

IMAN AGANJ

Assistant Professor of Radiology, **Harvard Medical School**

Assistant in Neuroscience, Martinos Center for Biomedical Imaging, **Massachusetts General Hospital**

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Education

- 09/2005 – 12/2010 **Ph.D.** in *Electrical Engineering* (minor in *Computer Science*), **University of Minnesota**, Minneapolis, MN, USA. **M.S.** received in 2008. Research Assistant of Prof. [Guillermo Sapiro](#).
- 04/2003 – 06/2005 **B.S.**, *Computer Science*, **École Polytechnique**, Paris, France.
- 09/2001 – 02/2003 *Electrical Engineering*, **Sharif University of Technology**, Tehran, Iran.
- 06/2000 – 06/2001 *Physics*, preparation program for International Physics Olympiad, **Young Scholars Club**, Tehran, Iran.

Work Experience

- 04/2016 – present Assistant Professor of Radiology at **Harvard Medical School**, Boston, MA, USA.
- 12/2013 – 03/2016 Instructor (junior faculty) in Radiology at **Harvard Medical School**, Boston, MA, USA.
- 12/2013 – present Assistant in Neuroscience at the Athinoula A. Martinos Center for Biomedical Imaging, **Massachusetts General Hospital**, Boston, MA, USA.
- 02/2011 – 12/2013 Postdoctoral Research Fellow at the **Massachusetts General Hospital** (Athinoula A. Martinos Center for Biomedical Imaging, with Prof. [Bruce Fischl](#)), Radiology Department, **Harvard Medical School**, and Research Affiliate at the Department of Electrical Engineering and Computer Science (LIDS, with Prof. [Devavrat Shah](#)), **Massachusetts Institute of Technology**, Boston, MA, USA.
- 09/2005 – 12/2010 Research Assistant at the Image Sciences Laboratory of Prof. [Guillermo Sapiro](#), Department of Electrical and Computer Engineering, **University of Minnesota**, Minneapolis, MN, USA.
- Summer 2010 Internship at the Center for Magnetic Resonance Research (with Prof. [Noam Harel](#)), **University of Minnesota**, Minneapolis, MN, USA.
- July 2009 Visiting the Odyssee Project Team (Prof. [Rachid Deriche](#)), Institut National de Recherche en Informatique et en Automatique (**INRIA**), Sophia Antipolis, France.
- Summer 2008 Visiting Centre d'Enregistrement et de Recherche en Technologies de l'Information et Systèmes (CERTIS, Prof. [Renaud Kériveren](#)), **École Nationale des Ponts et Chaussées**, Paris, France.
- July 2007 Visiting the Laboratory of Neuro Imaging (Prof. [Paul Thompson](#)), **University of California – Los Angeles**, CA, USA.
- Summer 2006 Internship at the Laboratory of Cell Biology (with Prof. [Sriram Subramaniam](#)), National Cancer Institute, **National Institutes of Health**, Bethesda, MD, USA.
- Spring 2005 Internship at the Image Sciences Laboratory of Prof. [Guillermo Sapiro](#), Department of Electrical and Computer Engineering, **University of Minnesota**, Minneapolis, MN, USA.
- 07/2001 – 06/2002 Teaching physics in the preparation program for the International Physics Olympiad, **Young Scholars Club**, Tehran, Iran.

Languages

Fluent: *English, French*; Native: *Persian*; Intermediate: *Spanish, Arabic*.

Awards and Honors

2016	GPU Grant (hardware gift), NVIDIA Corporation .
2016	Alzheimer’s Disease Research Award (\$300,000 of direct costs over three years), BrightFocus Foundation .
2016	Microsoft Azure Research Award (\$20,000 of Azure credit for one year).
2015	Mentored Research Scientist Development (K01) Award (\$738,500 of direct costs over five years), National Institutes of Health / National Institute of Diabetes and Digestive and Kidney Diseases.
2015	JDRF Career Development Award (\$681,814 of direct costs over five years). This award was declined due to overlap with the above NIH K01 grant.
2014	Neurodegenerative Diseases Pilot Study Grant (\$40,000 of direct costs for one year), Harvard NeuroDiscovery Center, Massachusetts Alzheimer’s Disease Research Center (ADRC), and MGH Neurological Clinical Research Institute .
2014	Educational Stipend, Joint Annual Meeting ISMRM-ESMRMB , Milan, Italy.
2013	First-author MRM’10 article was recognized at the International Society for Magnetic Resonance in Medicine (ISMRM) Award Ceremony by President <u>Thomas Grist</u> as one of the Top 5 Cited <i>Magnetic Resonance in Medicine</i> Papers from 2010.
2003 – 2005	Eiffel Excellence Scholarship, École Polytechnique , Paris, France.
2001	Silver medal of the International Physics Olympiad , Antalya, Turkey.
2000	Gold medal of the National Physics Olympiad , Tehran, Iran.

