Michael I Miller, Ph.D.

Bessie Darling Massey Professor and Director, Johns Hopkins Department of Biomedical Engineering   
Co-Director, Kavli Neuroscience Discovery Institute

Gilman Scholar

Professor, Electrical and Computer Engineering

[mim@jhu.edu](mailto:mim@jhu.edu)

https://en.wikipedia.org/wiki/Michael\_I.\_Miller

**Education**

Ph.D. Biomedical Engineering, Johns Hopkins University, 1984  
M.S. Electrical Engineering, Johns Hopkins University, 1979  
B.S. Electrical Engineering, State University of New York at Stony Brook, 1976

**Experience**

Bessie Darling Massey Director, Johns Hopkins Department Biomedical Engineering 2017 – Present

Co-Director, Kavli Neuroscience Discovery Institute, Johns Hopkins University 2015 – Present

Gilman Scholar, Johns Hopkins University 2011 – Present

Professor, Johns Hopkins University 1998 – Present

Director, Center for Imaging Science, Johns Hopkins University 2000 – 2020

Herschel and Ruth Seder Chair in Biomedical Engineering, Johns Hopkins University 2004 – 2017

Visiting Professor, École Normale Supérieure de Cachan, France 2000, 2002, 2007, 2009, 2011, 2014, 2015

Visiting Professor, Brown University 1990, 1994, 1995 – 2001

Visiting Professor, Institut Henri Poincaré, France 1998

Newton R and Sarah L Wilson Chair in Biomedical Engineering, Washington University in St. Louis 1995 – 1998

Professor, Washington University in St. Louis 1992 – 1998

Visiting Professor, Paris Descartes University, France 1997

Associate Professor, Washington University in St. Louis 1986 – 1992

Assistant Professor, Washington University in St. Louis 1984 – 1986

Research Associate, Washington University in St. Louis 1983 – 1984

**Awards**

**Elected Fellow**, Institute of Electrical and Electronics Engineers 2019

**Bessie Darling Massey Professorship** in Biomedical Engineering, Johns Hopkins University 2017

**Elected Fellow**, Biomedical Engineering Society 2017

**John S Laughlin 25th Anniversary Memorial Lecturer and Visiting Professor**, Department of 2016

Medical Physics, Memorial Sloan Kettering Cancer Center

**Best Lightning Talk**, Annual Conference on Extreme Science and Engineering Discovery Environment 2014

Atlanta, GA

**Capers and Marion McDonald Award for Excellence in Mentoring and Advising**, 2013

Johns Hopkins University

**Farrington Daniels Award for best paper** in *Medical Physics*, American Association of Physicists 2013

in Medicine

**Gilman Scholar** for distinguished scholarship and research, Johns Hopkins University 2011

**Highest increase in total citations** in the field of engineering, ISI Essential Science Indicators 2002

**Herschel Ruth Seder Professorship** in Biomedical Engineering, Johns Hopkins University 2003

**Elected Fellow**, American Institute for Medical and Biological Engineering 1998

**Newton R and Sarah Louisa Glasgow Wilson Professorship** in Biomedical Engineering, 1995

Washington University in St. Louis

**Presidential Young Investigator Award**, National Science Foundation 1986

**Paul Ehrlich Research Award**, Johns Hopkins University 1983

**IEEE Biomedical Engineering Thesis Award**, First Prize, Tau Beta Pi 1982

**Professional Activities**

1. Advisory Board, Department of Biomedical Engineering, Columbia University 2024 – Present
2. Advisory Board, Department of Biomedical Engineering, Boston University 2023 – Present
3. Advisory Board, Department of Biomedical Engineering, University of Alabama 2023 – Present
4. Member, IEEE Society 2023 – Present
5. Advisory Council Committee, JHM Diversity & Inclusion, Johns Hopkins School of Medicine 2021 – Present
6. Review Committee, Neurophontonic Center, Boston University August 2022
7. Founding Member and Advisory Board, Northeast Biomedical Engineering Society 2022
8. IEEE EMBS ISBI Steering Committee Member 2022 – 2023
9. IEEE OJEMB Advisory Board [https://www.embs.org/ojemb/advisory-board/](https://nam02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.embs.org%2Fojemb%2Fadvisory-board%2F&data=04%7C01%7CMIM%40jhu.edu%7C4771ae463dae4e189f5408d9c8ef39e6%7C9fa4f438b1e6473b803f86f8aedf0dec%7C0%7C0%7C637761752068564557%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000&sdata=IVRfK2sL%2BQ1Q0XoEExIaXgu7%2BkdNX3%2BRzb%2BSE%2Ft7orc%3D&reserved=0).  2019 – Present
10. Fellow, Institute of Electrical and Electronics Engineers 2019 – Present
11. Fellow, Biomedical Engineering Society 2017 – Present
12. Advisory Board Department of Bioengineering, University of Illinois 2018 – Present
13. Member, Biomedical Engineering Society 2003 – Present
14. Fellow and Member, American Institute for Medical and Biological Engineering 1998 – Present
15. Senior Member, Institute of Electrical and Electronics Engineers 1995 – Present
16. Artis Ventures Pioneers Workshop, San Francisco, CA 2019 - Present
17. Janelia Group Leader Review Meeting September 2018
18. Organizer, 2nd International Brain Conference on Brain Health, Beidaihe, China September 2018
19. Review Committee, Department of Electronic-Computer Engineering, Tsinghua University April 2018
20. Review Committee, Orthopaedic Surgery, Johns Hopkins School of Medicine February 2018
21. Organizer, 1st International Brain Conference Neurodegenerative Disease, Beidaihe, China August 2017
22. Dean Search Committee, Johns Hopkins School of Public Health Spring 2017
23. Provost Search Committee, Johns Hopkins University Spring 2016
24. Review Committee,Department of Psychology-Brain Science, Johns Hopkins Arts & Sciences December 2015
25. Review Committee, Department of Biostatistics, Johns Hopkins Bloomberg School Public Health December 2014
26. Dean Search Committee Member, Johns Hopkins Krieger Arts & Sciences Fall 2014
27. Panelist, P41 PI Meeting, National Institutes of Health June 2014
28. Review Committee, Department of Biomedical Engineering, National University Singapore March 2014
29. Dean Search Committee, Johns Hopkins Whiting School of Engineering Summer 2013
30. Dean Search Committee, Johns Hopkins School of Medicine Winter 2011 – 2012
31. Member, The Academy of Science of St. Louis
32. Panelist, Science of the Arts, Baltimore, MD October 2010
33. Panelist, Rising to the Challenge, Johns Hopkins University, New York, NY April 2010
34. Consultant, Texas Higher Education Coordinating Board, Review of proposed PhD program April 2009

in BME, University of Texas

1. Panelist, BIRN All-Hands Meeting, Lead Standards and Deliverables Session October 2003
2. Panelist, P41 PI Meeting, National Institutes of Health June 2003
3. Panelist, P41 PI Meeting, National Institutes of Health June 2002
4. Co-Chair, Session ATR Characterization-Metrics, 3rd Workshop on Conventional Weapons ATR November 1997
5. Workshop Organizer, Pattern-Theoretic Knowledge Representation, National Institutes of Health April 1996
6. Review Panelist, Computational Biology, National Science Foundation September 1995
7. Visiting Scientist, Geometry Institute, University of Minnesota August 1995
8. Panelist, Office of Naval Research Workshop, “Acquisition and Tracking May 1995

of Maneuvering Targets from Image Sequence Data”

1. Organizer, Session on Markov Random Fields, Information Theory Society November 1994
2. Panelist, Army Science Board Meeting, “Target Recognition: Fundamental Metrics,” July 1994

