

BIOGRAPHICAL SKETCH

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NAME: Sung-Min Sohn

eRA COMMONS USER NAME (credential, e.g., agency login): sungmin

POSITION TITLE: Assistant Professor

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Korea University, Seoul, Korea	B.S.	02/2002	Electrical Engineering
Korea University, Seoul, Korea	M.S.	02/2004	Electrical Engineering
University of Minnesota, Minneapolis, MN	Ph.D.	02/2013	Electrical Engineering

A. Personal Statement

I am working at the center for magnetic resonance research (CMRR), University of Minnesota. The areas of my expertise are electrical circuit (radiofrequency/analog/digital) design and evaluation, methodology of system-on-a-chip (SoC), MR RF coils, electromagnetic analysis of RF systems in MRI, and MR compatible electronics. In addition to my unique set of experiences and skills in microelectronics and MR hardware technology, I gain additional non-hardware knowledge in MR such as RF pulse, MR sequence, and MR spectroscopy to successfully accomplish the proposed career development and research plan in this application and finally I will have ability to independently conduct research in MR area. The objective is to enable an automatic radiofrequency (RF) signal frequency tuning and impedance matching capability at ultrahigh field, and then its electrical system will be miniaturized with a custom designed microchip. I have both professional industry experience to make chip-scale integrated circuits and MR engineering.

1. **Sohn S-M**, Vaughan JT, Lagore RL, Garwood M, Idiyatullin D. "In vivo MR imaging with simultaneous RF transmission and reception," *Magnetic Resonance in Medicine*. 2016. (In Early view, DOI: 10.1002/mrm.26464)
2. **S. M. Sohn**, A. Gopinath, and J.T. Vaughan, "A Compact, High Power Capable, and Tunable High Directivity Microstrip Coupler" *IEE Trans. on Microwave Theory and Techniques*, vol. 64, pp. 3217-3223, 2016. (DOI: 10.1109/TMTT.2016.2602835)
3. **Sung-Min Sohn**, Lance DelaBarre, Anand Gopinath, and J.Thomas Vaughan: Design of Electrically Automated RF Transceiver Head Coil in MRI. *IEEE Trans. Biomedical Circuits and Systems*. Oct. 2014 (web version available, doi: 10.1109/TBCAS.2014.2360383)
4. **Sung-Min Sohn**, Lance DelaBarre, Anand Gopinath, and J.Thomas Vaughan: RF Head Coil Design with Improved RF Magnetic Near-Fields Uniformity for Magnetic Resonance Imaging (MRI) Systems. *IEEE Trans. Microw. Theory Techn.*, vol. 62, no. 8, pp. 1784-1789. Aug. 2014. (doi: 10.1109/TMTT.2014.2331621)
5. **Sung-Min Sohn**, Sung-Hyun Yang, Sang-Wook Kim, Kug-Hyun Baek, Woo-Hyun Paik: SoC design of an auto-focus driving image signal processor for mobile camera applications. *IEEE Trans. Consumer Electronics*, vol. 52, no.1, pp. 10–16, Feb. 2006. (doi: 10.1109/TCE.2006.1605018)

B. Positions and Honors

Positions and Employment

1/2004 - 8/2007	Circuit design Engineer, LG Electronics, Seoul, Korea
Summer, 2012	Lecturer, Department of Electrical and Computer Engineering, University of Minnesota, MN
3/2013 – 11/2014	Post-Doctoral Associate, Center for Magnetic Resonance Research (CMRR), University of Minnesota, MN
12/2014 – 7/2016	Research Associate, CMRR, University of Minnesota, MN
8/2016 – present	Assistant Professor, Department of Radiology, University of Minnesota.

Honors

2006	Best paper award (System IC division at LG Electronics)
2012	Travel Fellowship from Department of Electrical and Computer Engineering at University of Minnesota to attend IEEE International Microwave Symposium (IMS).
2014	ISMRM Annual Meeting Educational travel award.

Other Experience and Professional Memberships

2011-	Member, International Society of Magnetic Resonance in Medicine (ISMRM)
2011-	Member, Institute of Electrical and Electronics Engineers (IEEE)

C. Contribution to Science

1. My research have had a focus on developing a prominent automated and integrated MR hardware system, which is an automatically frequency tuned and impedance matched system. Some papers directly related to this research topic have been published during my Ph.D. and postdoctoral training period. The papers presented the feasibility of automated RF coils. These results have led to a new interest in automatic RF coils and the use of microelectronics for MR imaging and spectroscopy because ultrahigh field and multi channel technology will not be fully applied to preclinical and potential clinical applications without this approach.

1. **Sung-Min Sohn**, Anand Gopinath, and John Thomas Vaughan: Tunable and High Directivity Coupler for MRI Applications. IEEE MTT-S International Microwave Symposium, 2014.
2. **Sung-Min Sohn**, Lance DelaBarre, Anand Gopinath, and J. Thomas Vaughan: Automatically tuned and matched RF transceive head coil at 7T. Proc. Intl. Soc. Mag. Reson. Med. 22 (2014) p. 318.
3. **Sohn S-M**, Vaughan JT, Gopinath A. System and Method for Control of RF Circuits for Use With an MRI System. US Patent App. 13/868,014; 2013.
4. Can Eyup Akgun, Lance DelaBarre, **Sung-Min Sohn**, Carl Snyder, Gregor Adriany, Kamil Ugurbil, John Thomas Vaughan, Anand Gopinath: Novel multi-channel transmission line coil for high field magnetic resonance imaging. IEEE MTT-S International Microwave Symposium, p. 1425-1428, 2009.

2. I put a lot of effort into advancing integrated microchip technology in professional microelectronics industry before starting Ph.D. The study emphasized system on a microchip to realize a miniaturized electrical system. This experience is also directly related to this application.

1. **Sung-Min Sohn**, J Thomas Vaughan, Anand Gopinath: An interdigitated split-ring resonator for metamaterials. Microwave and Optical Technology Letters, vol.53, no. 1, pp. 174-177, Jan. 2011.
2. **Sung-Min Sohn**, Sung-Hyun Yang, Hyung-Man Park, Sang-Wook Kim, Yong-Tae Cho, Man-Hong Sohn, Seung-Hyun Yi, Kuk-Tae Hong, Kug-Hyun Beak, Woo-Hyun Paik: SoC design of an auto-focus driving image signal processor for mobile camera applications. IEEE Consumer Electronics, pp.73-74, 7-11 Jan. 2006
3. Sung-Hyun Yang, **Sung-Min Sohn**, Kuk-Tae Hong, Hyoung-Soo Lee, Bo-Ik Sohn: On-Chip Voice-Coil Motor Driver for Mobile Auto-Focus Camera Applications. Asian Solid-State Circuits Conference, pp. 101-104, 2005
4. **Sung-Min Sohn**, Soo-Hwan Kim, Suh-Ho Lee, Kwang-Jin Lee, Suki Kim: A CMOS image sensor (CIS) architecture with low power motion detection for portable security camera applications. IEEE Trans. Consumer Electronics, vol.49, no4, pp. 1227-1233, Nov. 2003

D. Research Support

Automatic RF signal tuning and matching system for MR imaging and spectroscopy

K99EB020058 (PI: Sung-Min Sohn), NIH/NIBIB K99/R00 Pathway to Independence Award

Total budget: \$ 919,152 (02/01/2016 – 1/31/2021)

The goal of this project is an automatically controlled RF system and its integration that will advance the detection and diagnosis of health and diseases with MRI scanners. The automatic system will be implemented on a custom designed MRI-compatible electronics.