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Prepared:
March 4, 2015

Anatoli Gorchetchnikov

Curriculum Vitae

EDUCATION

2005 • PhD Cognitive and Neural Systems, Department of Cognitive and Neural Systems, Boston University. Dissertation: *"A Model of Goal-Driven Spatial Navigation Based on Rodent Neurophysiological Data"*, defended on March 26, 2005; Advisor: Dr. Michael E. Hasselmo.

2000 • MS Computer Science, Department of Computer Science, Middle Tennessee State University. Major: computer science; minor: psychology/biology. Thesis: *"An Approach to a Biologically Realistic Simulation of Natural Memory"*, defended on May 4, 2000; Advisors: Dr. Al Cripps, Dr. Chrisila C. Pettey.

1997 • BS Computer Science (cum laude), Department of Mathematics and Computer Science, Belmont University. Major: computer science; minor: mathematics.

RESEARCH EXPERIENCE

2014–present • **Research Assistant Professor at the Department of Psychological and Brain Sciences, Boston University**

2011–present • **Research Assistant Professor at Center for Computational Neuroscience and Neural Technology and the Program in Cognitive and Neural Systems, Boston University**

2012–present • Principal investigator in the project with NASA aiming at creating adaptive bio-inspired navigation system for planetary exploration. Project involves morphing a model of a navigational system with noisy and inconsistent sensory input into a system capable of real time control of NASA exploratory vehicles for Martian surface.

2012–present • Supervising graduate students and postdocs that work on comprehensive set of connected projects to explain the role of visual attention, temporal dynamics of eye movements, and dopamine modulation of strategy switching in spatial and non-spatial tasks. One student successfully defended in Spring 2014.

2010–2014 • Project Leader for biologically based solution for visually and internally guided navoigation project within NSF SLC CELEST. Creating a complete model of a navigational system with noisy and inconsistent sensory input.

2009–2013 • Project Leader for Modular Neural Exploring and Traveling Agent (MoNETA) project within Neuromorphics Lab colloborative research effort with Hewlett-Packard (HP). Creating a modular modeling framework subserving autonomous agents of various complexities. The effort includes adaptation of biological models to HP development platform and gradual evolution of the design to achieve more complex behaviors.

RESEARCH EXPERIENCE (continued)

2008–2011 • **Research Assistant Professor at the Department of Cognitive and Neural Systems, Boston University**

2008–2011 • Supervising graduate students that worked on comprehensive set of connected projects to explain the role of entorhinal cortex and hippocampal formation in proprioceptively and visually based navigation. Both students defended their PhDs in 2011.

2008–2009 • Computational modeling of the hippocampal formation and other brain areas related to spatial representations, their formation, and use in solving navigational tasks. Current emphasis is on interactions between head direction and linear path integration systems to form grid cells in the entorhinal cortex, specifically how regular grid firing pattern can emerge from proprioceptive information and be influenced by visual cues. PI – Prof. Stephen Grossberg.

2005–2008 • **Postdoctoral Research Associate at the Department of Cognitive and Neural Systems, Boston University**

• Modeling of the hippocampus and entorhinal cortex related to spatial representations, their formation, and use in solving navigational tasks. Emphasis was on interactions between grid cells in entorhinal cortex and place cells in dentate gyrus and hippocampal area CA3, specifically how short spatial scales in entorhinal cortex lead to large spatial scales of place cells and its relation to temporal processing in the hippocampal area. PI – Prof. Stephen Grossberg.

• Supervising graduate students that work on comprehensive set of connected projects to explain the role of entorhinal cortex and hippocampal formation in proprioceptively and visually based navigation. One student works on linear path integration mechanisms, another works on angular path integration and head direction properties.

2000–2005 • **Graduate Research Assistant at the Department of Cognitive and Neural Systems, Boston University**

• Biophysically detailed computational modeling of the hippocampal formation and other brain areas in solving goal-driven navigational tasks, with implications for more general mechanisms of decision making and episodic memory. Implemented abstract propositions, such as bidirectional breadth-first graph search into a biologically detailed model using the spread of neuronal activity. PI – Prof. Michael E. Hasselmo.

1999–2000 • **Graduate Research Assistant at the Computer Science Department, MTSU**

• Modeling of interactions between entorhinal cortex layer II, dentate gyrus and hippocampal area CA3 during fast encoding of new memories. Investigation of the applicability of the fast-learning ART algorithm to a spiking network with architecture that resembles part of the natural fast-learning hippocampal system. Model was initially designed for MasPar MP1 (SIMD parallel computer) and then ported to Linux. Supervisor – Prof. Al Cripps.

