

ABBAS BABAJANI-FEREMI

CONTACT INFORMATION

Henry Ford Health System, 1 Ford Place, 2F (Box 82), Detroit, MI 48202
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CURRENT POSITION

Research Scientist, Henry Ford Health System, Detroit, MI

EDUCATION

Ph.D., Biomedical (Electrical) Engineering, Bioelectric, February 2006
University of Tehran, Tehran, Iran

Dissertation title: Activation detection using integrated modeling and analysis of MEG and fMRI

Advisor: Professor Hamid Soltanian-Zadeh

M.S., Biomedical (Electrical) Engineering, Bioelectric, September 1998
University of Tehran, Tehran, Iran

Dissertation title: Active contour segmentation of tissues in medical images using finite element method

Advisor: Professor Hamid Soltanian-Zadeh

B.S., Electrical (Electronic) Engineering, September 1995
University of Tehran, Tehran, Iran

HONORS AND AWARDS

Research Award for Distinguished Ph.D. student, University of Tehran, Tehran, Iran, 2006

Ranked 2nd among B.S. students of electronic engineering at University of Tehran, Tehran, Iran, 1995

Ranked 24th among over 200,000 participants in national university entrance exam for undergraduate study, Iran, 1991

Ranked 1st in the Mazandaran province, Physics and Mathematics diploma, 1991

RESEARCH INTERESTS

Signal and image processing; medical imaging; brain connectivity analysis using functional neuroimaging techniques such as electroencephalography (EEG), magnetoencephalography (MEG), and functional magnetic resonance imaging (fMRI); dynamic contrast enhancement magnetic resonance imaging (DCE-MRI) analysis of tumor; epilepsy seizure localization.

PROFESSIONAL EMPLOYMENT

2007– Present, Research Scientist, Henry Ford Health System, Detroit, Michigan

Develop and evaluate integrated MEG/EEG and fMRI models for the brain connectivity analysis, develop and evaluate a variational Bayesian expectation maximization method for model inversion of nonlinear dynamical systems, develop and evaluate quantitative and semi-quantitative analysis methods based on DCE-MRI data for animal and human tumor applications, localization of epileptogenic seizure zone using intracranial electrocorticography (ECoG) data.

1997 - 2007, Tehran Padena Co., Tehran, Iran

Supervisor of an engineering team to design, product, and test a sophisticated microprocessor based protection unit (relay) used in the air circuit breaker. Design and production of several test units for quality control of products of company, e.g., contactor test unit.

Latest position: Supervisor of the research & development (R&D) department.

2002, Kish Lead Tech Co., Tehran, Iran

Design and production of a transmitter/receiver to control 32 Sony PTZ (Pan/Tilt/Zoom) cameras using Video System Control Architecture (VISCA) communication protocol, Implementation of H.263 (a video compression standard designed as a low-bitrate compressed format for videoconferencing) and G.723.1 (an audio codec for voice compression) in H.323 audio-visual communication protocol using Visual C++, feasibility study of a project for production of videophone based on H.324 protocol using digital signal processor (DSP).

2000-2001, Pazand Tarh Co., Tehran, Iran

Work in an engineering team to design and test a control system for the first national solar power house in Iran. The control system consisted of 17 programmable logic controllers (PLCs) and 48 control boards which were linked to two host computers using the MODBUS communication protocol.

1995 - 1997, ITRC, Tehran, Iran

Worked on 8086 minimum system and wrote a program to verify and test the quality of transferred sound in a central switch system designed by ITRC.