Lincoln Laboratory

1. Visiting Scientist and Panelist, “Speech Recognition and Their Image Processing Cousins” June 1994
2. Panelist, ATR Working Group, Army Research Office May 1994
3. Panelist, Harvard-M.I.T.-Brown Center for Intelligent Control Pattern Theory Group January 1994
4. Panelist, Army Research Office Workshop, "The Future of Automated Target Recognition" November 1993
5. Visiting Scientist, The Newton Institute, “A Year in Computational Vision,” Cambridge, England October 1993
6. Panelist, National Science Foundation Workshop, Biology and Emerging Technologies, October 1992
7. Panelist, Department of Defense Tri-Service Workshop (ONR, ARO, AFOSR), Stochastic May 1992

Methods in Image Analysis, "Deformable Templates,"

1. Visiting Scientist, Institút Mittag-Leffler, Stockholm, Sweden July 1990
2. Visiting Scientist, Institutó de Calculo, "A Year in Statistics," Rome, Italy June 1990
3. Panelist, IBM-NSF-PYI Workshop, "Stochastic Optimization over Formal Languages on April 1989

Massively Parallel Processors," IBM Thomas J Watson Research Center, Yorktown Heights, NY

1. Review Panelist, Computational Engineering, National Science Foundation, Washington, DC. March 1988

**Presentations (Invited 1999 - Present)**

1. Miller MI: “Molecular Computational Anatomy: From Euler to Dirac”, Caltech University, February 23, 2024.
2. Miller MI: “Biomedical Data Science, From Euler to Dirac: Discovering the Spatial and Temporal Progression of
3. Molecular and Tissue Structures in Alzheimer’s Brains”, UCLA, November 2, 2023
4. Miller MI: Biomedical Data Science, From Euler to Dirac: Discovering the Spatial and Temporal Progression of Molecular and Tissue Structures in Alzheimer’s Brains”, Stony Brook University, August 29, 2023.
5. Miller MI: “Molecular Computational Anatomy: From Euler to Dirac”, Tulane University, April 24, 2023.
6. Miller MI: “Molecular Computational Anatomy: From Euler to Dirac”, University of California-Irvine, February 10, 2022.
7. Miller MI: Molecular Computational Anatomy. Biomedical Engineering, University of Pittsburgh, October 6, 2022.
8. Miller MI: Molecular Computational Anatomy. Biomedical Engineering, University of Maryland, September 16, 2022.
9. Miller MI: Unifying the Tissue and Molecular Scales. Biomedical Engineering, New York University, September 28, 2022.
10. Miller MI: Neurodegerative Profiles within and Beyond T1W, Princton Universerity, July28, 2022.
11. Miller MI: Representations of the Brain Unifying Tissue and Molecular Scales.South China Image Processing and Pattern Recognition Workshop, December 2021.
12. Miller MI: Biomedical Data Science Grand Challenge: Representations of the Brain Unifying Tissue and Molecular Scales. IEEE Grand Challenge Plenary, November 2021.
13. Miller MI: Brain Mapping via Measure Representations Unifying Tissue and Molecular Scale. ShanghaiTech, Plenary of Inaugural Series, August 2021.
14. Miller MI: Measure Representations of the Brain Unifying Tissue and Molecular Scales. Plenary Human Brain Mapping Satellite, June 2021.
15. Miller MI: MRI Cloud as a High-Throughput Neuroinformatics Software as a Service. Plenary MICR-2019, 2nd International Conference on Medical Imaging and Case Reports, Boston Massachusetts, November 20, 2019.
16. Miller MI: Computational anatomy and diffeomorphometry: Embedding the brain at meso-scale into the soft-tissue condensed matter continuum. Bioengineering Department Seminar, Rice University, October 28, 2019.
17. Miller MI: Computational anatomy and diffeomorphometry: Embedding the brain at meso-scale into the soft-tissue condensed matter continuum. Bioengineering Department Seminar, University of Illinois, October 23, 2019.
18. Miller MI: Computational anatomy and diffeomorphometry: Embedding the brain at meso-scale into the soft-tissue condensed matter continuum. Bioengineering Department Seminar, University of Minnesota, September 30, 2019.
19. Miller MI: Computational anatomy and diffeomorphometry: Embedding the brain at meso-scale into the soft-tissue condensed matter continuum. Bioengineering Department Seminar, Cornell, October 2018.
20. Miller MI: Coordinate Systems for Medial Temporal Lobe Human Anatomy. NIH. March 2018.
21. Miller MI: Computational anatomy and diffeomorphometry: Embedding the brain at meso-scale into the soft-tissue condensed matter continuum. Bioengineering Department Seminar, Columbia, University October 2018.
22. Miller MI: Coordinate Systems for Medial Temporal Lobe Human Anatomy. NIH. March 2018.
23. Miller MI: Diffeomorphometry and Computational Anatomy. Allen Institute. BICCN Review, NIH.March 2018.
24. Miller MI: Computational anatomy and diffeomorphometry: Embedding the brain at meso-scale into the soft-tissue condensed matter continuum. Bioengineering Department Seminar, George Washington, March 2, 2018, (invited by Dr. Igor Ebrimov).
25. Miller MI: Computational anatomy and diffeomorphometry: Embedding the brain at meso-scale into the soft-tissue condensed matter continuum. Bioengineering Department Seminar, Purdue University, February 2018, (invited by Dr. George Wadicka).
26. Miller MI: Computational anatomy and diffeomorphometry: Embedding the brain at meso-scale into the soft-tissue condensed matter continuum. Bioengineering Department Seminar, University of California, San Diego, December 8, 2017, (invited by Dr. Shankar Subramaniam).
27. Miller MI: Brain Mapping, AI, the Cloud. Beijing Tiantan International Forum of Neurosurgery (BIFNS) Opening Ceremony, China National Convention Center, Beijing, November 4, 2017.
28. Miller MI: Biomarkers for Huntington’s Disease. Huntington’s Disease Biomarkers Workshop, National Institutes of Health, Bethesda, MD. October 13, 2017.
29. Miller MI: Welcome Remarks at the 2017 BMES Annual Meeting Welcome Reception. Phoenix, AR, October 11, 2017.
30. Miller MI: Understanding the Brain in the Condensed Matter Continuum. Applications Driven Geometric Functional Data Analysis Workshop, Florida State University, Tallahassee, FL, October 9, 2017.
31. Miller MI: Computational Anatomy and Diffeomorphometry: A Dynamical Systems Model of Neuroanatomy in the Soft Condensed Matter Continuum. Yale Systems Biology Institute Seminar Series, September 26, 2017 (invited by Andre Levchenko).
32. Miller MI: Tracking Neurodegeneration measured with MRI across Brain Networks via Diffeomorphometry, High-field Atlasing, Changepoint Modelling. First International Life Science Summer Summit, Beidaihe New District, China, August 2, 2017.
33. Miller MI: Understanding the Brain in the Condensed Matter Continuum. OneChemistry Symposium Chemistry’s Role in the Brain Initiative Johns Hopkins University, Department of Chemistry, Baltimore, MD. March 28, 2017.
34. Miller MI: Computational Anatomy and BrainClouds. Computational Brain Mapping Meeting, IIT Madras, January 8, 2017 (invited by Dr. Partha Mitra of Cold Spring Harbor).
35. Miller MI: Neurodegeneration and BrainClouds. Windows Into the Mind, Duke University, December 8, 2016 (invited by Dr. Richard O'Brien, Chairman Neurology Duke Medicine).
36. Miller MI: Computational Anatomy – Understanding Shape Change in the Human Brain. Janelia Research Campus, November 28, 2016 (invited by Karel Svoboda).
37. Miller MI: On a Theory of Shape and Form. The Cold Spring Harbor Laboratory, October 21, 2016 (invited by Partha Mitra).
38. Miller MI: BrainCloud: Data Intensive Neuroscience. Mathematics of Shapes and Applications, Institute for Mathematical Sciences and Clinical Imaging Research Centre, Singapore, July, 25, 2016.
39. Miller MI: BrainCloud and High Throughput Neuroinformatics. 2016 Gordon Research Conference on Advanced Health Informatics, Hong Kong, July 17, 2016.
40. Miller MI: BrainClouds, Big Data and Getting Older: Sure Beats the Alternative! John S Laughlin Visiting Professorship Memorial Sloan Kettering Cancer Center, Schwartz Building, New York, New York, May 12, 2016
41. Miller MI: BrainClouds and the Complexity of the Human Brain at the Morphome Scale. 71st Annual Meeting of the ORAU Council of Sponsoring Institutions, Applications of Big Data Analytics: Medical-Imaging-Cyber, Oak Ridge National Laboratory, Oak Ridge, TN, March 8 – 10, 2016.