1997–present • **Open Source Modular Framework for Computational Neuroscience Lead Architect**

2005-present • Continue to lead the development team. Exploring general purpose GPU computation to further improve the speed and scalability of the computational engine. Explore novel numerical methods of solving differential equations to increase precision and computational speed. Extend the variety of implemented models and bring the support for newly emerging model description languages.

2001-2005 • Formed and took the lead of KInNeSS development team. Advised multiple researchers on use and extension of KInNeSS. This research as well as core concepts of development were presented to the community together with several more beta releases. The work resulted in fully documented public release and the following publication.

RESEARCH EXPERIENCE (continued)

1999-2000
- Rebuild of the framework for multiprocessor Linux architectures. Adoption of standard C++ library as the foundation of the computational engine. Development of KDE/Qt based graphic user interface. Conversion of the system to a modular expandable structure and introduction of behavioral component. The resulting framework was named KInNeSS (KDE Integrated Neurosimulation System) and first beta release was made public.

1997-1999
- Creating the foundations of massively parallel framework for computational neuroscience for MasPar MP1 architecture as a part of MS (Computer Science) Degree at MTSU.

TEACHING EXPERIENCE

2011–present
- **Co-teaching CN 550 "Neural and Computational Models of Recognition, Memory and Attention"**

- Introduction and comparative analysis of multiple neural and non-neural models of pattern recognition within Boston University regular course. Responsibilities include lecturing, design of homeworks and tests, guidance of the course project, and grading.

2008–present
- **Teaching CN 510 "Principles and Methods of Cognitive and Neural Modeling"**

- Introducing graduate and advanced undergraduate students to cognitive and neural modeling within Boston University regular course. Responsibilities include lecturing, design of homeworks and tests, grading, and supervision of a teaching assistant.

2005–2008
- **Developing a printed handbook on learning and memory under NSF Science of Learning Center grant (CELEST)**

- Writing a workbook that can introduce basic ideas of theoretical research on learning and memory to a wide audience from high schoolers to accomplished experimental researchers without modeling background.

2002–present
- **Guest lectures in graduate and undergraduate-level classes**

- "Spatial navigation with and without place cells." in *CN 810: "Advanced Topics in Mobile Robotics."* Presented in Sept 2010.
- "Diffuse projecting neuromodulatory systems and psychoactive drugs." in *CN 210: "Introduction to Computational Models of Brain and Behavior."* Presented in March 2010 and April 2011.
- "Intrinsic properties of neurons and their role in memory function." in *PS 530: "Neural Models of Memory Function."* Presented in Feb 2004.
- "The role of the hippocampus in spatial navigation" in *CN 740: "Topics in Sensory-Motor Control."* Presented in Feb 2002, 2004, 2006, and 2008.
- "The role of the hippocampus in conditioning" in *CN 570: "Neural and Computational Models of Conditioning, Reinforcement, Motivation and Rhythm."* Presented in March 2002 and 2003.

1997–1999
- **Graduate Teaching Assistant at the Department of Developmental Studies, MTSU**

- One semester of lecturing two sections of Developmental Algebra 080 (3 credit hours per section). Class size: about 25 students. In addition to lecturing, duties included homework/test/quiz design and grading. Classes consisted of older returning students, student athletes, and students that had problems with math in high school. The main goal was not only to bring them up to the college level of knowledge, but also to establish their confidence and interest in handling mathematical exercises.

TEACHING EXPERIENCE (continued)

- Three regular and two summer semesters of individual tutoring in Developmental Studies Math Lab. Duties included help with all four Developmental Studies Math classes (pre-algebra, two levels of algebra and geometry). This was a duty complementary to teaching and aimed at a similar population of students with the same goals as above.
- College Reading and Learning Association (CRLA) tutoring certificates received: Regular in Fall 1997, Advanced in Spring 1998, Master in Fall 1998.

