BIOGRAPHICAL SKETCH

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NAME: Steven M. Wright

eRA COMMONS USER NAME (credential, e.g., agency login): steve103

POSITION TITLE: Professor of Electrical and Computer Engineering

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
University of Illinois, Urbana, IL	B.S.	01/1980	Electrical Engineering
University of Illinois, Urbana, IL	M.S.	08/1981	Electrical Engineering
University of Illinois, Urbana, IL	Ph.D.	10/1984	Electrical Engineering

A. Personal Statement

I have developed RF hardware and corresponding methodology for magnetic resonance imaging and spectroscopy with array coils for over 25 years. With many outstanding students, my group has developed the first 16 channel head coil and receiver, and more recently, the first 64 channel receiver, transmitter, and coils for MR imaging. Recently we have been active in developing isolating hardware configurations for multiple channel transmitters, paralleling the development of isolating preamplifiers for multiple channel receivers. We are also investigating using this technology for extremely high speed imaging and more recently high speed/high resolution elastography.

B. Positions and Honors

Positions and Employment

1981 - 1984 National Science Foundation Graduate Fellow, Dept. of Electrical Engineering, Univ. of IL, Urbana, IL
1984 - 1988 Engineer/Scientist for Magnetic Resonance Imaging, Saint Francis Medical Center, Peoria, IL
1985 - 1988 Asst. Prof. of Elect. Eng. in Radiology, Dept. of Radiology, Univ. of Illinois College of Medicine, Peoria, IL.
1986 - 1988 Adjunct Assistant Professor, Dept. of Elect. and Comp. Engineering, Univ. of IL, Urbana, IL.
1988 - 1993 Assistant Professor of Electrical Engineering, Texas A&M University, College Station, TX.
1993 - 2000 Associate Professor of Electrical Engineering, Texas A&M University.
1998 - 2017 Area Leader, Biomedical Imaging, Department of Electrical Engineering.
2000 - present Professor of Electrical Engineering, Texas A&M University, College Station, TX
2000 Visiting Scientist, University of Texas MD Anderson Cancer Center (6/1/00 – 12/31/00).
2002 - present Professor of Electrical Engineering and Biomedical Engineering, College of Engineering Texas A&M University, and Professor of Radiology, College of Medicine, Texas A&M University Health Science System
2012- present Adjunct Professor, Advanced Imaging Research Center, University of Texas Southwestern Medical Center, Dallas, TX
2013 – 2017 Associate Department Head, Department of Electrical and Computer Engineering Texas A&M University, College Station, TX

Selected Experience and Professional Memberships (recent)

2001 - present	Editorial Board, Magnetic Resonance Engineering
2000 - 2001	Chair, Study Group on MR Engineering, Intl. Society of Magnetic Resonance in Medicine.
2003 - 2006	Member, Scientific Program Committee, Intl. Society of Magnetic Resonance in Medicine.
2008- 2010	Member, Governance Committee, Intl. Society of Magnetic Resonance in Medicine.
2010-present	Vice Chair, Safety Committee, Intl. Society of Magnetic Resonance in Medicine
2009-2011	General Chair, IEEE International Symposium on Biomedical Imaging (ISBI) 2011, Chicago.
2009-2013	Associate Editor, IEEE Transactions on Engineering in Medicine and Biology.
2009–2013	Deputy Editor, Magnetic Resonance in Medicine
2010-2013	Member Board of Trustees, Intl. Society of Magnetic Resonance in Medicine.
2012-2013	Chair, Safety Committee, Intl. Society of Magnetic Resonance in Medicine
2013-present	Member, Editorial Board, IEEE Transactions on Biomedical Engineering
2014-2016	Member, External Advisory Board, MIT/Berkeley/Case Western NIH R24 Planning Grant: Human Magnetic Particle Imaging
2016-present	VP for Member and Student Activities, IEEE Engineering in Med. and Biology Society