42. Miller MI: BrainClouds and the Aging Brain. Workshop, Royal Institute of Technology (KTH). Stockholm, December 3, 2015.
43. Miller MI: Computational Anatomy and Diffeomorphometry: 100 Years Since D’Arcy Thompson. Red Raider Mini Symposium, Texas Tech University, Lubbock, November 6 – 7, 2015.
44. Miller MI: Panel 1: Neuroscience – Past, Present, Future. Kavli Foundation Mini-Symposium Neuroscience in the 21st Century, Capitol Visitor Center, Washington, DC, October 1, 2015.
45. Miller MI: Neuroinformatics Computational Anatomy and Brain Clouds at the Morphome Scale. Grand Opening and 10th Anniversary Celebration, Biomedical Research Imaging Center, University of North Carolina, September 30, 2015.
46. Miller MI: Neuroinformatics and the Complexity of the Brain at 1mm Scale. SAMSI Neuroscience Opening Workshop for the 2015-2016 SAMSI research program on Challenges in Computational Neuroscience (CCNS), North Carolina, August 17 -21, 2015.
47. Miller MI: Bayesian Deformable Templates in Multi-Atlas Orbits in Computational Anatomy. 3rd Biomedical Image Analysis Summer School: Modalities, Methodologies & Clinical Research, Institut Henri Poincare, Paris, France, July 6 – 10, 2015.
48. Miller MI: Diffeomorphometry, Geodesic Positioning, Hamiltonian Control for Estimating and Reconstructing Human Anatomy. Advanced Study School on Imaging for Medial Applications (SSIMA), Sinaia, Romania, June 29 – July 4, 2015.
49. Miller MI: MRICloud Use regarding Computational Anatomy Gateway. XSEDE Science Gateway Community Call, Teleconference, May 29, 2015.
50. Miller MI: Neuroinformatics Computational Anatomy and Brain Clouds at the Morphome Scale. Seventh International Workshop Statistical Analysis of Neuronal Data (SAND 7), University of Pittsburgh, Pittsburg, PA May 27-29, 2015.
51. Miller MI: Bayesian Deformable Templates Neurodegenerative Disease, Brain Clouds at the Morphome Scale (1mm). Joint Carnegie Mellon University Pittsburgh PhD Program in Computational Biology’s Seminar Series Carnegie Mellon University, April 5, 2015.
52. Miller MI: Issues in Big Data and Healthcare. Big Data, Big Changes, Big Impact: Improving your Health and your Healthcare, Booz Allen Hamilton, McLean, March 26, 2015.
53. Miller MI: Quantitative brain mapping in neurological disorders. JHU-NIMHANS Translational Neuroscience Symposium, Johns Hopkins University, Baltimore, February 25 and 26, 2015.
54. Miller MI: Bayesian Deformable Templates in Computational Anatomy, BrainClouds and Neurodegenerative Diseases. Erwin Schrodinger Institute, Workshop on Riemannian Geometry in Shape Analysis and Computational Anatomy, Vienna, February 16, 2015.
55. Miller MI: BrainClouds for High Throughput Radiological Workflows. Dr. Fayad's Translational Research conference, Johns Hopkins University, Baltimore , January 29, 2015.
56. Miller MI: High throughput Neuroinformatics BrainClouds. Johns Hopkins University, 4th Annual Hopkins Imaging Conference, Baltimore , November 5, 2014.
57. Miller MI: On a Theory of Shape and Form at the Morphome Scale: 100 Years Since D'Arcy. Thomson Hopkins BME Distinguished Lecture Series, Baltimore, November 3, 2014.
58. Miller MI: Diffeomorphometry, Geodesic Positioning and High Throughput Neuroinformatics. University Pennsylvania, AMCS/PICS Colloquium, Baltimore, October 3, 2014.
59. Miller MI: Bayesian Deformable Templates in Multiple Atlas Orbits. The Medical Image Computing and Computer Assisted Intervention Society, Boston, September 18, 2014.
60. Miller MI: Bayesian Deformable Templates in Multiple Atlas Orbits. Keynote speaker at Johns Hopkins BME Ph.D. Retreat, Ocean City, Maryland, September 12 and 13, 2014.
61. Miller MI: Computational Anatomy Gateway: Leveraging XSEDE Computational Resources for Shape Analysis. 2014 Annual Conference on Extreme Science and Engineering Discovery Environment, Atlanta, July 13 - 18, 2014.
62. Miller MI: Geodesic Positioning Systems for Biological Coordinate Systems and High Throughput Informatics. National Research Council of the National Academies Workshop, Washington, DC, May 17, 2014.
63. Miller MI: Computational Anatomy and High throughput Neuroinformatics BrainClouds. Vanderbilt University, Department of Electrical Engineering, Nashville, Tennessee , March 6, 2014.
64. Miller MI: Computational Anatomy and High throughput Neuroinformatics Brain Clouds. National University of Singapore, Department of Biomedical Engineering, Singapore, March 11 and 12, 2014.
65. Miller MI: Computational Anatomy and High throughput Neuroinformatics BrainClouds. Centre for Mathematics CMLA, June 2013.
66. Miller MI: The development of a population of 4D pediatric XCAT phantoms for CT imaging research and optimization. Proc. SPIE 9033, Medical Imaging 2014: Physics of Medical Imaging, 90331V, San Diego, February 15-20, 2014.
67. Miller MI & Mori S: MRI as a Tool for Diagnosing Chronic Traumatic Encephalopathy. The Neuropathology of Chronic Traumatic Encephalopathy, Neuroscience Center, Bethesda, Maryland. December 2012.
68. Miller MI: Segmentation via the Random Multi-Atlas Orbit Model. MICCAI Conference. Nice, France. October 2012.
69. Miller MI: Computational Anatomy and High Throughput Neuroinformatics at 1mm Scale. The Johns Hopkins Brain Science Institute, Brain Night, Baltimore, Maryland. September 2012.
70. Miller MI: The Random Atlas Model in Computational Anatomy and High Throughput Image Informatics. MITAS Conference, Mathematics of Brain Imaging, Simon Frasier University, Burnaby BC. June 2012.
71. Miller MI: Diffeomorphic Shape Momentum and Neuroinformatics. ICM Distinguished Seminar Series, Johns Hopkins University, Baltimore, Maryland. September 2011.
72. Miller MI: Diffeomorphic Shape Momentum, Computational Anatomy, Neuroinformatics at 1mm Scale. Mathematics of Medical Imaging Conference, Fields Institute, Toronto, Canada. June 2011.
73. Miller MI: Computational Anatomy and High Throughput Image Informatics. Lecture, INRIA Sophia, France. May 2011.
74. Miller MI: Anatomic Data Analysis: Comparing Populations (Subcortical Structures). ISMRM Conference, Montreal, Quebec, Canada. May 2011.
75. Miller MI: Computational Functional Anatomy. Welcome Lecture Oxford University, London, England. June 2010.
76. Miller MI: Neural Imaging, Signal Analysis, Image Processing. NEBEC Conference, Columbia University, NY. March 2010.
77. Miller MI: Computational Functional Anatomy and the Diffeom Project. BME Seminar Series, Stony Brook University, NY. March 2010.
78. Miller M: Computational Functional Anatomy. CIS SHAPE Retreat, Johns Hopkins University, Baltimore, MD. January 2010.
79. Miller M: Computational Functional Anatomy. NAMIC Conference, Salt Lake City, UT. January 2010.
80. Miller MI: Computational Functional Anatomy. Distinguished Seminar Series on Vision, University of MD. College Park, MD. March 13, 2009.
81. Miller MI: Mori S: MRI/DTI Image Analysis Tools Based on Large Deformation Diffeomorphic Metric Mapping. NIH Seminar. NIH. April 01, 2008.
82. Miller MI: Image Co-Registration and Warping. FM Kirby Research Center for Functional Brain Imaging Research Retreat. Mt. Washington MD. May 30, 2008.
83. Miller MI: Computational Functional Anatomy. Mathematical Biosciences Institute. Ohio State University. June 10, 2008.
84. Miller MI: Computational Functional Anatomy. Dept of Psychiatry & Behavioral Sciences Speaker Series. Feinberg School of Medicine, Northwestern University. June 20, 2008.
85. Miller MI: Computational Anatomy of Shape using Pattern Theory. IPAMM Mathematics in Brain Imaging. UCLA. July 15, 2008.
86. Miller MI: Computational Functional Anatomy in Diseased Brain. NIH Blueprint for Neuroscience Research. NIH. September 23, 2008.
87. Miller MI: The Emergent Discipline of Computational Functional Anatomy. Inaugural Symposium AMCS at UPenn.  September 27, 2008.
88. Miller MI: Computational Functional Anatomy on the TeraGrid. SuperComputing 2008 Conference. Austin, TX, November 19, 2008.
89. Miller MI: Computational Functional Anatomy. IEEE BioCAS Conference. Baltimore, MD. November 22, 2008 (Invited)
