BIOGRAPHICAL SKETCH

NAME: Zhang, Xiaotong

eRA COMMONS USER: ZHANG-X

POSITION TITLE: Associate Professor

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	Completion Date MM/YYYY	FIELD OF STUDY
Zhejiang University, Hangzhou, China	B.S.	07/2004	Electrical Engineering
Zhejiang University, Hangzhou, China	Ph.D.	07/2009	Electrical Engineering
University of Minnesota, Twin Cities, MN	Postdoctoral Associate	07/2012	Biomedical Engineering
University of Minnesota, Twin Cities, MN	Research Associate	09/2015	Biomedical Engineering

A. Personal Statement

I have expertise and motivation necessary to successfully carry out the proposed research project. I have a broad background in electrical engineering and biomedical engineering, with specific training and expertise in biomedical imaging and computational electromagnetic modeling and computation. My research is aimed at developing and improving electrical properties imaging technique – a brand new and promising quantitative imaging modality, and integrating such technique with applications in biomedical imaging and MRI engineering problems. The ultimate goal encompasses clinical applications in disease diagnosis, as well as body imaging with improved image quality, in order to fully exploit the entire range of benefits inherently offered by MRI at higher fields. Since 2009, I have been playing a leading role in the genesis and subsequent development of this field, and have made significant contributions that have provided a solid foundation in this prosperous ongoing research endeavor. The current application builds logically on my prior work; and as a result of my previous experiences, I am aware of the importance of frequent communication among project members and of constructing a realistic research plan and timeline.

a. **Zhang, X.**, Liu, J., and He, B. (2014). “Magnetic Resonance Based Electrical Properties Tomography: A Review”. *IEEE Reviews in Biomedical Engineering*, 7, 87-96.

B. Positions and Honors

Positions and Employment

2009-2012	Postdoctoral Associate, Department of Biomedical Engineering, University of Minnesota, Twin Cities, MN
2012-2015	Research Associate, Department of Biomedical Engineering, University of Minnesota, Twin Cities, MN
2015-present	Associate Professor, Zhejiang Interdisciplinary Institute of Neuroscience and Technology (ZIINT), Zhejiang University, Hangzhou, China

Other Experience and Professional Memberships

2010-2014	Trainee Member, International Society for Magnetic Resonance in Medicine (ISMRM)
2014-present	Member, International Society for Magnetic Resonance in Medicine (ISMRM)
2014-present	Member, Institute of Electrical and Electronics Engineers (IEEE)

Honors

2008 ASUS Scholarship, Zhejiang University
2008 Lu's Education Foundation Fellowship, Zhejiang University
2009 NIBIB / NIH Student Travel Fellowship
2013 ISMRM Merit Awards: Magna Cum Laude
2014 ISMRM Merit Awards: Magna Cum Laude

C. Contribution to Science

1. **Electrical Properties Imaging of Biological Tissues**: The objective is by utilizing well-established RF-coil-induced magnetic field (B1 field) mapping techniques in MRI, to reconstruct the electrical conductivity and permittivity distribution of biological tissues at the operating Larmor frequency. I firstly proposed and developed the novel concept of using the multiple-channel transmit and/or receive technique in MRI for Electrical Properties Imaging; firstly proposed and developed a series of novel reconstruction algorithms by removing the assumption of piece-wise homogeneity in tissue structure which was widely employed in conventional algorithms. This work has created a range of new opportunities for studying Electrical Properties Imaging.
   a. **Zhang, X.**, Yan, D., Zhu, S., and He, B. (2008). "Noninvasive Imaging of Head-Brain Conductivity Profiles by Means of Magnetic Resonance Electrical Impedance Imaging", *IEEE Engineering in Medicine and Biology Magazine*, 27(5), 78-83.
   b. **Zhang, X.**, Zhu, S., and He, B. (2010). "Imaging Electric Properties of Biological Tissues by MRI". *IEEE Transactions on Medical Imaging*, 29(2), 474-481.
   c. **Zhang, X.**, Van de Moortele, P.-F., Schmitter, S., and He, B. (2013). "Complex B_1 Mapping and Electrical Properties Imaging of the Human Brain using a 16-channel Transceiver Coil at 7T". *Magnetic Resonance in Medicine*, 69(5), 1285-1296.
   d. Liu, J., **Zhang, X.**, Schmitter, S., Van de Moortele, P.-F., and He, B. (2015). "Gradient-based Electrical Properties Tomography (gEPT): a Robust Method for Mapping Electrical Properties of Biological Tissues in Vivo Using Magnetic Resonance Imaging". *Magnetic Resonance in Medicine*, 74(3): 634-646.