PUBLICATIONS**Journals - Published**

1. **A. Babajani-Feremi** and H. Soltanian-Zadeh, "Development of a variational scheme for model inversion of multi-area model of brain. Part II: VBEM method," *Mathematical Biosciences*, vol. 229, pp. 76-92, Jan. 2011.
2. **A. Babajani-Feremi** and H. Soltanian-Zadeh, "Development of a variational scheme for model inversion of multi-area model of brain. Part I: Simulation evaluation," *Mathematical Biosciences*, vol. 229, pp. 64-75, Jan. 2011.
3. **A. Babajani-Feremi** and H. Soltanian-Zadeh, "Multi-Area Neural Mass Modeling of EEG and MEG Signals," *NeuroImage*, vol. 52, no. 3, pp. 793-811, 2010.
4. M.A. Meser, J. Branislava, **A. Babajani-Feremi**, R.S.V. Nadimpalli, A.S.M. Iskander, J. Anagli, and A.S. Arbab, "Changes in Vascular Permeability and Expression of Different Angiogenic Factors Following Anti-Angiogenic Treatment in Rat Glioma," *PLoS ONE*, vol. 5, no. 1, pp. 1-11, 2010 (e8727).
5. **A. Babajani-Feremi**, H. Soltanian-Zadeh, and John E. Moran, "Integrated MEG/fMRI Model Validated Using Real Auditory Data," *Brain Topography*, vol. 21, pp. 61-74, 2008.
6. **A. Babajani-Feremi**, and H. Soltanian-Zadeh, "Combined MEG and fMRI model," *Journal of Iranian Association of Electrical and Electronics Engineers*, vol. 2, no. 2, pp. 1-17, 2006.
7. **A. Babajani** and H. Soltanian-Zadeh, "Integrated MEG/EEG and fMRI model based on neural masses," *IEEE Trans. Biomedical Engineering*, vol. 53, pp. 1794-1801, 2006.
8. **A. Babajani**, M. H. Nekooei, and H. Soltanian-Zadeh, "Integrated MEG and fMRI model: synthesis and analysis," *Brain Topography*, vol. 18, pp. 101-113, 2005.

Conferences - Refereed Proceedings

1. **A. Babajani-Feremi**, Kourosh Jafari-Khouzani1, and H. Soltanian-Zadeh, "Development of a Variational Bayesian Expectation Maximization (VBEM) Method for Model Inversion of Multi-Area E/MEG Model," the 2011 *IEEE International Symposium on Biomedical Imaging: From Nano to Macro (ISBI'11)*, in press.
2. M.A. Latif, **A. Babajani-Feremi**, D. Barkmeier, J. A. Leob, and H. Soltanian-Zadeh "Spatio-temporal Localization of Focal Epileptic Sources from Intracranial Electrocranial Recordings using an Independent Component Analysis (ICA) Algorithm," Presented at and published in the Proceedings of the *17th Iranian Biomedical Engineering Conference*, Isfahan, Iran, Nov. 3-4, 2010.
3. **A. Babajani-Feremi**, S.M. Bowyer, J.E. Moran, K. Elisevich, and H. Soltanian-Zadeh "Variational Bayesian Framework for Estimating Parameters of Integrated E/MEG and fMRI Model," Presented at and published in the Proceedings of *SPIE Medical Imaging 2009: Biomedical Applications in Molecular, Structural, and Functional Imaging*, Orlando, FL, Feb. 7-12, 2009.
4. **A. Babajani-Feremi**, S.M. Bowyer, J.E. Moran, K. Elisevich, K. Podell, and H. Soltanian-Zadeh "Multi-Area Integrated E/MEG and fMRI Modeling," Presented at and published in the *Proceedings of SPIE Medical Imaging 2009: Biomedical Applications in Molecular, Structural, and Functional Imaging*, Orlando, FL, Feb. 7-12, 2009.
5. M. Rajabioun, **A. Babajani-Feremi**, and H. Soltanian-Zadeh "Combinational Method for Focal Brain Activation Detection Using MEG Signal," Presented at and published in the Proceedings of *SPIE Medical Imaging 2009: Biomedical Applications in Molecular, Structural, and Functional Imaging*, Orlando, FL, Feb. 7-12, 2009.
6. M. Rajabioun, **A. Babajani-Feremi**, and H. Soltanian-Zadeh, "A Novel Method for Activation Detection of Focal Cortical Sources Using MEG," Presented at and published in the Proceedings of the *14th annual conference of computer society of Iran (CSICC2009)*, 1-2 July, 2009.
7. **A. Babajani-Feremi**, H. Soltanian-Zadeh, and John E Moran "Validation of Proposed Integrated EEG/MEG and fMRI Model Using Real Data," Presented at and published in the Proceedings of the *14th Iranian Biomedical*

Engineering Conference, Tehran, Iran, Feb. 13-14, 2008.