PROFESSIONAL TRAINING

1997–2005 • **Completed following graduate school courses and ready to teach and train in the following areas**

- Neural and Computational Models of Planning and Temporal Structure in Behavior
- Introduction to and Topics in Computational Neuroscience
- Neural and Computational Models of Conditioning, Reinforcement, Motivation and Rhythm
- Neural and Computational Models of Adaptive Movement Planning and Control
- Neural and Computational Models of Vision
- Introduction to Analysis of Algorithms
- Introduction to Operating Systems
- Introduction to and Advanced Topics in Artificial Intelligence
- Introduction to and Advanced Topics in Parallel Programming
- Introduction to Neuroscience
- Introduction to Molecular Genetics
- Introduction to Molecular Biology
- Introduction to Cognitive Psychology

PUBLICATIONS

DOCTORAL DISSERTATION

2005 • A Model of Goal-Driven Spatial Navigation Based on Rodent Neurophysiological Data,
Boston University, Boston, MA.

MASTER THESIS

2000 • An Approach to a Biologically Realistic Simulation of Natural Memory,
Middle Tennessee State University, Murfreesboro, TN.

PATENTS

2014 • Gorchetchnikov A, Ames HM, Versace M, Livitz G.
Methods and Apparatus for Iterative Nonspecific Distributed Runtime Architecture and its Application to Cloud Intelligence.
Application #PCT/US2014/039162
approval pending.
• Gorchetchnikov A, Versace M, Barnes T.
Methods and Apparatus for Early Sensory Integration and Robust Acquisition of Real World Knowledge.
Application #PCT/US2014/039239
approval pending.

2008 • Gorchetchnikov A, Ames HM, Versace M, Santini F.
Graphic Processor Based Accelerator System and Method.
Patent # 8648867, granted: February 11, 2014, Publication Date: May 22, 2008.

PUBLICATIONS

2014 • Patrick S, Bullock D, **Gorchetchnikov A**, Sohail A, and Versace M. (2014).
Simulating conditions in which striatal learning assigns behavior control to the fastest-computed reward-predictive representations of cues and contexts.
In: *Society for Neuroscience Abstracts 44*: 633.28.

2013 • Sherbakov L, Livitz G, Sohail A, **Gorchetchnikov A**, Mingolla E, Ames H, and Versace M. (2013).
CogEye: An online active vision system that disambiguates and recognizes objects.
In: *Proceedings of NeuComp 2013*, Grenoble, France.
• Sherbakov L, Livitz G, Sohail A, **Gorchetchnikov A**, Mingolla E, and Versace M. (2013).
A computational model of the role of eye-movements in object disambiguation.
In: *Proceedings of CoSyNe Conference 2013*, Utah, USA.

2012 • Ames H, Versace M, **Gorchetchnikov A**, Chandler B, Livitz G, Léveillé J, Mingolla E, Carter D, Abdalla H, and Snider G. (2012).
Persuading computers to act more like brains.
In: *Advances in Neuromorphic Memristor Science and Applications*, R Kozma, R. Pino, G. Pazienza (eds), Springer Verlag.
• Ames H, Mingolla E, Sohail A, Chandler B, **Gorchetchnikov A**, Léveillé J, Livitz G, and Versace M. (2012).
The Animat.
IEEE Pulse, January/February 2012.
• Fortenberry B, **Gorchetchnikov A**, Grossberg S. (2012).
Learned integration of visual, vestibular, and motor cues in multiple brain regions computes head direction during visually-guided navigation.
Hippocampus, 22:2219–2237.
• Gorchetchnikov A (2012).
Modular neural exploring and traveling agent (MoNETA) in virtual Morris water maze.
In: *Society for Neuroscience Abstracts 42*: 600.16.

PUBLICATIONS (continued)

- Mhatre H, **Gorchetchnikov A**, Grossberg S (2012).
  Grid cell hexagonal patterns formed by fast self-organized learning within entorhinal cortex.
  Hippocampus 22:320–334.

