode Recording and Stimulation in Behaving Animals. Neural Interfaces Workshop, Cleveland.
 5. Kuykendal, M. L., Ross, J. D., Potter, S. M., & DeWeerth, S. P. (2008). Real-time characterization of neural excitability by multisite extracellular stimulation. Soc. Neurosci. Abstr, 43.1.
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 8. Madhavan, R., Chao, Z. C., & Potter, S. M. (2007). Artificial background sensory input aids functional plasticity in cultured cortical networks. Soc. Neurosci. Abstr, 586.7.
 9. Chao, Z. C., Bakkum, D. J., Wagenaar, D. A., & Potter, S. M. (2006) Network plasticity in simulated and living cortical networks: comparison of the Center of Activity Trajectory (CAT) with other metrics. 5th Intl. Meeting on Substrate-Integrated Microelectrode Arrays, Reutlingen, Germany. pp. 14-15.
 10. Chao, Z. C., Bakkum, D. J., & Potter, S. M. (2006) A more animal-like in vitro model for the study of learning and embodiment. Annual Meeting of the BMES, Chicago.
 11. Wagenaar, D. A., Pine, J., & Potter, S. M. (2006) Large Database of Spontaneous and Evoked Activity Patterns in Developing Networks. 5th Intl. Meeting on Substrate-Integrated Microelectrode Arrays, Reutlingen, Germany. pp. 54-55.
 12. Rambani, K., Vukasinovic, J., Glezer, A., & Potter, S. M. (2006). Maintaining viable thick cortical slices by perfusion of nutrient medium. Soc. Neurosci. Abstr, 200.15.
 13. Madhavan, R., Mheta, B., & Potter, S. M. (2006). Activity-dependent changes in percent GABA-positive neurons in dissociated cortical cultures. Soc. Neurosci. Abstr, 235.15.
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 16. Rolston, J. D., Wagenaar, D. A., & Potter, S. M. (2006). Precisely timed spatiotemporal patterns of neural activity in dissociated cortical cultures. Soc. Neurosci. Abstr, 432.11.
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 22. Ross, J. D., Madhavan, R., Potter, S. M., Brown, E. A. and DeWeerth, S. P. (2004). Multi-electrode impedance tuning: The effect of electrode impedance on stimulation of dissociated cultures. Society for Neuroscience, San Diego.
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- dissociated cortical cultures on multi-electrode arrays." Substrate-Integrated Micro-Electrode Arrays, Denton, Texas.
27. Wagenaar, D. A., Pine, J., and Potter, S. M. (2003) "Parameters for voltage- and current-controlled stimulation of cortical cultures through multi-electrode arrays." *Society for Neuroscience Abstracts* 29: 429.14
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 29. Madhavan, R., Wagenaar, D. A., and Potter, S. M. (2003) Multi-site stimulation quiets bursts and enhances plasticity in cultured networks. *Society for Neuroscience Abstracts* 29: 808.14
 30. DeMarse, T. B., D. A. Wagenaar and S. M. Potter (2002). "The neurally-controlled artificial animal: A neural-computer interface between cultured neural networks and a robotic body." *Society for Neuroscience Abstracts* 28: 347.1.
 31. Wagenaar, D. A., T. B. DeMarse, S. M. Potter and J. Pine (2001). "Development of complex activity patterns in cortical networks cultured on multi-electrode arrays." *Society for Neuroscience Abstracts* 27: 922.3.
 32. DeMarse, T. B., D. A. Wagenaar, A. W. Blau and S. M. Potter (2001). "Enhancement and depression of neural activity over days following tetanic stimulation on a multi-electrode array." *Society for Neuroscience* 27: 372.17.
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 37. Blau, A., DeMarse, T., Pine, J., and Potter, S., (2000) "High-speed imaging of neuronal network activity," *2nd International Meeting on Substrate-Integrated Microelectrode Arrays*, Reutlingen, Germany, June 21-23.
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 39. Potter, S. M., Kantor, D. B., Mamelak, A. N., Fraser, S. E. and Schuman, E. M., (1997) "3D time-lapse imaging of hippocampal dendritic spine plasticity using 2-photon microscopy," *Society for Neuroscience*, 23:136.5.
 40. Fraser, S. E., Pine, J. and Potter, S. M., (1997) "2-Photon time-lapse imaging of transplant integration in cultured rat hippocampal slices," *Society for Neuroscience*, 23:140.18.
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 43. Pine, J., Maher, M. and Potter, S. M., (1997) "Microstructures for studies of cultured neural networks," *3rd International Conference on Cellular Engineering*, Nice, France.
 44. Potter, S. M., Garrity, P., and Fraser, S. E., (1996) "Using two-photon microscopy to image GFP in living specimens," *British Society for Developmental Biology/British Society for Cell Biology —Joint Spring Meeting*, York, England.
 45. Potter, S. M., Fraser, S. E., and Pine, J., (1996) "The greatly reduced photodamage of 2-photon microscopy enables extended 3-dimensional time-lapse imaging of living neurons," *Scanning*, 18:147.
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47. Aswad, D. W., Johnson, B. A., Potter, S. M., Hancock, W. S., and Henzel, W. J., (1991) "Occurrence and detection of isoaspartate in peptides and proteins," *2nd International Congress on Amino Acids and Analogues*, 1:177.
48. Aswad D. W., Johnson, B. A., Potter, S. M., and Hancock, W. S., (1990) "Enzymatic analysis of isoaspartate formation in proteins," *3rd International Symposium on Analytical Methods in Biotechnology*.