Publications

Journal Papers

I. Aganj and B. Fischl, “Multimodal image registration through simultaneous segmentation,” *IEEE Signal Processing Letters*, in press, 2017.

T. Tong, **I. Aganj**, T. Ge, J. R. Polimeni, and B. Fischl, “Functional density and edge maps: characterizing functional architecture in individuals and improving cross-subject registration,” *NeuroImage*, vol. 158, pp. 346–355, 2017.

I. Aganj, J. E. Iglesias, M. Reuter, M. R. Sabuncu, and B. Fischl, “Mid-space-independent deformable image registration,” *NeuroImage*, vol. 152, pp. 158–170, 2017.

A. Gholipour, O. Afacan, **I. Aganj**, B. Scherrer, S. P. Prabhu, M. Sahin, and S. K. Warfield, “Super-resolution reconstruction in frequency, image, and wavelet domains to reduce through-plane partial voluming in MRI,” *Medical Physics*, vol. 42, pp. 6919–6932, 2015.

J. L. Gaglia, M. Harisinghani, **I. Aganj**, G. R. Wojtkiewicz, S. Hedgire, C. Benoist, D. Mathis, and R. Weissleder, “Noninvasive mapping of pancreatic inflammation in recent-onset type-1 diabetes patients,” *Proceedings of the National Academy of Sciences*, vol. 112, pp. 2139–2144, 2015.

I. Aganj, M. Reuter, M. R. Sabuncu, and B. Fischl, “Avoiding symmetry-breaking spatial non-uniformity in deformable image registration via a quasi-volume-preserving constraint,” *NeuroImage*, vol. 106, pp. 238–251, 2015.

J. E. Iglesias, M. R. Sabuncu, **I. Aganj**, P. Bhatt, C. Casillas, D. Salat, A. Boxer, B. Fischl, and K. Van Leemput, “An algorithm for optimal fusion of atlases with different labeling protocols,” *NeuroImage*, vol. 106, pp. 451–463, 2015.

G. Prasad, S. Joshi, N. Jahanshad, J. Villalon, **I. Aganj**, C. Lenglet, G. Sapiro, K. McMahon, G. de Zubicaray, N. Martin, M. Wright, A. Toga., and P. Thompson, “Automatic clustering and population analysis of white matter tracts using maximum density paths,” *NeuroImage*, vol. 97, pp. 284–295, 2014.

I. Aganj, B. T. T. Yeo, M. R. Sabuncu, and B. Fischl, “On removing interpolation and resampling artifacts in rigid image registration,” *IEEE Transactions on Image Processing*, vol. 22, no. 2, pp. 816–827, 2013.

E. Caruyer, **I. Aganj**, C. Lenglet, G. Sapiro, and R. Deriche, “Motion detection in diffusion MRI via online ODF estimation,” *International Journal of Biomedical Imaging*, vol. 2013, Article ID 849363, 2013.

I. Aganj, C. Lenglet, E. Yacoub, G. Sapiro, and N. Harel, “A 3D wavelet fusion approach for the reconstruction of isotropic-resolution MR images from orthogonal anisotropic-resolution scans,” *Magnetic Resonance in Medicine*, vol. 67, no. 4, pp. 1167–1172, 2012.

I. Aganj, C. Lenglet, N. Jahanshad, E. Yacoub, N. Harel, P. Thompson, and G. Sapiro, “A Hough transform global probabilistic approach to multiple-subject diffusion MRI tractography,” *Medical Image Analysis*, vol. 15, no. 4, pp. 414–425, 2011.

I. Aganj, C. Lenglet, G. Sapiro, E. Yacoub, K. Ugurbil, and N. Harel, “Reconstruction of the orientation distribution function in single and multiple shell q-ball imaging within constant solid angle,” *Magnetic Resonance in Medicine*, vol. 64, no. 2, pp. 554–566, 2010.