2011

- Gorchetchnikov A, Cannon R, Clewley R, Cornelis H, Davison A, De Schutter E, Djurfeldt M, Gleeson P, Hill S, Hines M, Kriener B, Le Franc Y, et al. (2011).
  NineML: declarative, mathematically-explicit descriptions of spiking neuronal networks.
  Frontiers events, 4th INCF C. Frontiers. doi:10.3389/conf.fninf.2011.08.00098
- Gorchetchnikov A, Versace M, Ames H, Chandler B, Léveillé J, Livitz G, Mingolla E, Snider G, Amerson R, Carter D, Abdalla H, and Qureshi MS. (2011).
  Review and unication of learning framework in *Cog Ex Machina* platform for memristive neuromorphic hardware.
  In: *Proceedings of the International Joint Conference on Neural Networks*, number 531 in IEEE CD-ROM Catalog Number: CFP11IJS-CDR, ISBN: 978-1-4244-9636-5 pp. 2601–2608.
- Livitz G, Ames H, Chandler B, **Gorchetchnikov A**, Léveillé J, Vasilkoski Z, Versace M, Mingolla E, Snider G, Amerson R, Carter D, Abdalla H, and Qureshi MS. (2011).
  Visually-Guided Adaptive Robot (ViGuAR).
  In: *Proceedings of the International Joint Conference on Neural Networks*, number 620 in IEEE CD-ROM Catalog Number: CFP11IJS-CDR, ISBN: 978-1-4244-9636-5 pp. 2944–2951.
- Livitz G, Versace M, **Gorchetchnikov A**, Vasilkoski Z, Ames H, Chandler B, Léveillé J, and Mingolla E. (2011).
  Scalable adaptive brain-like systems
  The Neuromorphic Engineer: 10.2417/1201101.003500.
- Raikov I, Cannon R, Clewley R, Cornelis H, Davison A, De Schutter E, Djurfeldt M, Gleeson P, **Gorchetchnikov A**, Hill S, Hines M, Kriener B, Le Franc Y, et al. (2011).
  NineML: the network interchange for neuroscience modeling language.
  BMC Neuroscience:12(Suppl 1), P330. BioMed Central Ltd. doi:10.1186/1471-2202-12-S1-P330
- Snider G, Amerson R, Carter D, Abdalla H, Qureshi S, Léveillé J, Versace M, Ames H, Patrick S, Chandler B, **Gorchetchnikov A**, Mingolla E. (2011).
  Adaptive computation with memristive memory.
  IEEE Computer 44(2):21–28.
- Vasilkoski Z, Ames H, Chandler B, **Gorchetchnikov A**, Léveillé J, Livitz G, Mingolla E, and Versace M. (2011).
  Review of stability properties of neural plasticity rules for implementation on memristive neuromorphic hardware.
  In: *Proceedings of the International Joint Conference on Neural Networks*, number 524 in IEEE CD-ROM Catalog Number: CFP11IJS-CDR, ISBN: 978-1-4244-9636-5 pp. 2563–2569.

2010

- Gorchetchnikov A, and INCF Multiscale Modeling TF. (2010).
  NineML a description language for spiking neuron network modeling: the user layer.
  BMC Neuroscience:11(Suppl 1), 10795. BioMed Central Ltd. doi:10.1186/1471-2202-11-S1-P71 Léveillé J, Ames H, Chandler B, **Gorchetchnikov A**, Mingolla E, Patrick S, and Versace M. (2010).
  Learning in a distributed software architecture for large-scale neural modeling.
  In: *Proceedings of the BIONETICS 2010 Meeting*, Boston, MA (in press).
- Léveillé J, Ames H, Chandler B, **Gorchetchnikov A**, Mingolla E, Patrick S, and Versace M. (2010)
  Learning in a distributed software architecture.
  In: *Lecture Notes for Computer Sciences, Social Informatics, and Telecommunications Engineering (LNICST)* (in press).
- Mhatre H, **Gorchetchnikov A**, Grossberg S (2010a).
  From path integration to place cells: Self-organized learning and oscillatory dynamics of hexagonal grid cell maps in the entorhinal cortex.
  In: *Proceedings for Annual Conference of Society for Neuroscience*: 635.8.
- Mhatre H, **Gorchetchnikov A**, Grossberg S (2010b).
  A neural model of grid cell hexagonal map formation by self-organized learning.
  In: *Proceedings of the 14th International Conference on Cognitive and Neural Systems (ICCNS)*, Boston, MA.

PUBLICATIONS (continued)

- Mhatre H, **Gorchetchnikov A**, Grossberg S (2010c).
  How path integration signals create the spatial representations upon which visual navigation builds
  Journal of Vision, 10(7): 1044, http://journalofvision.org/10/7/1044/, doi: 10.1167/10.7.1044.
- Versace M, **Gorchetchnikov A**, Chandler B, Kozma RT, Ames HM, Mingolla E (2010).
  Brain-inspired computing.
  In: *Proceedings of the Third iSLC meeting*, Boston MA