90. Miller MI: Shapes in Medical Imaging. Computational Anatomy SAMSI Workshop. Research Triangle Park, NC. July 08, 2007. Invited by Laurent Younes.
91. Miller MI: Computational Functional Anatomy. IPAM Random Space Shapes Workshop. Los Angeles CA. May 24, 2007. Invited by Paul Thompson.
92. Miller MI: Computational Functional Anatomy. Mathematical Methods for Medical Image Analysis Conference. Banff, Canada. November 05, 2007. Invited by Ghassan Harnarneh.
93. Miller MI:  Cardiovascular Research Grid. External Advisory Board Meeting. Johns Hopkins University. October 22, 2007. Invited by Rai Winslow.
94. Miller MI: Integrative Image Analysis. Institute for Computational Analysis Presentation. Johns Hopkins University, Baltimore, MD. February 20, 2006. Invited by Raimond Winslow.
95. Miller MI: Paths Towards Understanding the Shapes of the Whole Brain. IMA Workshop on Shape Spaces. Minneapolis, MN. April 03, 2006. Invited by David Mumford and Laurent Younes.
96. Miller MI: Computational Anatomy and the Infinite Dimensional Diffeomorphisms. SIAM Annual Meeting. Boston, MA. July 13, 2006. Invited by Carlos Castillo-Chavez and Ricardo Cortez.
97. Miller MI: Informal Talk EP Differentials Workshop. Santa Fe, NM. July 26, 2006.Invited by Darryl Holm and Laurent Younes.
98. Miller MI: The Emergent Discipline of Computational Anatomy. SCI Institute Seminar. Salt Lake City, UT. September 22, 2006. Invited by Chris Johnson.
99. Miller MI: Computational Anatomy and the Infinite Dimensional Diffeomorphisms. MBI Workshop. Columbus, OH. September 26, 2006. Invited by Raimond Winslow.
100. Miller MI: Concept of Biomedical Engineering. JHU Biomedical Engineering Retreat. Baltimore, MD. May 23, 2005. Invited by Eric Young.
101. Miller MI: Morphometry. Biomedical Informatics Research Network Spring Conference. Miami Beach, FL. March 02, 2005. Plenary talk  invited by Jorge Jovicich.
102. Miller MI: Results/Challenges in 3D Medical Shape Analysis Statistical Inferences on Shape Manifolds Workshop. Palo Alto, CA. May 06, 2005. Invited by David Mumford.
103. Miller MI: Applications of Computational Anatomy to Mental Illness The Whitaker Foundation Leadership Award Site Visit. Baltimore, MD. March 29, 2005. Invited by Murray Sachs.
104. Miller MI: Informal Talk Shape Analysis Retreat. Baltimore, MD. October 17, 2005. Laurent Younes (Invited)
105. Miller MI: Advances in Imaging Sciences The Whitaker Foundation Leadership Award Site Visit. Johns Hopkins University, Baltimore, MD. March 18, 2004. Invited by Murray Sachs.
106. Miller MI: Emerging Field of Computational Anatomy. IPAM's Graduate Summer School: Mathematics in Brain Imaging. Los Angeles CA. July 12, 2004. Invited by Paul Thompson.
107. Miller MI: Going from Structural Maps to Functional Imagery: Initiatives in DTI and fMRI FM. Kirby Research Center for Functional Brain Imaging Retreat. Baltimore, MD. October 30, 2004. Invited by Dr. Peter van Zijl.
108. Miller MI: Intel Technology for Imaging Science and Computational Anatomy. HPC Roundtable. Portland, OR. March 17, 2004. Invited by Dr. David Barkai.
109. Miller MI: Clutter Metrics for ATR. Dayton, OH. December 01, 2004. (Invited)Miller MI: Metrics and Euler-Lagrange Equations of Computational Anatomy CAIP Center Seminar. Rutgers University. February 24, 2003. Invited by Dr. Ed Devinney.
110. Miller MI: Technologies for a Center of Excellence in Homeland Security. Mt. Washington Valley Economic Council Talk. North Conway, NH. March 06, 2003. Invited by John Bruni.
111. Miller MI: Metrics and Euler-Lagrange Equations of Computational Anatomy. IPAM UCLA Seminar. Los Angeles CA. April 08, 2003. Invited by Song Chun Zhu.
112. Miller MI: Computational Anatomy: An Emerging Discipline. GRASP Laboratory Seminar, Computer Science. University of Pennsylvania. April 10, 2003. Invited by James Gee.
113. Miller MI: Photo/Geo Metric Spaces for Image Analysis. ONR PI Meeting. University of Minnesota. May 09, 2003. Invited by Dr. Guillermo Sapiro.
114. Miller MI: The Emerging Discipline of Computational Anatomy. Conformal Brain Mapping Meeting. Townsend, TN. May 20, 2003. Invited by Ken Stephenson.
115. Miller MI: Image Analysis in the 21st Century. The JASONS Program. San Diego, CA. July 08, 2003. invited by Dr. Robert Henderson.
116. Miller MI: Computational Anatomy and Models for Image Analysis. BC Inverse Problems and Medical Imaging Workshop. Vancouver, BC. August 06, 2003. Invited by Dr. John Schotland.
117. Miller MI: Computational Neuropsychiatry and Computer Vision. Some Applications to Psychiatry JHU Department of Psychiatry Weekly Research Conference. Johns Hopkins University, Baltimore, MD. October 07, 2003. Invited by Russell Margolis.
118. Miller MI: Models for Image Analysis and Computational Anatomy. Computational Sciences Lecture Series. University of Wisconsin, Madison, WI. October 30, 2003. Invited by Dr. Robert Nowak.
119. Miller MI: Computational Anatomy and Models for Image Analysis. Institute for Systems Research, Seminar. University of Maryland, College Park, MD. November 05, 2003. Invited by Dr. PS. Krishnaprasad.
120. Miller MI: I-3 Presentation to IBM representatives. Johns Hopkins University, Baltimore, MD. November 11, 2003.
121. Miller MI: Plenary Speaker, Society for Mathematical Biology, Knoxville TN, June 2002.
122. Miller MI: On the Metrics and Variational Equations of Computational Anatomy. SIAM Life Sciences 2002. Boston, MA. March 06, 2002.
123. Miller MI: Information Theory of Automatic Target Recognition. Northrop Grumman Space System Division Seminar. Azusa, CA. January 22, 2002.
124. Miller MI: Ratnanather JT: Development and Validation of New Tools for Computational Anatomy. Conte Center Executive Committee Meeting. JHU. February 12, 2002.
125. Miller MI: van Zijl P: Overview of Resource for Quantitative Functional MRI. National Center for Research Resources PI Meeting. Bethesda, MD. June 24, 2002.
126. Miller MI: Computational Anatomy: An Emerging Discipline. Annual Meeting of the Society for Mathematical Biology and International Conference on Mathematics and Biology. Knoxville, TN. July 13, 2002. Plenary Speaker.
127. Miller MI: The Euler-Lagrange Equations of Computational Anatomy. Reunion Conference for the Geometrically Based Motions IPAM Program. Lake Arrowhead, CA. September 16, 2002.
128. Miller MI: On the Metrics and Euler-Lagrange Equations of Computational Anatomy. Image Analysis and Understanding Data from Scientific Experiments. Los Alamos National Laboratory, Los Alamos, NM. December 02, 2002.
129. Miller MI: The Emerging Discipline of Computational Anatomy. Computer Surgery. The National Library of Medicine. January 16, 2001.
130. Miller MI: Image Understanding. NSF Science and Technology Center Site Review. Rutgers University, NJ. October 10, 2001.
131. Miller MI: Pattern Based Computing. Santa Rosa Darpa Meeting. Santa Rosa, CA. June 25, 2001.
132. Miller MI: Metric Spaces for Clutter Invariant ATR. Wright Patterson Air-Force Base. August 08, 2001.
133. Miller MI: Computational Anatomy NIH/NIAA Workshop. Bethesda, MD. September 10, 2001.
134. Miller MI: The Information Theory for Optimal Aimpoint Selection via Multiple Sensors. Office of Naval Research (ONR), Marine Corps Review. Quantico, VA. March 02, 2001.
135. Miller MI: Impact of NPACI on Computational Anatomy. NPACI All hands Meeting. San Diego, CA. February 27, 2001.
136. Miller MI: The Future of Computational Imaging Science. Donald L Snyder Workshop. Washington University. January 15, 2000.
137. Miller MI: Computational Anatomy: An Emerging Discipline. University of Minnesota's Symposium on Brain Imaging. IMA, University of Minnesota. October 13, 2000.
138. Miller MI: Pattern Based Computing. DARPA Workshop on Future of Pattern Based Computing. San Diego, CA. October 24, 2000
139. Miller MI: Performance Analysis of Multiple Sensor Systems in Automatic Target Recognition. Office of Naval Research MURI Review. Johns Hopkins University, Baltimore, MD. November 10, 2000.
140. Miller MI: Deformable Templates and Image Understanding. The Applied Physics Laboratory, JHU. March 03, 2000.
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**Publications: Patents**