E. Other Scholarly Accomplishments

Host to visiting scientists

- Philip Gamblen and Guy Ben-Ary of U. of Western Australia, Perth (Jan-May 2006)

Patents

- Potter, S. M. and Pine, J. (2003). "High-speed CCD array camera with random pixel selection." US Patent [6,633,331](#)
- Potter, S. M. (2003). "Sealed Culture Chamber." US Patent [6,521,451](#)

Research-related media articles, interviews, and TV specials

Full-length documentary, "Is this art? - Volume 4: MEART The Semi Living Artist" by ArtFilms, Robots Podcast, BBC Horizon documentary "Human v2.0", WIRED Magazine, The Economist, New York Times, Discover, IEEE Intelligent Systems, New Scientist, National Geographic, Photonics Spectra, Technology Review, US News & World Report, BBC News, NPR, "Beyond Human" TV special, CNN, Canadian Broadcast Company, Australian Broadcast Company, and others.

V. Service

A. Professional Contributions

- Director, Laboratory for Neuroengineering, since 2009
- Associate Editor, *Frontiers in NeuroRobotics*, 2007-present
- Council Member, Society for Neuroscience, Atlanta Chapter, 2006-2010
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- Member, Scientific Advisory Boards in Neuroscience and Robotics/AI, Lifeboat Foundation, 2008-present
- Brain-Machine Interfaces session organizer and chair, IJCNN conf., Atlanta, June 14, 2009
- Neural Imaging and Recording session organizer and chair, IEEE EMBS conf., NYC, Aug. 31, 2006
- Cellular Neuroimaging session organizer and chair, IEEE EMBS conference, Cancun, September, 2003
- Served as peer reviewer for over 50 journal articles and foundation grants.
- Served on NIH R01/R21 grant review study sections since 2003
- Served on NSF grant review panels since 2001
- Served on NIH SBIR grant review study section, October, 2000
- Creator and administrator since 1996, Multi-Photon Microscopy Users internet mailing list
- Creator and administrator since 1998, Multi-electrode Array Users internet mailing list
- Member, Microscopy Society of America
- Member, IEEE Engineering in Medicine & Biology Society
- Member, International Neural Network Society
- Member, Society for Neuroscience
- Member, International Society for Optical Engineering (SPIE)

B. Campus Contributions

- Student Computer Ownership Committee, Georgia Tech, since 2009
- Elected to Executive Committee, Neuroscience Graduate Program, Emory GDBBS, 2007-2010
- BME Awards Committee 2009-2010
- BME Educational Assessment Committee 2006-2008
- BME Faculty Recruiting Committee 2002-2004
- BME Faculty Advisory Committee 2003-2004
- PhD Dissertation committee member: Varadraj Vernekar (advisor: LaPlaca), Paul Garcia (advisors: Ditto, Calabrese) Gustavo Prado (advisor: LaPlaca), Jim Ross (advisor: Steve DeWeerth), Toshiro Endo (advisor: Ron Arkin).
- Faculty, NSF Center for Behavioral Neuroscience
- Program Faculty, Emory University Neuroscience Graduate Program
- Program Faculty, GT Robotics & Intelligent Machines
- Program Faculty, Cognitive Science Program, Georgia Tech

C. Other Contributions

Creator and Leader, The Group Mind (civic reading group on books about brains and minds, 2 years)

VI. Grants and Contracts

A. As Principal and Co-Principal Investigator

Emory Neurosciences Initiative Seed Grant, “Optical Neural Stimulation to Control Bursting,” \$40k, one year beginning May 2009. (Co-PIs Robert Gross (Emory Neurosurgery), Dieter Jaeger (Emory Biology)).