2. **Quantitative Prediction and Proactive Management of Local Heating in Ultra-high-field MRI Applications**: The objective is from measured B1 maps in MRI, to quantitatively estimate local Specific Absorption Rate (SAR) – the measure of RF power absorbed in tissues – on a subject-specific basis. This work can significantly benefit the fast-growing parallel-transmission technique in associated pulse sequence design, and ultimately lead to comprehensive development and use of ultra-high-field MRI in body imaging. I have proposed multiple approaches in local SAR quantification through *in vivo* B1 mapping in MRI; first applied and validated these approaches on a parallel-transmission system at ultra-high-field (i.e. 7 T MRI).
   a. **Zhang, X.**, Schmitter, S., Van de Moortele, P.-F., Liu, J., and He, B. (2013). "From Complex B_1 Mapping to Local SAR Estimation using Multi-channel Transceiver Coil". *IEEE Transactions on Medical Imaging*, 32(6), 1058-1067.
   b. **Zhang, X.**, Van de Moortele, P.-F., Liu, J., Schmitter, S., and He, B. (2014). "Quantitative Prediction of Radio Frequency Induced Local Heating Derived from Measured Magnetic Field Maps in Magnetic Resonance Imaging: A Phantom Validation at 7 Tesla". *Applied Physics Letters*, 105(24): 244101.

3. **RF body coil Investigation using parallel-transmission technique in MRI**: The objective is to evaluate the performance of z-stacked 3D arrays designed with multiple-ring arrangement, and compare to conventional single-ring 2D arrays, as well as conventional birdcage coil at 3T. I have conducted parallel-transmission pulse design at with regularization of global SAR or peak local SAR, in order to reach flip angle homogenization within the region of interest for head/C-Spine, T-spine, and pelvis imaging. Our results suggest that parallel-transmission-based pulses with multi-channel transmit coils can reduce local and global SAR substantially for body coils while attaining improved B1 homogeneity, particularly for a z-stacked double-ring design, providing valuable reference for RF coil design in high-field MRI body imaging.
   a. Wu, X.†, **Zhang, X.**† (co-first author), Tian, J., Schmitter, S., Hanna, B., Strupp, J., Pfeuffer, J., Hamm, M., Wang, D., Nistler, J., He, B., Vaughan, T., Ugurbil, K., and Van de Moortele, P-F. (2015). "Comparison of radiofrequency body coils for MRI at 3 Tesla: a simulation study using parallel transmission on various anatomical targets". *NMR in Biomedicine*, 28(10), 1332-1344.

Publication list: https://www.ncbi.nlm.nih.gov/pubmed/?term=zhang+xiaotong+he+mri

D. Research Support

Ongoing Research Support

Fundamental Research Funds for the Central Universities (Zhang, PI) 01/01/16-12/31/17

Dynamic B1-shimming for 8-channel Transmission at 7T

The goal of this proposal is to develop an MATLAB toolbox for online dynamic B1 amplitude/phase shimming which will be utilized at 7T with 8-channel RF power transmission.

Completed Research Support

IEM Seed Grant (Zhang, W., PI; Zhang, X., co-I) 06/01/15- 05/31/16

Institute for Engineering in Medicine (IEM), University of Minnesota

A Pilot Study of Brain Connectivity with High Resolution EEG/MEG and DTI in TSC Epilepsy Patients

The primary goal of this project is to test the hypothesis that multimodal neuroimaging using MEG/EEG/OTI will provide enhanced understanding of functional and structural networks in this usually multifocal genetic disease. We will integrate MEG/EEG for source imaging during interictal spikes and perform functional connectivity analysis. We will compare such functional connectivity patterns with OTI findings in the same patients. The proposed pilot project will enable us to study this important brain disorders using multimodal neuroimaging, and obtain pilot data supporting major group NIH grant applications.