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16. Miller MI (2010) Viewpoint-Invariant Image Matching and Generation of 3D Models from 2D Imagery. US Patent No. 7643685B2. Granted January 5, 2010.
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19. Miller MI, Joshi SC, Christensen GE (2001) Rapid Convolution based large Deformation Image Matching Via Landmark and Volume Imagery. US No. 6226418B1. Granted May 1, 2001.
20. Miller MI, Christensen GE, Joshi SC, Ulf Grenander (1999) Method and Apparatus for Image Registration. US Patent No. 6009212. Granted December 28, 1999.

**Research Support (Active and Completed Past Ten Years)**

R01NS134842 (Huganir) 12/08/2023 - 11/30/2028

JHU $3,118,298 Total

Extramural Research Programs in the Neurosciences and Neurological Disorders

Goal: Using deep network learning, we will develop algorithms to automatically detect and track how the strength of millions of individual synapses changes during learning. This will enable exploration of circuit-specific learning mechanisms within discrete cell types and specific presynaptic inputs.

2243106 (Miller) 7/2023 – 2028

NSF $650,000 Total

**AGEP FC-PAM: Alliance for Relevant and Inclusive Sponsorship of Engineering Researchers (ARISE) to Increase the Diversity of the Biomedical Engineering Faculty**

Goal: We are working with our colleagues at Brown University, Yale University and Columbia University to establish a pipeline for increasing diversity of faculty in Biomedical Engineering. Proposed activities include networking and training sessions with our partners.

AARG-23-1144317 (Morris-PI) (Miller-Co-PI) 9/2023 - 8/2026

JHU $199, 740 Total

**Diffeomorphic Reconstruction of Amygdala Pathology and AD Molecular Changes**

Goal: This work will build a 3-dimensional map of molecular changes and pathology in the amygdala in Alzheimer’s disease (AD) to gain insight into how specific regions are preferentially affected in AD.

2309683 (Younes) 7/2023 – 6/2026

NSF $340,128 Total

**Large-Scale Models and Algorithms in Diffeomorphic Shape And Image Registration**

Goal: Our primary focus will be on new models and developments around the ``large-deformation diffeomorphic metric mapping'' (LDDMM) paradigm, organized along Multiscale modeling of the diffeomorphism group, and related algorithms, Stochastic gradient descent (SGD) algorithms for LDDMM and LDDMM algorithms for the comparison of non-smooth images using image varifolds.

P41EB031771 (Van Zijl) 0701/2021 – 04/30/2026

Kennedy Krieger, Inc./NIH/NIBIB $1,598,115 Total

**MRI Resource for Physiologic, Metabolic and Anatomic Biomarkers**

Goal: This resource grant seeks to develop novel noninvasive MRI candidate biomarkers that can be ultimately used for personalized assessment of patients for diagnosis, prognosis, treatment monitoring, or for monitoring the development of new medical technologies and drugs.

1P50HD103538 (Schlaggar) 06/01/2020 – 05/31/2025

NIH/NICHD $59,356 Total

**Intellectual and Developmental Disabilities Research Centers 2020**

Goal: The Johns Hopkins Whiting School of Engineering will serve as a collaborating site for the Neuroimaging Core of the multi-site Intellectual and Developmental Disabilities Research Center (IDDRC). Dr. Miller will advise users on and providing state-of-the-art image analysis tools. This includes design and evaluation of the new methods for multimodality mapping of whole brain data and the processing software development.

RF1MH128875 (Nauen) 09/15/2021 – 08/31/2024

Cold Spring Harbor Laboratory / NIH $510,900 Total

**A 3d Multimodal Micron-Scale Human Brain Atlas Bridging Single Cell Data, Neuropathology and Neuroradiology**

Goal: This project will develop a three-dimensional atlas of the human brain for use in spatially structuring the data from the BRAIN initiative Cell Census project and in other human brain research as well as clinical care.

U19AG033655 (Albert)                      04/01/19 – 03/31/2024

NIH/NIA                                              $1,448,282 Direct / $2,371,563 Total

**Biomarkers of Cognitive Decline Among Normal Individuals: The BIOCARD Cohort**

The goal is to identify biomarkers that predict progression from normal cognitive status to mild impairment or dementia.

RF1MH123212 (Huganir) 09/01/2020 – 08/31/2023

NIH/NIMH $1,757,079 Total

**Developing Molecular and Computational Tools to Enable Visualization of Synaptic Plasticity In Vivo**

Goal: The major goal of this grant is to develop tools to image AMPA receptors and other synaptic molecules during synaptic plasticity in vivo using two photon microscopies. Specific Aim 1. Develop novel tools to fluorescently label endogenous synaptic proteins in vivo.

5U54DA049110 (Lindquist, Martin) 09/01/2019 – 07/31/2023

NIH/NIDA $9,975,673 Total

**Data Center for Acute to Chronic Pain Biosignatures**

Goal: As part of the NIH A2CPS Program, we will establish a Data Integration and Resource Center (DIRC) to integrate imaging, peripheral physiology, omics, behavior, and clinical measures to study chronic pain.