8. M. Rajabioun, **A. Babajani**, and H. Soltanian-Zadeh, "A New Weighted Method for Reducing Noise Effect in MEG Inverse Solution," Presented at and published in the Proceedings of the *14th Iranian Conference on Electrical Engineering (ICEE2006)*, 16-18 May, 2006.
9. **A. Babajani** and H. Soltanian-Zadeh, "Using Real MEG and fMRI Data for Parameter Estimation of the Integrated Model," Presented at and published in the Proceedings of the *14th Iranian Conference on Electrical Engineering (ICEE2006)*, 16-18 May, 2006.
10. M. Rajabioun, **A. Babajani**, and H. Soltanian-Zadeh, "A Novel Method for Solving the Inverse Problem of MEG," Presented at and published in the Proceedings of the *11th annual conference of computer society of Iran (CSICC2006)*, 24-26 January, 2006.
11. **A. Babajani**, M. H. Nekooei, and H. Soltanian-Zadeh, "Extended Neural Mass Model for Integrated Modeling of EEG/MEG and fMRI," Presented at and published in the Proceedings of the *11th annual conference of computer society of Iran (CSICC2006)*, 24-26 January, 2006.
12. **A. Babajani**, M. H. Nekooei, and H. Soltanian-Zadeh, "Exploring Relationship between fMRI and MEG Using a New Model," Presented at and published in the Proceedings of the *Third Iranian Conference on Machine Vision and Image Processing (MVIP2005)*, vol. 2, pp. 600-607, 23-24 February, 2005.
13. **A. Babajani**, M. H. Nekooei, and H. Soltanian-Zadeh, "Integrated MEG and fMRI Model," Presented at and published in the Proceedings of the *10th annual conference of computer society of Iran (CSICC2005)*, pp. 76-84, 15-17 February, 2005.
14. M.H. Nekooei, **A. Babajani-Feremi**, H. Soltanian-Zadeh, "Evaluating Linear MEG Inverse Problem Methods Based on Distributed Source Model and Developing an Efficient Combinative Method," Presented at and published in the Proceedings of the *11th Iranian Biomedical Engineering Conference*, pp. 259-266, Tehran, Iran, Feb. 17-18, 2004.
15. **A. Babajani-Feremi** and H. Soltanian-Zadeh, "A Novel Method for Segmentation of Body Structures in CT Images," Presented at and published in the Proceedings of the *7th Iranian Conference on Elec. Eng.: Biomedical Eng. Section*, pp. 143-150, Tehran, Iran, May 1999.
16. G.A. Hossein-Zadeh, H. Soltanian-Zadeh, A. Ghodrati, and **A. Babajani**, "Magnetic Resonance Imaging Through Wavelet Transform," Presented at and published in the Proceedings of the *Third International Annual Computer Society of Iran Computer Conference (CSICC'97)*, Tehran, Iran, Dec. 1997.