Role: Co-PI (among 3)

NSF Office of Emerging Frontiers in Research and Innovation (EFRI) program for Cognitive Optimization and Prediction (COPN) collaborative projects, “Neuroscience and Neural Networks for Engineering the Future Intelligent Electric Power Grid,” \$2M over 4 years, beginning Nov 2008. (Co-PIs Ron Harley (GT ECE); Kumar Venayagamoorthy, and Don Wunsch, Missouri S&T)
Role: Co-PI (among 4)

NIH NINDS R21 “Distributed Microstimulation for Epilepsy,” \$372k over 2 years, beginning Sept. 2008. (Robert Gross, Emory Neurosurgery, PI)
Role: Co-PI

Epilepsy Research Foundation New Therapies Grant, “Closed-loop microstimulation with multielectrode arrays to suppress epileptic seizures,” \$100k over 1 year + \$24k matching from the COE, beginning Aug 2007. Robert Gross (Emory Neurosurgery) Co-PI.
Role: PI

National Academies-Keck Foundation Futures Initiative Smart Prosthetics Grant, “Testbed for Developing Direct Cortical Feedback of Proprioception for Smart Limb Prostheses,” \$75k over 2 years beginning June 2007, Jose Carmena (Berkeley) Co-I.
Role: Sole PI

Coulter Foundation Translational Partners Award, “Multi-Electrode Microstimulation To Treat Intractable Seizures In A Rat Model Of Focal Epilepsy,” \$300k over 3 years (July 2006-2009), Robert Gross (Emory Neurosurgery) Co-PI.
Role: PI

Cutting-Edge Basic Research Award from NIDA R21-DA018250, “Chemical Reward Systems for Embodied Cultured Networks,” \$300k over two years beginning Aug 2004.
Role: sole PI

NIH Bioengineering Research Partnership RO1 EB000786 from NINDS/NIBIB, "A 3-D Microfluidic/Electronic Neural-Interfacing System" \$7M over 5 years beginning Aug 2002.
Role: Co-PI (among 7), Stephen DeWeerth PI.

NIH New Neuroscience Technology RO1 NS38628 grant from the NINDS, “Multi-electrode and imaging analysis of cultured networks” \$1.2M over 5 years beginning Apr 1999.
Role: sole PI.

\$100k startup funds, Georgia Tech President’s Office
\$100k startup funds, College of Engineering Dean’s Office
\$250k startup funds, The Whitaker Foundation

B. As Investigator

NIH SBIR “Simultaneous Stimulation and Recording in Scalable Multielectrode Arrays,” \$329K over two years. James Ross (Axion Biosystems) PI.
Role: Investigator, Consultant

NSF Center for Behavioral Neuroscience Venture Grant, “Multi-electrode approaches to probing affective circuits in awake, behaving animals,” Don Rainnie (Emory Psychiatry) PI.

NIH-NINDS 5R01NS045072-03 12/15/02-5/31/08 “Strain-Induced Scarring & its Effects on Microelectrodes” Role: Consultant (Bellamkonda PI)

NIH-NIMH 1T32MH067547-01A2 7/1/05-6/30/10 “GT-Emory Postdoctoral Training Program in Neuroimaging Sciences” Role: program faculty and instructor (Douglas Bremner, PI, Emory SOM)

VII. Honors and Awards

Awards

1st Prize (€18,000) VIDA 12.0 (Fundacion Telefonica’s artificial life art contest) for our Silent Barrage project.

Georgia Tech BMES “Outstanding Faculty Award,” 2008

“Thanks for Being a Great Teacher,” Georgia Tech Center for the Enhancement of Teaching and Learning, 2008, 2009, 2010

Editorship

Invited to serve as Associate Editor and journal organizer for *Frontiers in NeuroRobotics*, 2007

Independently written scholarly treatments on our research

- A philosophical journal article analyzing our work entitled, “Brains, vats, and neurally-controlled animats,” was independently written by N. C. Manson, in *Stud. Hist. Phil. Biol. & Biomed. Sci.* 35 (2004) 249–268.
- A page about our work, “Studying Neural Networks with Hybrots,” appears in the college textbook, *Psychology, 3rd Canadian Edition*, by Santrock & Mitterer, 2006.
- Several pages were written about our work by Rolf Hughes in the scholarly book, “Architecture and Authorship,” Black Dog Publishing, 2007
- Several pages describe our “pioneering” work, in “How the Body Shapes the Way We Think: A New View of Intelligence,” by Rolf Pfeifer and Josh Bongard, MIT Press, 2007
- Our semi-living artist project is described in “Rat” (from the Animal series) by Jonathan Burt, Reaktion Books, 2006.

Exhibits

Our MEART project is featured as the first art installation in the lobby and reception of the Center for Biotechnology and Interdisciplinary Studies (similar to the IBB at Georgia Tech) at Rensselaer Polytechnic Institute, Troy, NY. Boryana Rossa, RPI Bioarts Initiative, exhibit designer and curator. Our Silent Barrage was exhibited at Exit Art as part of the Corpus Extremus (LIFE+) show, Feb-April 2009, reviewed in *Nature*, 12 March 2009.

Grant-related

- 1.3 percentile score on RO1 application to NIH NINDS New Neuroscience Technology (NS38628), 1999
- Cutting-Edge Basic Research Award, best score for 2004, in R21 application to NIH NIDA (DA18250), 2004
- NIH Director’s Pioneer Award Semifinalist, 2004
- National Research Service Award, Postdoctoral Fellowship from NIH (NS10257), 1995

VIII. Biographical

Born November 9, 1964, in Pasadena, California. Grew up in Altadena, Pasadena (CA) and Kailua (HI).