Honors

1981 - 1984	National Science Foundation Graduate Fellowship.
1986	Radiological Society of North America Scientific Exhibit Citation "An Imaging Sequence for Multi-Plane Scout Scans."
1993	Lockheed Fort Worth Company Award for Excellence in Engineering Education.
1999	James Stone Faculty Fellow, Texas A&M University College of Engineering Award.
1999	TEES Fellow Award, Texas A&M University College of Engineering Award.
2004 - 2005	TEES College of Engineering Faculty Fellow, Texas A&M University.
2002 - 2007	University Faculty Fellow, Texas A&M University.
2005 - 2006	TEES College of Engineering Faculty Fellow, Texas A&M University.
2006 – present	Royce E. Wisenbaker II Professor, Texas A&M University.
2007 – present	Fellow, American Institute of Medical and Biological Engineering (AIMBE)
2009 – present	Fellow, International Society of Magnetic Resonance in Medicine (ISMRM)
2010 – present	Fellow, The Institute of Electrical and Electronics Engineers (IEEE)
2019 – present	Fellow, International Academy of Medical and Biological Engineering (IAMBE)

C. Contributions to Science

1. My early work in MRI focused on the use of receive coils and receive coil arrays. At this time in the development of MRI, scanners came with only a single receive channel. We explored methodology for adding multiple channel receive capabilities to scanners through time-multiplexed receivers. We developed the first sixteen channel head coil using time multiplexing, and demonstrated up to eight channel coils for x-nuclei spectroscopy, also using time-multiplexing. Though collaborations, we showed what may be the first eight channel accelerated images, obtained in our laboratory also using time-multiplexing. As additional aspect of our work at this time was optimizing the matching and tuning networks used in coil arrays. This included both auto-tuning and element selection of RF coil arrays to control the impedance matching and FOV and the design of matching networks for isolating preamplifiers.

a) S.M. Wright, R.L. Magin and J.R. Kelton, "Arrays of Mutually Coupled Receiver Coils: Theory and Application," Magnetic Resonance in Medicine, Vol. 17, No. 1, pp. 252-268, Jan. 1991.

b) A. Reykowski, S.M. Wright, and J.R. Porter, "Design of Matching Networks for Low Noise Preamplifiers," Magnetic Resonance in Medicine, Vol. 33, pp. 848-852, June, 1995.

c) J.R. Porter, S.M. Wright and A. Reykowski, “A Sixteen-Element Phased Array Head Coil,” Magnetic Resonance in Medicine, Vol. 40, No. 2, pp. 272-279, August, 1998.

d) J.A. Bankson, M.A. Griswold, S.M. Wright, and D.K. Sodickson, “SMASH Imaging with an Eight Element Multiplexed RF Coil Array,” Magnetic Reson. Materials in Med., Phys. And Biology, (MAGMA), Vol. 10, No. 2, pp. 93-104, June, 2000.

2. Extending this work in array coils, my students and I demonstrated the first 64 channel RF coil, and demonstrated that meaningful images could be obtained in a single echo by using very large array coils. This work showed the feasibility of image encoding with radiofrequency coils. We explored the impact of the phase imparted by the RF coils and found a way to compensate for the depth dependence of this coil with a fourth static field gradient system, enabling highly accelerated three dimensional imaging using these large planar arrays, targeted towards MR histology and MR elastography.

a) M.P. McDougall and S.M. Wright, "A 64-Channel Array Coil for Single Echo Acquisition Magnetic Resonance Imaging," Magnetic Resonance in Medicine, Vol. 54, pp. 386-392, 2005.

b) J.C. Bosshard, N. Yallapragada, M.P. McDougall, S.M. Wright, "Exploration of highly accelerated magnetic resonance elastography using high-density array coils." Quant. Imaging Med. Sug. 2017; 7(2):195-204. Doc: 10.21037/qims2017.04.02

c) S.M. Wright, M.P. McDougall, "Single Echo Acquisition Imaging using RF Encoding," NMR in Biomedicine, vol 22., no. 9, pp. 982-993, 2009. DOI: 10.1002/nbm.1399

d) J.C. Bosshard, M.P. McDougall, and S.M. Wright, "An Insertable Non-Linear Gradient Coil for Phase Compensation in Sea Imaging," IEEE Transactions on Biomedical Engineering. Vol 61, No. 1, pp. 217-223, Jan 2014. DOI: 10.1109/TBME.2013.2238537

3. Our group has also been investigating the RF transmit side of MRI. Along with collaborators at GE Healthcare we developed a technique for providing isolation between RF transmit channels, called "Current Source Amplifiers". An eight channel head coil with integrated RF amplifiers was built and demonstrated. To overcome power limitations with this approach we explored the ultra-low impedance RF amplifier approach, building an eight channel system installed at the University of Michigan. Simultaneously we developed a 64 channel RF transmit system in our lab, and demonstrated that this could be used to generate curved slices in a single, conventional RF pulse through phased array techniques.