2009
- Ames HM, Versace M, **Gorchetchnikov A** (2009).
  How can computational neuroscience benefit real world technological applications.
  In: *Proceedings of the Second iSLC meeting*, Seattle WA.
- Fortenberry B, **Gorchetchnikov A**, Grossberg S. (2009a).
  Computing head direction from interacting visual and vestibular cues during visually-based navigation in the rat [Abstract].
  Journal of Vision, 9(8): 1119, 1119a, http://journalofvision.org/9/8/1119/, doi:10.1167/9.8.1119
- Fortenberry B, **Gorchetchnikov A**, Grossberg S. (2009b).
  Integration of motor and vestibular cues to compute head direction during visually-guided navigation.
  In: *Proceedings for Annual Conference of Society for Neuroscience*: 196.24.
- Mhatre H, **Gorchetchnikov A**, Grossberg S. (2009a).
  Grid cell hexagonal pattern formed by fast self-organized learning within the entorhinal cortex. Technical Report CAS/CNS-TR09-011, Boston, MA: Boston University
- Mhatre H, **Gorchetchnikov A**, Grossberg S. (2009b).
  Hexagonal structure of grid cells formed by fast self-organized learning within the entorhinal cortex.
  In: *Proceedings for Annual Conference of Society for Neuroscience*: 679.6.
- Mhatre H, **Gorchetchnikov A**, Grossberg S. (2009c).
  A neural model of grid cell hexagonal map formation by self-organized learning.
  In: *Proceedings for Computational Cognitive Neuroscience Conference*: abstract 39.

2008
- Versace M, Ames HM, Léveillé J, Fortenberry B, **Gorchetchnikov A** (2008a).
  KInNeSS: A modular framework for computational neuroscience.
  Neuroinformatics 6(4): 291–309.
- Versace M, Ames HM, Léveillé J, Fortenberry B, **Gorchetchnikov A** (2008b).
  KInNeSS: A modular framework for computational neuroscience.
  in: *Proceedings of the 12th International Conference on Cognitive and Neural Systems (ICCNS)*, Boston, MA.
- Versace M, Ames HM, Léveillé J, Fortenberry B, **Gorchetchnikov A** (2008c).
  KInNeSS: A modular framework for computational neuroscience.
  CELEST Annual Review Abstracts, Boston, MA (NSF CELEST 2008).

2007
- Berzhanskaya J, **Gorchetchnikov A**, Schiff SJ (2007).
  Switching between gamma and theta: Dynamic network control using subthreshold electric fields.
  Neurocomputing 70(10–12): 2091–2095.
- Gorchetchnikov A, Grossberg S (2007).
  Space, time, and learning in the hippocampus: How fine spatial and temporal scales are expanded into population codes for behavioral control.
  Neural Networks 20: 182–193.

2005
- Gorchetchnikov A, Versace M, Hasselmo ME (2005a).
  A model of STDP based on spatially and temporally local information: derivation and combination with gated decay.
  Neural Networks 18: 458–466.
- Gorchetchnikov A, Versace M, Hasselmo ME (2005b).
  Spatially and temporally local spike-timing-dependent plasticity rule.
  In: *Proceedings of the International Joint Conference on Neural Networks*, number 1568 in IEEE CD-ROM Catalog Number: 05CH37662C, pp. 390–396.
- Gorchetchnikov A, Hasselmo ME (2005a).
  A biophysical implementation of a bidirectional graph search algorithm to solve multiple goal navigation tasks.
  Connection Science 17(1-2): 145–166.

PUBLICATIONS (continued)

- Gorchetchnikov A, Hasselmo ME (2005b).
  A simple rule for spike-timing-dependent plasticity: local influence of AHP current.
  Neurocomputing 65-66: 885–890.

2004
- Gorchetchnikov A, Hasselmo ME (2004).
  A model of context-guided episodic retrieval during a spatial alternation task.
  Society for Neuroscience Abstracts 34: 1007.7.

2003
- Gorchetchnikov A, Hasselmo ME (2003a).
  Timing of consecutive traveling pulses in a model of entorhinal cortex.
  In: *Proceedings of the International Joint Conference on Neural Networks*, number 1299-640 in IEEE CD-ROM Catalog Number: 03CH37464C, pp. 1637–1642.
- Gorchetchnikov A, Hasselmo ME (2003b).
  Rhythmic neuromodulation and spike timing dependent plasticity in the model of rat spatial navigation.
  Society for Neuroscience Abstracts 33: 91.17.
- Koene RA, **Gorchetchnikov A**, Cannon RC, Hasselmo ME (2003).
  Modeling goal-directed spatial navigation in the rat based on physiological data from the hippocampal formation.
  Neural Networks 16(5–6): 577–584.