I. Aganj, G. Sapiro, N. Parikshak, S. K. Madsen, and P. Thompson, “Measurement of cortical thickness from MRI by minimum line integrals on soft-classified tissue,” *Human Brain Mapping*, vol. 30, no. 10, pp. 3188–3199, 2009.

R. Narasimha, **I. Aganj**, A. Bennett, M. Borgnia, D. Zabransky, G. Sapiro, S. McLaughlin, J. Milne, and S. Subramaniam, “Evaluation of denoising algorithms for biological electron tomography,” *Journal of Structural Biology*, vol. 164, no. 1, pp. 7–17, 2008.

Book Chapter

I. Aganj, G. Sapiro, and N. Harel, “Q-space modeling in diffusion-weighted MRI,” in *Brain Mapping: An Encyclopedic Reference*, A. W. Toga, Ed., Waltham: Academic Press, 2015, pp. 257–263.

Conference Papers

S. Koley, C. Chakraborty, C. Mainero, B. Fischl, and **I. Aganj**, “A fast approach to automatic detection of brain lesions,” in *Proc. MICCAI Brain Lesions Workshop*, pp. 52–61, Athens, Greece, 2016. (oral presentation)

Y. Zhang, **I. Aganj**, A. van der Kouwe, and M. D. Tisdall, “Effects of resolution and registration algorithm on the accuracy of EPI vNavs for real time head motion correction in MRI,” in *Proc. 7th International Workshop on Biomedical Image Registration (held in conjunction with IEEE CVPR)*, pp. 583–591, Las Vegas, NV, 2016.

I. Aganj, J. E. Iglesias, M. Reuter, M. R. Sabuncu, and B. Fischl, “Mid-space-independent symmetric data term for pairwise deformable image registration,” in *Proc. 18th International Conference on Medical Image Computing and Computer Assisted Intervention*, pp. 263–271, Munich, Germany, 2015.

I. Aganj, M. Reuter, M. R. Sabuncu, and B. Fischl, “Symmetric non-rigid image registration via an adaptive quasi-volume-preserving constraint,” in *Proc. 10th IEEE International Symposium on Biomedical Imaging*, pp. 234–237, San Francisco, CA, 2013.

A. Kamath, **I. Aganj**, J. G. Xu, E. Yacoub, K. Ugurbil, G. Sapiro, and C. Lenglet, “Generalized constant solid angle ODF and optimal acquisition protocol for fiber orientation mapping,” in *Proc. MICCAI Workshop on Computational Diffusion MRI*, pp. 67–78, Nice, France, 2012.

G. Prasad, S. Joshi, N. Jahanshad, J. Villalon, **I. Aganj**, C. Lenglet, G. Sapiro, K. McMahon, G. de Zubicaray, N. Martin, M. Wright, A. Toga, and P. Thompson, “White matter tract analysis in 454 adults using maximum density paths,” in *Proc. MICCAI Workshop on Computational Diffusion MRI*, pp. 1–12, Toronto, Canada, 2011.