R01NS102670 (Miller) 04/01/2018 – 3/31/2023

NIH/NINDS $938,690 Direct / $1,228,690 Total

**Tracing Spread of Pathology Within the HD Brain via Automated Neuroimaging**

The goal is to test the possibility that the spread of atrophy in the HD brain follows patterns of axonal connectivity.

R01EB026549-01 (Lindquist) 07/18/18 – 03/31/2023

NIH/NIBIB $69,063 Direct / $2,723,615 Total

**Individualized Spatial Topology in Functional Neuroimaging**

In this project, we will compare our new methods to existing methods based on out-of-sample effect sizes in predicting behavior and test-retest reliability. We will make the analytic methods, software, dataset available to other researchers, along with a library of functional reference spaces for multiple psychological states.

R01NS084957 (Mori) 06/01/2018 – 02/28/2023

NIH/NINDS                                                                          $617,668 Direct / $1,821,918 Total

**Continued development and maintenance of MRI Studio**

The goal of this grant is to sustain our current effort to develop and disseminate software programs to analyze MRI data.

1RF1MH121539-01 (Mueller-Miller Co-PI)                  09/17/19 – 08/31/2022

NIH/NIMH                                              $617,668 Direct / $1,821,918 Total

**Accessible technologies for high-throughput, whole-brain reconstructions of molecularly characterized mammalian neurons**

The goal is to deploy new technologies for studying morphology of large-scale projecting mammalian neurons.

RF1MH121539-01 (Muller, Miller) 09/01/2019 – 08/31/2022

NIH/NIMH $753,974 Direct / $1,180,445 Total

**Accessible technologies for high-throughput, whole-brain reconstructions of molecularly characterized mammalian neurons**

The overall goal of the proposal is to develop technologies for the brain-wide reconstruction of axonal arbors of molecularly defined neurons. The proposal aims at overcoming barriers in neuronal labeling, imaging and computation to achieve this goal, to develop a technology platform that can be scaled to all neurons of the brain.

P41EB015909 (van Zijl) 9/1/2016 – 6/30/2021

NIH/NCRR $551,694 Direct / $778,190 Total

**The Resource of Quantitative Functional MRI—TRD4**

The major goals are to develop computational anatomy tools for construction and analysis of cortical surfaces, gyral and sulcal folds of the various brain substructures. The new tools will be automated and made available to collaborators and others in the scientific community.

R01EB020062-01A1(Miller/Mostofsky/Paulsen/Wang - MPI) 09/30/16 – 07/31/20

NIH/NIBIB $2,092,428 Direct / $2,787,392 Total

**Neurodegenerative and Neurodevelopmental Subcortical Shape Diffeomorphometry**

The goal is to extend and harden powerful computational anatomy and computer science software to analyze large datasets from neuroimaging studies of neurodevelopmental and neurodegeneration disorders.

R01NS086888 (Mori) 9/30/2014 – 07/31/2020

NIH/NINDS $85,441 Direct / $138,414 Total

**Multi-scale electronic human brain atlas**

The goal of this atlas is to develop a four-dimensional electronic atlas of the human brain, which will be used as a portal for various brain-related databases.

R01MH085328-10 (Mostofsky) 07/01/15 – 06/30/2020

NIH/ NIMH $137,313 Direct / $197,839 Total

**Adolescent Changes in Brain and Behavior in Boys and Girls with ADHD**

The goal is to examine developmental changes in brain structure and behavior in both girls and boys with ADHD, to examine the impact of these changes on adolescent mental health and other functional outcomes. The findings will help to identify risk factors in children with ADHD and could thereby lead to prevention efforts and improved outcomes for children with ADHD.

R01HL130292-01A1 (Ardekani) 07/01/2016 – 06/30/2020

NIH/NHLBI $7,592 Direct / $12,431 Total

**Computational Assessment of Galectin-3 Significance in Heart Failure Remodeling**

The goal of this project is to use imaging-based computational models to identify role of Galectin-3 in myocardial remodeling in ischemic and non-ischemic heart failure.

R01MH105660-01 (Ishizuka)            09/25/2014 – 05/31/2020

NIH/NIMH                                                               $368,117 Direct / $500,093 Total

**DISC1-dependent defects in neural fate, corticogenesis and cognition in psychosis**

Cortical thickness analysis of dorsolateral prefrontal cortex, anterior cingulate cortex and planum temporale, correlation with other biomarkers.

U19MH114821-01 (Huang) 09/21/2017 – 05/31/2020

NIH/NIMH BICCN $293,952 Direct / $477,006 Total

**A Comprehesive Center for Mouse Brain Cell Atlas**

The goal of this project is to analyze high resolution images of mouse brains with nissl and fluorescent image data and analyze brain connectivity from these images to be able to provide a high throughput platform for LDDMM based brain mapping.

R03AG060340-01 (Wu) 08/15/18 – 05/31/2020

NIH/NIA $15,403 Direct / $25,223 Total

**Multi-atlas based Direct Estimation in Preclinical Alzheimer's Disease**

In this application, we will establish a novel paradigm of atlas-based brain MRI analysis of preclinical Alzheimer’s disease (AD), featuring in direct estimation of the patients’ attributes with a unique knowledge-based information- retrieval technology.

U19AG033655-06 (Albert) 8/14/2014 – 8/31/2019

NIH/NIA $1,418,719 Direct / $2,301,723 Total

**Biomarkers for Older Controls at Risk for Dementia (BIOCARD) Study Extension**

The goal is to identify biomarkers that predict progression from normal cognitive status to mild impairment or dementia.

NSF1649880 (Burns) 01/15/17 – 10/14/18

NSF $8,539 Direct / $17,397 Total

**Brain Comp Infra: EAGER: BrainLab CI: Collaborative, Community Experiments with Data-Quality Controls through Continuous Integration**

The goals is to deploy an experimental-management infrastructure that allows users to construct community-wide experiments that implement data and metadata controls on the inclusion and exclusion of data.

R01HD065955 (Oishi) 9/20/2011 – 7/31/2018

NIH/NICHD $100,530 Direct / $144,329 Total

**Development of Quantitative MRI DTI Analysis Tool**

The goal of this grant is to develop computational neuroanatomy tools to analyze anatomy of neonates.

R24HL085343 (Winslow, R) 03/07/11 – 11/30/16

NIH/NHLBI $1,133,215 Direct / $1,818,185 Total

**The Cardiovascular Research Grid (CVRG)**

The CVRG Project is a national resource providing the capability to store, manage, analyze data on the structure and function of the cardiovascular system in health and disease. The CVRG Project has developed and deployed unique technology that is now being used in a broad range of studies. We propose to develop new tools that will enhance the ability of researchers to explore and analyze their data to understand the cause and treatment of heart disease.

P41RR015241-12 (Van Zijl P) 09/01/12 – 8/31/16

NIH/NCRR $1,119,652 Direct / $1,819,706 Total

**The Resource of Quantitative Functional MIR—TRD4**

The major goals are to develop computational anatomy tools for construction and analysis of cortical surfaces, gyral and sulcal folds of the various brain substructures. The new tools will be automated and made available to collaborators and others in the scientific community.

R01MH090786-01 (Luby, J) 05/01/10 – 02/28/15

NIH/NIMH $99,038 Direct / $167,949 Total

**Neuroimaging in Early Onset Depression: Longitudinal Assessment of Brain Changes**

The main goal is to characterize developmental differences in the function and structure of key limbic cortical networks in a large and unique cohort of children with preschool onset Major Depressive Disorder (MDD).