2002
- Gorchetchnikov A, Hasselmo ME (2002a).
  A model of hippocampal circuitry mediating goal-driven navigation in a familiar environment.
  Neurocomputing 44-46: 423–427.
- Gorchetchnikov A, Hasselmo ME (2002b).
  A model of septal, entorhinal and hippocampal interactions to solve multiple goal navigation tasks.
  Society for Neuroscience Abstracts 32: 676.16.
- Hasselmo ME, Hay J, Ilyn M, **Gorchetchnikov A** (2002).
  Neuromodulation, theta rhythm, and rat spatial navigation.
  Neural Networks 15(4-6): 689–707.

2000
- Gorchetchnikov A (2000).
  Introduction of threshold self-adjustment improves the convergence in feature-detective neural nets.
  Neurocomputing 32-33: 385–390.
- Gorchetchnikov A, Cripps A (2000).
  Neural unit sensitive to modulation.
  In: Malmgren H, Borga M, Niklasson L (eds), *Proceedings of the ANNIMAB conference, Perspectives in Neural Computing*, pp. 241–246., Göteborg, Sweden Springer-Verlag

1999
- Gorchetchnikov A (1999a).
  Limitations on the connection weights due to the introduction of threshold self-adjustment.
  In: *Proceedings of the International Joint Conference on Neural Networks*, number 217 in IEEE CD-ROM Catalog Number: 99CH36339C
- Gorchetchnikov A (1999b).
  Memory model with unsupervised sequential learning: The effect of threshold self-adjustment.
  In: *Proceedings of the 37th Southeast ACM Conference*, pp. 236–242.

CONFERENCE PRESENTATIONS AND SEMINARS

2013
- **Invited talk at National Institute for Aerospace**: "Neuromorphic solutions for navigation," Hampton, VA, Jan 31.

2012
- **Society for Neuroscience Annual Meeting**: "Modular neural exploring and traveling agent (MoNETA) in virtual Morris water maze," New Orleans, LA, Oct 17.

CONFERENCE PRESENTATIONS AND SEMINARS (continued)

2011
- **International Joint Conference on Neural Networks**: "Brain-Inspired Computing with Memristive Technology," (invited talk) San Jose, CA, August 3. Coauthors: Members of Neuromorphics Lab.
- **International Joint Conference on Neural Networks**: "Visually-Guided Adaptive Robot (ViGuAR)," San Jose, CA, August 1. Coauthors: Members of Neuromorphics Lab.
- **International Joint Conference on Neural Networks**: "Review and Unication of Learning Framework in *Cog Ex Machina* Platform for Memristive Neuromorphic Hardware," San Jose, CA, August 1. Coauthors: Members of Neuromorphics Lab.
- **International Joint Conference on Neural Networks**: "Review of Stability Properties of Neural Plasticity Rules for Implementation on Memristive Neuromorphic Hardware," San Jose, CA, August 1. Coauthors: Members of Neuromorphics Lab.
- **Computational Neuroscience Annual Meeting**: "MoNETA: massive parallel application of biological models navigating through virtual Morris water maze and beyond," Stockholm, Sweden, July 25. Coauthors: Members of Neuromorphics Lab.

2010
- **CELEST Workshop on the Hardware and Software of Functional Connections**: "MoNETA: Modular Neural Exploring Traveling Agent" Boston, MA, October 22. Coauthors: H. M. Ames, B. Chandler, and others.
- **Invited Lecture at Unité de Neuroscience, Information et Complexité (UNIC)**: "Modeling self-localization" Gif-sur-Yvette, France, October 12.
- **Third Annual Neuroinformatics Congress**: "NineML: A Description Language for Spiking Neuronal Networks Description: The User Layer," Kobe, Japan, August 31. Coauthors: Members of INCF Multiscale Modeling Task Force.
- **DARPA SyNAPSE site visit**: "MoNETA (Modular Neural Exploring Traveling Agent) project review" Palo Alto, CA, August 25. Coauthors: J. Léveillé, M. Versace, and others.
- **Computational Neuroscience Annual Meeting**: "General Form of Learning Algorithms for Neuromorphic Hardware," San Antonio, TX, July 27. Coauthors: M. Versace, H. M. Ames, and others.
  "NineML: A Description Language for Spiking Neuronal Networks Description: The User Layer," San Antonio, TX. Poster: July 26, Workshop: July 28. Coauthors: Members of INCF Multiscale Modeling Task Force.
- **CELEST Neural Plasticity Workshop**: "General form of learning algorithms for neuromorphic hardware implementation" Boston, MA, July 13. Coauthors: M. Versace, H. M. Ames, and others.
- **Invited Lecture at HP research labs**: "Introduction to Neuroscience and Neural Modeling" Palo Alto, CA, March 3.