- E. Caruyer, **I. Aganj**, C. Lenglet, G. Sapiro, and R. Deriche, “Online motion detection in high angular resolution diffusion imaging,” in *Proc. 8th IEEE International Symposium on Biomedical Imaging*, pp. 516–519, Chicago, IL, 2011.
- N. Jahanshad, **I. Aganj**, C. Lenglet, A. Joshi, Y. Jin, M. Barysheva, K. McMahon, G. de Zubicaray, N. Martin, M. Wright, A. Toga, G. Sapiro, and P. Thompson, “Sex differences in the human connectome: 4-Tesla high angular resolution diffusion imaging (HARDI) tractography in 234 young adult twins,” in *Proc. 8th IEEE International Symposium on Biomedical Imaging*, pp. 939–943, Chicago, IL, 2011.
- G. Prasad, N. Jahanshad, **I. Aganj**, C. Lenglet, G. Sapiro, A. Toga, and P. Thompson, “Atlas-based fiber clustering for multi-subject analysis of high angular resolution diffusion imaging tractography,” in *Proc. 8th IEEE International Symposium on Biomedical Imaging*, pp. 276–280, Chicago, IL, 2011.
- L. Zhan, A. Leow, **I. Aganj**, C. Lenglet, G. Sapiro, E. Yacoub, N. Harel, A. Toga, and P. Thompson, “Differential information content in staggered multiple shell HARDI measured by the tensor distribution function,” in *Proc. 8th IEEE International Symposium on Biomedical Imaging*, pp. 305–309, Chicago, IL, 2011.
- Y. Jin, Y. Shi, N. Jahanshad, **I. Aganj**, G. Sapiro, A. Toga, and P. Thompson, “3D elastic registration improves HARDI-derived fiber alignment and automated tract clustering,” in *Proc. 8th IEEE International Symposium on Biomedical Imaging*, pp. 822–826, Chicago, IL, 2011.
- I. Aganj**, C. Lenglet, and G. Sapiro, “ODF maxima extraction in spherical harmonic representation via analytical search space reduction,” in *Proc. 13th International Conference on Medical Image Computing and Computer Assisted Intervention*, pp. 84–91, Beijing, China, 2010.
- E. Caruyer, **I. Aganj**, C. Lenglet, G. Sapiro, and R. Deriche, “Online orientation distribution function reconstruction in constant solid angle and its application to motion detection in HARDI,” in *Proc. 7th IEEE International Symposium on Biomedical Imaging*, pp. 812–815, Rotterdam, Netherlands, 2010.
- I. Aganj**, C. Lenglet, G. Sapiro, E. Yacoub, K. Ugurbil, and N. Harel, “Multiple q-shell ODF reconstruction in q-ball imaging,” in *Proc. 12th International Conference on Medical Image Computing and Computer Assisted Intervention*, pp. 423–431, London, UK, 2009.
- I. Aganj**, C. Lenglet, and G. Sapiro, “ODF reconstruction in q-ball imaging with solid angle consideration,” in *Proc. 6th IEEE International Symposium on Biomedical Imaging*, pp. 1398–1401, Boston, MA, 2009. (oral presentation)
- I. Aganj**, G. Sapiro, N. Parikshak, S. K. Madsen, and P. Thompson, “Segmentation-free measurement of cortical thickness from MRI,” in *Proc. of the 5th IEEE International Symposium on Biomedical Imaging*, pp. 1625–1628, Paris, France, 2008. (oral presentation)
- D. Rother, K. Patwardhan, **I. Aganj**, and G. Sapiro, “3D priors for scene learning from a single view,” in *Proc. IEEE Workshop on Search in 3D (held in conjunction with IEEE CVPR)*, pp. 1–8, Anchorage, AK, 2008.
- I. Aganj**, A. Bartesaghi, M. Borgnia, H.Y. Liao, G. Sapiro, and S. Subramaniam, “Regularization for inverting the Radon transform with wedge consideration,” in *Proc. 4th IEEE International Symposium on Biomedical Imaging*, pp. 217–220, Arlington, VA, 2007. (oral presentation)
- R. Narasimha, **I. Aganj**, M. Borgnia, G. Sapiro, S. McLaughlin, J. Milne, and S. Subramaniam, “From gigabytes to bytes: Automated denoising and feature identification in electron tomograms of intact bacterial cells,” in *Proc. 4th IEEE International Symposium on Biomedical Imaging*, pp. 304–307, Arlington, VA, 2007.

Conference Abstracts

Y. Zhang, **I. Aganj**, A. van der Kouwe, and M. D. Tisdall, “Accurate high-speed 3D-registration of EPI vNavs for head motion correction,” in *Proc. 25th Annual Meeting of the International Society for Magnetic Resonance in Medicine*, Honolulu, HI, 2017.