a) N.A. Hollingsworth, K.L. Moody, J.-F. Nielsen, D. Noll, M.P. McDougall, S.M. Wright, "Tuning Ultra-Low Ouput Impedance Amplifiers for Optimal Power and Decoupling in Parallel Transmit MRI," IEEE International Symposium on Biomedical Imaging, San Francisco, April, 2013. (4 pp.)

b) K.N. Kurpad, E.B. Boskamp, and S.M. Wright, "Eight Channel Transmit Array Volume Coil Using On-Coil Radiofrequency Current Sources," Quant Imaging Med Surgery, Vol. 4, No. 2, pp. 71-78, 2014. (doi: 10.3979/j.ssn.2223-4292.2014.04.14

c) K. Feng and S.M. Wright, "Rapid Slice Excitation without B0 Gradients using Large Array Coils," Quant. Imaging Med. Surg., Vol. 4, No. 2, pp. 145-151, 2014. (doi: 10.3978/j.issn.2223-4292.0214.04.15)

d) K. Feng, N. A. Hollingsworth, M.P. McDougall, S.M. Wright, "A 64 Channel 100 Transmitter for Investigating Parallel Transmit MRI," IEEE Transactions on Biomedical Engineering. Vol. 59, No. 8, 2012, pp. 2152-2160.

4) Our collaboration with colleagues at UTSW in Dallas has enabled us to work on 7T MRI. This work has focused on the use of 'forced current' excitation of RF coils to ensure uniform RF coverage. We have demonstrated that this technology can generate very uniform RF fields even in the presence of mutual coupling between elements and uneven loading of elements. We have used this technique to develop RF transmit coils for the breast, both unilateral and bilateral. In the bilateral arrangement the forced current excitation enabled the coils to be easily switched between unilateral and bilateral modes, and prevented the very closely coupled coils from interfering with each other, giving a very uniform field. We have recently extended this technique to a switchable FOV dipole array for body imaging. Additionally, to support multiple channel receive at 2nd nuclei, we have built a sixteen channel frequency translator allowing sixteen channel receiver arrays to be used at one or more non-hydrogen nuclei. This system has been installed and tested at UTSW.

a) S. By, J.V. Rispoli, S. Cheshkov, I. Dimitrov, J. Cui, S. Seiler, S. Goudreau, C. Malloy, S.M. Wright, M.P. McDougall, “A 16-Channel Receive, Forced Current Excitation Dual-Transmit Coil for Breast Imaging at 7T”, *PLoS ONE* 9(11): e113969. doi:10.1371/journal.pone.0113969. November 2014. PMID: 25420018.

b) J. Cui, J. Bosshard, J. Rispoli, I. Dimitrov, S. Cheshkov, M. McDougall, C. Malloy, S. Wright, “A switched-mode breast coil for 7 tesla MRI using forced-current excitation”, *IEEE Transactions on Biomedical Engineering,* Vol. 62, No. 7 pp. 1777-1783, July 2015. PMID: 25706501.

c) J. Cui, I.E. Dimitrov, S. Cheshkov, M. Gu, C.R. Malloy, S.M. Wright, “An adjustable-length dipole using forced-current excitation for 7T MR”, IEEE Transactions on Biomedical Engineering, published online Dec. 2017. Doi: 10.1109/TBME.2017.2788864

d) S.E. Ogier and S.M. Wright, “A frequency translation approach for multichannel 13 C spectroscopy.” Proceeding of the Engineering in Medicine and Biology Society (EMBC), 2015 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Conference, pp. 1564-1567, 2015

D. Additional Information: Research Support and/or Scholastic Performance

Active External Support:

National Institutes of Health 1 R21 EB028516-01 9/1/2019 to 4/30/2021
Low-complexity decoupling of multi-frequency arrays for magnetic resonance imaging and spectroscopy using operational amplifiers
The major goal of this project is to develop a technique to extend ‘decoupling preamplifier’ technology for simultaneous use at multiple frequencies through the use of high speed operational amplifiers. (This is the current proposal under review).
Role: PI