U01NS082085-01 (Miller, M/Ross C) 09/26/12 – 07/31/14

NIH/NINDS $782,215 Direct / $1,114,995 Total

**Basal Ganglia Shape Analysis and Circuitry in Huntington's Disease**

Huntington’s disease (HD) is a progressive, fatal, neurodegenerative disease, with movement disorder, psychiatric features, cognitive decline. The neurodegeneration is regionally heterogeneous with preferential loss of striatal medium spiny neurons, but with significant atrophy in other regions. This leads to the question whether this pattern of regional degeneration is circuit related, reflecting the anatomic connections of the affected neurons, or by contrast is multifocal. To address this question, we will perform statistical shape analysis of basal ganglia and examine white matter structures connecting atrophied regions with affected cortical regions.

R01MH085328-05A1 (Mostofsky, S) 08/15/09 – 03/31/14

NIH/NIMH $234,192 Direct / $381,191 Total

**Neurology of Deficient Response Control in ADHD**

The overall goal is to understand the contribution of abnormalities in structural and functional connectivity to ADHD-associated impairments in intra-subject response variability (ISV) and to examine the effectiveness of behavioral interventions targeted at reducing ISV and associated failures of inhibitory control.

R01EB003543 (Mori S)                    08/01/09 – 07/31/13

NIH/NIBIB $140,759 Direct / $228,972 Total

**MR Microimaging of Mouse Brain Development**

The purpose of this project is to develop image technology for mouse brain development.

R01EB000975-05A2 (Miller, M) 07/01/09 – 06/30/13

NIH/NIBIB $865,446 Direct / $1,406,486 Total

**Validation of Structural/Functional MRI Localization**

The goal is to continue the development of co-registration of functional MRI (fMRI) information with the anatomical coordinates.

R01EB008171 (Miller, M) 05/01/09 – 02/28/13

NIH/NIBIB $1,454,301 Direct / 1,843,416 Total

**NCBC: 3D Shape Analysis for Computational Anatomy (CA)**

The long-term goal of CA is to create algorithmic tools that aid basic and clinical neuroscientists in the analysis of variability in anatomical structures at different scales. The overall aim is to integrate 3D Slicer application and ITK software library with the statistical shape analysis pipeline being disseminated by the Biomedical Informatics Research Network and thus enable the wider neuroimaging community to efficiently analyze anatomical variations in disease.

R01HL091036-01A2 (Segars, P) 04/04/09 – 01/31/13

NIH/NHLBI $320,157 Direct / $513,320 Total

**4D Multi-scale Model of the Human Heart for Imaging Research**

The goal of this project is to develop and validate a 4D multi-scale model of the human hearts spanning scales from cell to population based on state-of-the-art human imaging data. The heart model will provide a realistic framework from which to link structure and function for the cellular level to that of the intact human heart and to a group of anatomical variations found in the general population.

R01MH056584 (Csernansky, J) 08/31/07 – 06/30/12

NIH/NIMH $184,914 Direct / $302,474 Total

**Neuromorphometry in Schizophrenia by Computer Algorithm**

The major goals are to continue to use HDMB and LCMDM to define the distribution of static versus progressive neuroanatomical abnormalities in schizophrenia subjects to determine whether cortical gray matter loss over time is confined to the fronto-temporal cerebral cortex.

R01MH084803-01A1 (Wang L) 07/01/09 – 06/30/12

NIH/NIMH $208,689 Direct / $366,923 Total

**Schizophrenia Data and Software Tool Federation Using BIRN Infrastructure**

The main goal is to develop data-sharing and software tools that will enable scientists to generate new hypotheses related to the mal-development of brain structures and neural networks in individuals with schizophrenia.

R01AG020012 (Mori S) 09/01/07 – 06/30/12

NIH/NIA $223,683 Direct / $280,003 Total

**Human White Matter Tract Mapping by Diffusion MRI**

The major goals are to extend the past efforts under the same mission: “To contribute to the progress of this new and exciting field of human white matter anatomy using DTI.” The new aims are: 1. Elaboration of the single-subject white matter atlas, 2. Creation of statistical atlas of human white matter, 3. Acquisition and analyses of DTI data of normal aging population.

**Supervised Students (Completed)**

1. Sue Kulason

Ph.D, Biomedical Engineering, Awarded 2020

Thesis title: “Brain Mapping for Understanding the Pre-Clinical Spread of Alzheimer’s Disease”

1. Kwame Kutten

Ph.D, Biomedical Engineering, awarded 2017

Thesis title: “A Large Deformation Diffeomorphic Approach to Inter-modality Registration of Microscopy Image Volumes with Mutual Information Matching”

1. Daniel Tward

Ph.D, Biomedical Engineering, awarded 2017

Thesis title: “Singular geodesic coordinates for representing diffeomorphic maps in computational anatomy, with application to the morphometry of early Alzheimer's disease in the medial temporal lobe”

1. Dan Wu

Ph.D, Biomedical Engineering, awarded 2016

Thesis title:” Characterization of brain tissue microstructures with diffusion MRI”

1. Kegang Hua

Ph.D, Biomedical Engineering, awarded 2014

Thesis title: “Human Brain White Matter Analysis Using Tractography -- An Atlas-Based Approach”

1. Jianqiao Feng

Ph.D, Electrical and Computer Engineering, awarded 2014

Thesis title: “Fusion and Inference of Geometric Information and Functional Contrast in Computational Anatomy”

1. Yajing Zhang

Ph.D, Biomedical Engineering, awarded 2014

1. Xiaoying Tang

Ph.D, Electrical and Computer Engineering, awarded 2014

Thesis title: “Brain Segmentation via Diffeomorphic Likelihood Fusion and Its Applications to Clinical Analyses”

1. Aastha Jain  
   Ph.D, Biomedical Engineering, awarded 2011   
   Thesis title: “Practical Methods for Diffeomorphic Registration”
2. Manisha Aggarwal  
   Ph.D, Biomedical Engineering, awarded 2011   
   Thesis title: “Longitudinal Characterization of Brain Atrophy in Mouse Models of Huntington's Disease using in vivo Magnetic Resonance Imaging”
3. Jun Ma  
   Ph.D, Biomedical Engineering, awarded 2011   
   Thesis title: “Statistics on Computational Anatomy: From Template Estimation to Geodesically Controlled Diffeomorphic Active Shapes”
4. Felipe Arrate  
   Ph.D, Biomedical Engineering, awarded 2010   
   Thesis title: “Evolution Equations on the Group of Diffeomorphisms, with Applications in Computational Anatomy”
5. Nayoung Lee  
   Ph.D. Biomedical Engineering, awarded 2010   
   Thesis title: “Characterization of Brain Development in Children Using Diffusion Tensor Imaging”
6. Can Ceritoglu  
   Ph.D, Biomedical Engineering, awarded 2008  
   Thesis title: “Multichannel Large Deformation Diffeomorphic Metric Mapping and Registration of Diffusion Tensor Images”
7. Marc Vaillant  
   Ph.D, Biomedical Engineering, awarded 2007  
   Thesis title: “Surface Matching via Currents and Tangent Space Representations for Statistics on Diffeomorphisms”
8. Sachin Gangaputra  
   Ph.D, Electrical and Computer Engineering, awarded 2006
9. Anqi Qiu  
   Ph.D, Electrical and Computer Engineering, awarded 2006  
   Thesis Title: “Intrinsic and Extrinsic Analysis in Computational Anatomy”
10. Dmitri Bitouk  
    Ph.D, Electrical and Computer Engineering, awarded 2006  
    Thesis title: “Head-Pose and Illumination Invariant 3-D Audio-Visual Speech Recognition”
11. Hao Huang  
    Ph.D, Electrical and Computer Engineering, awarded 2005
12. Jiangyang Zhang  
    Ph.D, Biomedical Engineering, awarded 2004
13. Agatha Lee  
    Ph.D, Biomedical Engineering, awarded 2003
14. Faisal Beg  
    Ph.D, Biomedical Engineering, awarded 2003  
    Thesis Title: "Variational and Computational Methods for Flows of Diffeomorphisms in Image Matching and Growth in Computational Anatomy"
15. Rakesh Lal  
    M.S, Biomedical Engineering, awarded 2001  
    Thesis Title: "Tracking in Diffusion Tensor Imaging"
16. Cash Costello  
    M.S, Biomedical Engineering, awarded 2000  
    Thesis Title: "Medical Image Registration using the Hilbert-Schmidt Estimator"
17. Matthew Cooper  
    Ph.D, Electrical and Computer Engineering, awarded 1999  
    Thesis Title: "Information Measures for Object Recognition Accommodating Signature Variability"
18. Joseph Kostakis  
    M.S, Electrical and Computer Engineering, awarded 1999  
    Thesis Title: "Multi-Sensor Active-Passive Performance Characterization"
19. Muge Bakircioglu  
    M.S.; awarded 1999  
    Thesis Title: "Large Deformation Diffeomorphisms for Mapping Spherical Brain Manifolds"
20. Aaron Lanterman  
    M.S, awarded 1995; Ph.D, awarded 1998  
    M.S. Thesis Title: "Jump-Diffusion Algorithms for the Automated Understanding of Forward-Looking Infrared Scenes"