- I. Aganj**, G. Prasad, P. Srinivasan, A. Yendiki, P. M. Thompson, and B. Fischl, “Structural brain network augmentation via Kirchhoff’s laws,” in *Proc. Joint Annual Meeting of ISMRM-ESMRMB*, Milan, Italy, 2014.
- A. Gholipour, O. Afacan, **I. Aganj**, and S. Warfield, “Super-resolution MRI reconstruction in image, frequency, and wavelet domains,” in *Proc. Joint Annual Meeting of ISMRM-ESMRMB*, Milan, Italy, 2014.
- G. Prasad, **I. Aganj**, and P. Thompson, “Synthesizing connectivity networks to improve classification of Alzheimer’s disease,” in *Proc. 43rd Annual Meeting of the Society for Neuroscience*, San Diego, CA, 2013.
- A. Kamath, **I. Aganj**, J. Xu, E. Yacoub, K. Ugurbil, G. Sapiro, and C. Lenglet, “Optimal acquisition protocol for white matter fiber orientation mapping using generalized CSA-ODF reconstruction,” in *Proc. 21st Annual Meeting of International Society for Magnetic Resonance in Medicine*, Salt Lake City, UT, 2013.
- G. Prasad, S. Joshi, N. Jahanshad, J. Villalon, **I. Aganj**, C. Lenglet, G. Sapiro, K. McMahon, G. de Zubicaray, N. Martin, M. Wright, A. Toga, and P. Thompson, “Genetic analysis of fibers in white matter pathways from HARDI images,” in *Proc. 18th Annual Meeting of the Organization for Human Brain Mapping*, Beijing, China, 2012.
- I. Aganj**, C. Lenglet, E. Yacoub, G. Sapiro, and N. Harel, “A wavelet fusion approach to the reconstruction of isotropic-resolution MR images from anisotropic orthogonal scans,” in *Proc. 19th Annual Meeting of the International Society for Magnetic Resonance in Medicine*, Montréal, Canada, 2011.
- N. Jahanshad, **I. Aganj**, C. Lenglet, G. Sapiro, A. Toga, K. McMahon, G. de Zubicaray, N. Martin, M. Wright, and P. Thompson, “4-Tesla high angular resolution diffusion tractography analysis of the human connectome in 234 subjects: Sex differences and EPI distortion effects,” in *Proc. 19th Annual Meeting of the International Society for Magnetic Resonance in Medicine*, Montréal, Canada, 2011.
- E. Caruyer, **I. Aganj**, C. Lenglet, G. Sapiro, and R. Deriche, “Online reconstruction and motion detection in HARDI,” in *Proc. 19th Annual Meeting of International Society for Magnetic Resonance in Medicine*, Montréal, Canada, 2011.
- S. N. Sotiropoulos, **I. Aganj**, S. Jbabdi, G. Sapiro, C. Lenglet, and T. E. Behrens, “Inference on constant solid angle orientation distribution functions from diffusion-weighted MRI,” in *Proc. 17th Annual Meeting of the Organization for Human Brain Mapping*, Québec City, Canada, 2011.
- G. Prasad, N. Jahanshad, **I. Aganj**, C. Lenglet, G. Sapiro, A. W. Toga, and P. M. Thompson, “Atlas-based fiber clustering for multi-subject HARDI tractography,” in *Proc. 17th Annual Meeting of the Organization for Human Brain Mapping*, Québec City, Canada, 2011.
- L. Zhan, J. J. GadElkarim, A. D. Leow, **I. Aganj**, C. Lenglet, G. Sapiro, N. Harel, A. W. Toga, and P. M. Thompson, “Probabilistic tractography using the tensor distribution function in multiple-shell HARDI,” in *Proc. 17th Annual Meeting of the Organization for Human Brain Mapping*, Québec City, Canada, 2011.
- I. Aganj**, N. Jahanshad, C. Lenglet, A. W. Toga, K. L. McMahon, G. I. de Zubicaray, M. J. Wright, N. G. Martin, G. Sapiro, and P. Thompson, “Relating fiber crossing in HARDI to intellectual function,” in *Proc. 16th Annual Meeting of the Organization for Human Brain Mapping*, Barcelona, Spain, 2010.
- L. Zhan, A. D. Leow, **I. Aganj**, C. Lenglet, G. Sapiro, N. Harel, A. W. Toga, and P. Thompson, “Tensor distribution function in multiple shell high angular resolution diffusion imaging,” in *Proc. 16th Annual Meeting of the Organization for Human Brain Mapping*, Barcelona, Spain, 2010.
- I. Aganj**, C. Lenglet, and G. Sapiro, “Accurate ODF reconstruction in q-ball imaging,” in *Proc. 15th Annual Meeting of the Organization for Human Brain Mapping*, San Francisco, CA, 2009.
- I. Aganj**, C. Lenglet, G. Sapiro, M. C. Chiang, and P. Thompson, “Multi-subject diffusion MRI tractography via a Hough transform global approach,” in *Proc. 15th Organization for Human Brain Mapping*, San Francisco, CA, 2009. (oral presentation)
- I. Aganj**, C. Lenglet, R. Keriven, G. Sapiro, N. Harel, and P. Thompson, “A Hough transform global approach to diffusion MRI tractography,” in *Proc. 17th Annual Meeting of the International Society for Magnetic Resonance in Medicine*, Honolulu, HI, 2009. (oral presentation)