2009
- **Invited Lecture at RIKEN BSI**: "KDE Integrated NeuroSimulation Software (KInNeSS): Introduction and Perspectives" Wako, Japan, March 17.

2008
- **The First Annual iSLC Student/Postdoc Conference**: "From entorhinal grid cells to hippocampal place cells: Learning population codes for behavioral control for both spatial and temporal behaviors," Pittsburgh, PA, Feb 9. Coauthor: S. Grossberg.
- **International Conference on Cognitive and Neural Systems**: "Simulating biologically realistic neural models on graphic processing units" Boston, MA, May . Coauthors: M. Versace, H. M. Ames.

2007
- **International Conference on Cognitive and Neural Systems**: "From entorhinal grid cells to hippocampal place cells: Learning population codes for behavioral control for both spatial and temporal behaviors," Boston, MA, May 18. Coauthor: S. Grossberg.

2005
- **International Joint Conference on Neural Networks**: "Spatially and temporally local spike-timing-dependent plasticity rule," Montreal, Canada, August 1. Coauthors: M. Hasselmo and M. Versace.
- **Computational Neuroscience Annual Meeting**: "A simple rule for spike-timing-dependent plasticity: gated learning in response to triplets of spikes," Madison, WI, July 19. Coauthor: M. Hasselmo.
- **International Conference on Cognitive and Neural Systems**: "Applying the methods of experimental data visualization to neuronal simulations," Boston, MA, May 21. Coauthors: M. Versace and S. Grossberg.

2004
- **Computational Neuroscience Annual Meeting**: "A simple rule for spike-timing-dependent plasticity: local influence of AHP current," Baltimore, MD, July 20. Coauthor: M. Hasselmo.

CONFERENCE PRESENTATIONS AND SEMINARS (continued)

- **International Conference on Cognitive and Neural Systems**: "KInNeSS: A new software environment for simulations of neuronal activity," Boston, MA, May 22. Coauthors: M. Hasselmo and M. Versace.

2003
- **Society for Neuroscience Annual Meeting**: "Rhythmic neuromodulation and spike timing dependent plasticity in the model of rat spatial navigation," New Orleans, LA , Nov 8. Coauthor: M. Hasselmo.
- **International Joint Conference on Neural Networks**: "Timing of consecutive traveling pulses in a model of entorhinal cortex," Portland, OR, July 20. Coauthor: M. Hasselmo.
- **International Conference on Cognitive and Neural Systems**: "Timing of consecutive traveling pulses in a model of entorhinal cortex," Boston, MA, May 31. Coauthor: M. Hasselmo.

2002
- **Society for Neuroscience Annual Meeting**: "A model of septal, entorhinal and hippocampal interactions to solve multiple goal navigation tasks," Orlando, FL , Nov 12. Coauthor: M. Hasselmo.

2001
- **Computational Neuroscience Annual Meeting**: "A model of hippocampal circuitry mediating goal-driven navigation in a familiar environment," Monterray, CA, July 1. Coauthor: M. Hasselmo.
- **International Conference on Cognitive and Neural Systems**: "A model of hippocampal circuitry mediating goal-driven navigation in a familiar environment," Boston, MA, June 1. Coauthor: M. Hasselmo.

2000
- **ANNIMAB Conference**: "Neural unit sensitive to modulation," Göteborg, Sweden, May 12. Coauthor: A. Cripps.

1999
- **Middle Southeast ACM Conference**: "GUMP: Algorithm for quick generation of anti-random sequences," Gatlinburg, TN, November 13.
- **Computational Neuroscience Annual Meeting**: "Introduction of threshold self-adjustment improves the convergence in feature-detective neural nets," Pittsburg, PA, July 21.
- **International Joint Conference on Neural Networks**: "Limitations on the connection weights due to the introduction of threshold self-adjustment," Washington, DC, July 15.
- **International Conference on Cognitive and Neural Systems**: "The level of suppression in feedback connections required for learning depends primarily on intracellular parameters" Boston, MA, May 28.
- **37th Southeast ACM Conference**: "Memory model with unsupervised sequential learning: The effect of threshold self-adjustment," Mobile, AL, April 23.