Ph.D. Thesis Title: "Minimum Description Length Estimation for ATR"

1. Sarang Joshi  
   M.S, Electrical Engineering, awarded 1993; Ph.D, Electrical Engineering, awarded 1997  
   M.S. Thesis Title: "MAP Intensity Estimation with Good's Roughness and Global Shape Models for 3-D Optical Sectioning Microscopy"

Ph.D. Thesis Title: “Large Deformation Diffeomorphisms and Gaussian Random Fields for the Statistical Characterization of Brain Submanifolds”

1. Kevin Mark  
   Ph.D, Electrical Engineering, awarded 1997  
   Thesis Title: "Markov Random Field Models for Natural Language"
2. Anuj Srivastava  
   M.S, Electrical Engineering, awarded 1994; Ph.D, Electrical Engineering, awarded 1996  
   M.S. Thesis Title: "Automated Target Tracking and Recognition Using Jump-Diffusion Processes"

Ph.D. Thesis Title: "Inferences on Transformation Groups Generating Patterns on Rigid Motions"

1. Robert Schmich  
   M.S, awarded 1996  
   Thesis Title: "Stochastic Models of Synaptic Recovery and Post-Synaptic Action Potential Generation via Active Channel Dynamics"
2. Navin Khaneja  
   M.S, awarded 1996  
   Thesis Title: "Statistics and Geometry of Cortical Features"
3. Ayananshu Banerjee  
   M.S, awarded 1996  
   Thesis Title: "High-Dimensional Anatomical Maps and their Applications in Empirical Estimation, Functional Imaging and Neuromorphometry"
4. Robert Teichman  
   M.S, awarded 1994  
   Thesis Title: "Automated Target Recognition in a Distributed Computing Environment"
5. Gary Christensen  
   Ph.D, Electrical Engineering, awarded 1994  
   Thesis Title: "Deformable Shape Models for Anatomy"
6. Jing Wang  
   M.S, Electrical Engineering, awarded 1993  
   Thesis Title: "A Markov Process Model for Vesicle Release-Recycle and Action Potential Generation"
7. Christopher Butler  
   M.S, Electrical Engineering, awarded 1993  
   Thesis Title: "3-D Maximum A-Posteriori Estimation on Massively Parallel Computers for Single Photon Emission Tomography with Multigrid Initialization"
8. Timothy Schaewe  
   Ph.D, Electrical Engineering, awarded 1991  
   Thesis Title: "Maximum Likelihood Estimation for Magnetic Resonance Image Reconstruction"
9. Anders McCarthy  
   M.S, Electrical Engineering, awarded 1990  
   Thesis Title: "Medical Imaging on Mesh-Connected Parallel Computers"
10. Michael Turmon  
    M.S, Electrical Engineering, awarded 1990  
    Thesis Title: "Maximum-Likelihood Estimation of Constrained Means and Toeplitz Covariances with Application to Direction Finding"
11. Chrysanthe Preza  
    M.S, Electrical Engineering, awarded 1990  
    Thesis Title: "A Regularized Linear Reconstruction Method for Optical-Sectioning Microscopy"
12. Kurt Smith  
    Ph.D, Electrical Engineering, awarded 1990  
    Thesis Title: "A Bayesian Approach Incorporating Stochastic Complexity for Learning Regular Grammar Models and Image Models: Application to Segmenting Biomedical Images"
13. Tim S Chen  
    M.S, Electrical Engineering, awarded 1990  
    Thesis Title: "Maximum-Likelihood Methods for 1- and 2-D Nuclear Magnetic Resonance Spectroscopy"
14. Badrinath Roysam  
    Ph.D, Electrical Engineering, awarded 1989  
    Thesis Title: "Joint Stochastic and Symbolic Inference: Application to Hierarchical Imaging via Massively Parallel Architectures"
15. David Maffitt  
    M.S, Electrical Engineering, awarded 1989  
    Thesis Title: "Applications of the Maximum-Likelihood Method for Electron-Microscopic Autoradiography with Real Data
16. Neophytos Karamanos  
    M.S, Electrical Engineering, awarded 1987  
    Thesis Title: "A New Method for Analyzing Auditory-Nerve Discharge Patterns"

**Teaching (Johns Hopkins University)**

Fall 2022

580.431/580.631 **Introduction to Computational Medicine**

Graduate and Undergraduate Students: 66

580.243 **Linear Signals and Systems**

Graduate and Undergraduate Students: 115

Fall 2021

580.431/580.631 **Introduction to Computational Medicine**

Graduate and Undergraduate Students: 50

580.243 **Linear Signals and Systems**

Undergraduate Students: 106

Fall 2020

580.431/580.631 **Introduction to Computational Medicine**

Graduate and Undergraduate Students: 50

580.243 **Linear Signals and Systems**

Undergraduate Students: 106

Fall 2019

580.431/580.631 **Introduction to Computational Medicine**

Graduate and Undergraduate Students: 50

580.243 **Linear Signals and Systems**

Undergraduate Students: 106

Fall 2018

580.431/580.631 **Introduction to Computational Medicine**

Graduate and Undergraduate Students: 50

580.243 **Linear Signals and Systems**

Undergraduate Students: 120

Spring 2018

580.222 **Systems and Controls**

Undergraduate Students: 125

Fall 2017

580.431/580.631 **Introduction to Computational Medicine**

Graduate and Undergraduate Students: 50

Spring 2017

580.222 **Systems and Controls**

Undergraduate Students: 120

Fall 2016

580.431/580.631 **Introduction to Computational Medicine**

Graduate and Undergraduate Students: 40

Spring 2016

580.222 **Systems and Controls**

Undergraduate Students: 120

Fall 2015

580.431 **Introduction to Computational Medicine**

Undergraduate Students: 30

Spring 2014  
580.222 **Systems and Controls**  
Undergraduate Students: 125

Spring 2013  
580.222 **Systems and Controls**  
Undergraduate Students: 140

Spring 2012  
580.222 **Systems and Controls**  
Undergraduate Students: 115

Spring 2011  
580.222 **Systems and Controls**  
Undergraduate Students: 105

Spring 2010  
580.222 **Systems and Controls**  
Undergraduate Students: 105

Spring 2009  
580.222 **Systems and Controls**  
Undergraduate Students: 110

Spring 2008  
580.222 **Systems and Controls**  
Undergraduate Students: 100

Spring 2007  
580.222 **Systems and Controls**  
Undergraduate Students: 100

Spring 2006  
580.222 **Systems and Controls**  
Undergraduate Students: 88

Spring 2005  
580.222 **Signals and Systems**  
Undergraduate Students: 101

Fall 2004  
580.222 **Signals and Systems**  
Undergraduate Students: 137

Spring 2003  
520.644 **Pattern Theory**  
Graduate Students: 3

580.222 **Signals and Systems**  
Undergraduate Students: 150

**Assistant**

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