National Science Foundation 6/1/2016 to 5/31/2020
Positive Contrast MRI of the Small Interventional Devices.
This project aims to develop imaging methodology and image processing and analysis tools to convert susceptibility artifacts into positive contrast markers to identify radioactive seeds and potentially surgical tools and other devices inserted into the MR field of view. Our role is to advise students on MRI techniques.
Role: Co-PI. PI: Jim Ji, TAMU ECEN

Houston Methodist Research Institute (Victor, PI) 6/1/2019 to 12/31/2019
Ultra High-Field MR Spectroscopy of Non-alcoholic fatty liver disease
The overall goal of our component of this project is to develop a nested, dual-tuned 1H-31P transmit/receive surface coil for 7T liver spectroscopy.
Role: PI of TAMU Subcontract. PI: David Victor, MD, Houston Methodist

Active Internal Support:

TEES Human Clinical Research Facility Pilot Projects 2/2019 to 1/2021
Measurement of IntraMuscular Fat using Low-Cost MRI
This pilot project will attempt to demonstrate the ability to characterize intramuscular fat using a low-cost 1.0 Tesla extremity scanner in the Magnetic Resonance Systems Lab at TAMU.
Role: PI

TAMU T3 Pilot Project 11/2018 to 10/2020
Multiplexed Magnetic Resonance Imaging with Para-Hydrogen Induced Spin Polarization
This pilot project will demonstrate that we can create para-hydrogen prepolarized materials and transport them to the 1.0T magnet in the MRSL, and successfully image them.
Role: Co-PI PI: Christian Hilty, TAMU CHEM

TAMU 9/1/2016 8/31/2019

Interdisciplinary Research Seed Grant : Applicability of 1 Tesla assess abnormalities in muscle bioenergetics and metabolism during local exercise in older adults with a chronic disease

The goal of this pilot study project is to determine if 31P spectroscopy can be used to assess variation in muscle bioenergetics and metabolism with exercise at 1 Tesla. Our role is to develop the RF coils and pulse sequences for a prototype 1T MR scanner to support the project.

Role: Co-PI. PI: Marielle Engelen, TAMU CTRAAL

TAMU 9/1/2016 8/31/2019

Intramuscular metabolic phenotyping to identify muscle dysfunction in older adults with chronic disease.

This project also aims to analyze the use of 1T MRI to assess muscle metabolism in older adults. Our role is to extend our use of RF coils into RF coil arrays to support this project.

Role: Co-PI. PI: Marielle Engelen, TAMU CTRAAL

TAMU PESCA Award 5/1/2018 to 4/31/2020

Identification of non-invasive NMR-based biomarkers for Duchenne Muscular Dystrophy

This project aims to use 3.0 and 4.7T MRI and MRS to develop biomarkers for Duchenne Muscular Dystrophy using a dog model. Our role is to support the 4.7T MRI.

Role: Co-PI. PI: Mary McDougall.

Completed, past three years.

Cancer Prevention and Research Institute of Texas (CPRIT) 6/1/2016/ to 5/31/2019

A Body Coil for MR Imaging and Spectroscopy of Cancer at 7 Tesla

This goal of this project is to develop RF coil technology for imaging of the body using 7T MRI. The project end point is imaging of phantoms at 7T.

Role: PI

National Science Foundation 10/1/2015 to 4/30/2019

Localized finishing of targeted complex geometric structures using dynamic magnetic field-manipulated magnetic fluids.

The overall goal of this project is to use time-varying magnetic fields to polish 3D printed geometric structures. Our role on this project is to provide guidance on the creation and control of the time-varying fields.

Role: Co-PI. PI: Sathish Bukkapatnam, TAMU MEEN

Cancer Prevention and Research Institute of Texas (CPRIT) 4/1/2016/ to 3/31/2019

TAMU-UT Southwestern Partnership for Cancer Imaging and Spectroscopy at 7 Tesla (Competitive Renewal).

The role of the TAMU subcontract is to develop RF technology to support multiple channel spectroscopy.

Role: co-PI of TAMU subcontract. PI: Craig Malloy, UTSW.

UT BRAIN Seed Grant Award 9/1/2015 to 8/31/2017

Transformative MRI Neurotechnology for micro-scale human cortical imaging.

This seed grant aims to establish a collaboration between UT San Antonio, UT Soutwestern and Texas A&M University for potential studies in high-resolution brain imaging. Our role in this project was to develop RF coil arrays for high resolution imaging of the brain surface.

Role: Co-PI. PI: Timothy Duong, UTHSC