1998
- **Middle Southeast ACM Conference**: "Memory model with unsupervised sequential learning: The effect of threshold self-adjustment," Gatlinburg, TN, November 12.

AWARDS

2000 • Paul Hutchinson Graduate Scholarship, MTSU.
2000 • Elected in Honor Society in the Computing Sciences Upsilon Pi Epsilom, MTSU Chapter.
1999 • Best Student Presentation (Master's Level) at Mid-Southeast ACM conference.
• Finalist of Student Paper Competition at 37th Southeast ACM conference
1998 • Best Student Presentation (Master's Level) at Mid-Southeast ACM conference.
1997 • Member of the National Dean's List for 1996-1997 academic year.
1996 • Member of the Dean's List for Fall 1996.
• Member of the Dean's List for Summer 1996.

FUNDING

2012–2015 • Principal investigator of NASA STTR award NNX12CG32P (Phase I) and NNX13CL63C (Phase II) to Boston University and Neurala Inc, Adaptive bio-inspired navigation for planetary exploration, Project budget: Phase I $124,998, Phase II year 1 $178,099, Phase II year 2 $75,169.

2012–2014 • Principal investigator of Air Force Research Lab award FA8750-12-C-0123, subcontracted through Neurala Inc, Adaptive laminar computing on scalable heterogeneous hardware for image understanding, primary work is the development of a neural simulation software that utilizes GPU clusters. Project budget $190,888.

2011–2016 • Investigator leading a project Biologically based solution for simultaneous localization and mapping (SLAM) problem within CELEST (NSF SBE-0354378). Annual project budget: first year $138,692, second year $167,951, third year $223,246, fourth year $200,285, no cost extension into fifth year $48,533 .

PROFESSIONAL AND COMMUNITY SERVICE

2013–present • Chair of CompNet Scientific Computing and Visualization committee.
2013 • Reviever for *Frontiers in Computational Neuroscience*.
2012–present • Reviever for Organization for Computational Neuroscience Annual Meeting.
2012 • Reviever for *Journal of Neuroscience*.
2011–present • Member of Editorial Board of *Frontiers in Neuroinformatics*.
2011 • Reviever for *Neural Computation*.
2011 • Reviever for *Hippocampus*.
2009–2011 • Member of the Governing Board of INCF Task Force for a Standard Language in Neural Network Modeling.
2009 • Reviewer for National Science Foundation.
2008–2011 • Member of INCF Task Force for a Standard Language in Neural Network Modeling.
2007, 2010, 2011 • Reviewer for *IEEE Transactions on Neural Networks*.
2007, 2009–2013 • Reviewer for *Neural Networks*.
2007 • Reviewer for *PLOS Computational Biology*.
2003–2012 • Reviewer for International Joint Conferences on Neural Networks.
2003 • Helped the Program Chair for the International Joint Conference on Neural Networks with preparing the complete schedule for the conference.
2001–2003 • Organized and served as a captain of the departmental intramural soccer team.

COMPUTATIONAL SKILLS

- Professional knowledge of C++ with the emphasis on Linux/gcc/KDE systems.
- Extensive experience with CUDA package for nVidia GPUs
- Experience with iOS programming using Objective C and XCode framework.
- Recent experience with Java programming language within JMonkey engine and JBullet library.
- Recent experience with Scala programming language within Cog Ex Machina framework.
- Experience with OpenGL, GLSL, GPGPU computation including proprietary ATI/AMD drivers for Stream Processor and Pixel Shader 3.0 assembly.
- Experience with maintaining open source software projects.
- Experience with programming for Windows 95/98/NT/XP64/Vista/7, ULTRIX, VMS.
- Faded experience with MPL for MasPar MP1, Clipper, DBIV.

PROFESSIONAL ORGANIZATIONS

2012–present	• Society for Neuroscience, member.
2011–present	• Organization for Computational Neuroscience, member.
2006–present	• International Neural Network Society, member.
2001–2005	• Society for Neuroscience, student member.
1999–2005	• International Neural Network Society, student member.
1998–2001	• Cognitive Science Society, student member.
1996–2001	• Association for Computing Machinery, student member.