Presentations and Abstracts

1. **A. Babajani-Feremi**, R. Jain, J. Narang, A. S. Arbab, K. Jafari-Khouzani, M.R. Nazem-Zadeh, and H. Soltanian-Zadeh, "Patlak Model Selection Using Dynamic Contrast Enhanced T1-weighted MR Measurement of Vascular Permeability," the *Abstracts of the ISMRM'2011*, 7-13 May 2011, Montreal, Canada, in press.
2. M. Nazem-Zadeh, K. Jafari-Khouzani, **A. Babajani-Feremi**, S. P. Nejad-Davarani, H. Soltanian-Zadeh, and Q. Jiang, "Clustering Method for Estimating Principal Diffusion Directions," the *Abstracts of the ISMRM'2011*, 7-13 May 2011, Montreal, Canada, in press.
3. J. Narang, R. Jain, A. S. Arbab, and **A. Babajani-Feremi**, "Utility of Non-model based 'Semi-quantitative' Indices derived from Dynamic Contrast Enhanced T1-weighted MR Perfusion in Differentiating Treatment Induced Necrosis from Recurrent Progressive Brain Tumor," the *Abstracts of the ISMRM'2011*, 7-13 May 2011, Montreal, Canada, in press.
4. **A. Babajani-Feremi**, S.M. Bowyer, J.E. Moran, K. Elisevich, K. Podell, and H. Soltanian-Zadeh "Develop and Evaluate an Integrated E/MEG and fMRI Multi-Area Model," Presented at and published in the Abstracts of the *7th Annual Research Symposium of Henry Ford Health System*, Detroit, May 14, 2010.
5. M. M. Ali, B. Janic, **A. Babajani-Feremi**, N. R. S. Varma, A. Iskander, J. Anagli, A. S. Ali, "MRI Monitoring of Tumor Response Following Angiogenesis Inhibition in an Experimental Human Glioma Model," Presented at and published in the Abstracts of the *World Molecular Imaging Congress*, Montréal, Canada, Sept. 23-26, 2009.
6. **A. Babajani-Feremi**, J.E. Moran, H. Soltanian-Zadeh, "Integrated MEG and fMRI Model: Synthesis, Analysis, and Validation Using Auditory Data," Invited Talk at the *10th International Conference on Cognitive Neuroscience (ICON X)*, Bodrum, Turkey, Sept. 1-5, 2008.
7. **A. Babajani-Feremi**, B. Weiland, J.E. Moran, S.M. Bowyer, K. Elisevich, and H. Soltanian-Zadeh, "Using Variational Bayesian Expectation Maximization (VBEM) Method for Multi-Area Integrated MEG/fMRI Model,"

Presented at and published in the Abstracts of the *16th International Conference on Biomagnetism (BIOMAG'2008)*, Sapporo, Japan, August 25-28, 2008.

8. **A. Babajani-Feremi**, H. Soltanian-Zadeh, J. Moran, "Validation of Integrated EEG/MEG and fMRI Model Using Real Data," Presented at and published in the Abstracts of the *5th Annual Research Symposium of Henry Ford Health System*, Detroit, April 25, 2008.
9. **A. Babajani-Feremi**, H. Soltanian-Zadeh, "Integrated Model for Simultaneous Analysis of EEG or MEG with fMRI," Presented at and published in the Abstracts of the *4th Annual Research Symposium of Henry Ford Health System*, Detroit, April 13, 2007.

TEACHING EXPERIENCE

Lecturer, part-time lecturer, and teaching assistant at the University of Tehran, Tehran, Iran, 1997-2006, for the courses *Advanced Engineering Mathematics, Image Processing, Medical Imaging Systems, Advanced Digital Signal Processing*, and *Functional Imaging*.

Advisor, co-advisor, and mentorship of Ph.D., M.S., and B.S. students at Oakland University, University of Tehran, Henry Ford Health System, and Babol Noshirvani University of Technology.

PROFESSIONAL ACTIVITIES

Reviewer of Professional Journals

IEEE Trans. Biomedical Engineering,
Journal of Magnetic Resonance Imaging
Magnetic Resonance in Medicine
International Journal of Engineering
Journal of Electronic Imaging
Journal of Digital Signal Processing
American Institute of Biological Sciences
Journal of Computer Methods and Programs in Biomedicine
Journal of Research in Medical Sciences
Measurement
Annals of Biomedical Engineering
Journal of Theoretical Biology

Reviewer of Professional Conferences

International Society for Magnetic Resonance in Medicine (ISMRM)
Computer Society of Iran Computer Conference (CSICC)
Iranian Conference of Biomedical Engineering (ICBME)
Iranian Conference on Electrical Engineering (ICEE)
Iranian Conference on Machine Vision and Image Processing (MVIP)

Grant Reviewer, Funding Agencies

Letter Reviewer NIH, Challenge Grants in Health and Science Research (RC1)
Member of Panel Reviewer of the American Institute of Biological Sciences (AIBS) and United States Army Medical Research and materiel Command (USAMRMC)

Memberships

Institute of Electrical and Electronics Engineers (IEEE)
Society of Photo-Optical Instrumentation Engineers (SPIE)

ADDITIONAL INFORMATION

Permanent resident of the United States