

# Krishna S. Nayak

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## PRIMARY EXPERTISE

Signal and Image Processing; Magnetic Resonance Imaging (MRI) and Nuclear Magnetic Resonance (NMR) Physics; Pulse Sequence Design and Image Formation; Application of MRI to Cardiovascular Disease, Diabetes, Body Composition Assessment, and Cancer; Rapid Imaging; Real-Time Imaging; Clinical Translation of Biotechnology.

## EXPERIENCE

Professor of Electrical and Computer Engineering, *University of Southern California* 2003-present  
(joint appointments in Biomedical Engineering and Radiology)

Director, Dynamic Imaging Science Center [WEB](#)

Director, Magnetic Resonance Engineering Laboratory [WEB](#)

Director, Signal and Image Processing Institute [WEB](#) (2018-2024)

President, *Lively Sensors, LLC* 2016-2020

Technical Consultant / Key Opinion Leader / Expert Witness 2001-2016

Clients Include: *Physical Optics Corporation, Lithera, California Heart Centers, Phantoms by Design, NetVMG*

Lecturer & Research Associate, Electrical Engineering, *Stanford University* 2001-2003

## ACADEMIC FUNDING (out of >\$18M from 2003-present)

- ▶ **Principal Investigator**, NIH/NHLBI, "Improved Myocardial Perfusion Assessment using High-Performance Low-Field MRI," R21-HL159533. June 2022 – May 2024. Total: \$470k.
- ▶ **Principal Investigator** (MPI with BA Hargreaves), NIH/NIAMS, "Improved Diagnostic MRI around Metallic Implants," R01-AR078912. Feb 2022 – Dec 2026. Total: \$3.9M. KN's portion: \$3.0M.
- ▶ **Principal Investigator**, USC Provost's Strategic Directions Award, "Translational Pipeline for Pediatric and Fetal Applications of 0.55 Tesla MRI," Jan 2022 – Aug 2023. Total: \$300k.
- ▶ **Principal Investigator**, NSF/CNS, "MRI: Development of a High-Performance Low-Field MRI for Dynamic Imaging," #1828736. Oct 2018 – Sep 2023. \$2.5M. (plus \$2M matching funds from the USC Viterbi School)
- ▶ **Principal Investigator**, NIH/NCI, "Precise DCE-MRI Assessment of Brain Tumors," R33-CA225400. Sep 2017 – Jun 2022. Total: \$1.6M. KN's portion: \$1.3M.
- ▶ **Principal Investigator**, NIH/NHLBI, "Novel Myocardial Perfusion Stress Test using Arterial Spin Labeling," R01-HL130494. Jul 2016 – Jun 2022. Total: \$1.7M. KN's portion: \$1.2M.
- ▶ **Co-Investigator**, NIH/NIDCD, "Dynamics of Vocal Tract Shaping," R01-DC007142, PI: Shrikanth Narayanan. May 2005 – Apr 2010. Total: \$2.1M. KN's portion: \$400k. May 2010 – Apr 2015. Total: \$2.0M. KN's portion: \$380k. Dec 2015 – Nov 2020. Total: 2.0M. KN's portion: \$380k.
- ▶ **Co-Investigator**, NIH/NHLBI, "Model-based Phenotyping of OSAS in Pediatric Obesity using Dynamic MR Imaging," R01-HL105210. PI: Michael Khoo. Sep 2010 – Aug 2016. Total: \$3.4M. KN's portion: \$1.2M.
- ▶ **Principal Investigator**, NSF/DGE, "New GK-12: Body Engineering Los Angeles," Grant #1045595. Aug 2011-Jul 2016. \$1.4M. (plus \$1M matching funds from the USC Viterbi School)

## INVITED TALKS (out of >60)

1. High Performance Low Field MRI, NIST Workshop on Low-Field Magnetic Resonance, Boulder CO, August 2019.
2. Diagnostic Real-Time MRI, Plenary Session "Dynamic Real-Time MRI", ISMRM 2017 Scientific Sessions, Honolulu, HI, April 2017. [VIDEO](#)

## PEER-REVIEWED PUBLICATIONS (out of >150 journal papers, >350 conf papers)

1. NG Lee, R Ramasawmy, Y Lim, AE Campbell-Washburn, **KS Nayak**. "MaxGIRF: Image Reconstruction Incorporating Concomitant Field and Gradient Impulse Response Function Effects." *Magnetic Resonance in Medicine*. 88(2):691-710, August 2022.
2. Z Wu, W Chen, MCK Khoo, SL Davidson Ward, **KS Nayak**. Evaluation of upper airway collapsibility using real-time MRI. *Journal of Magnetic Resonance Imaging*. 44(1):158-167. July 2016. Recipient of the W.S. Moore Young Investigator Award at ISMRM 2016.
3. Z Zun, P Varadarajan, RG Pai, EC Wong, **KS Nayak**. "Arterial Spin Labeled MRI Detects Clinically Relevant Increases in Myocardial Blood Flow with Vasodilation," *JACC Cardiovascular Imaging* 4(12):1253-1261, December 2011.
4. S Narayanan, **KS Nayak**, S Lee, A Sethy, and D Byrd, "An approach to real-time magnetic resonance imaging for speech production," *Journal of the Acoustical Society of America*, 115(5):1771-1776, April 2004.

## REVIEW PAPERS

1. **KS Nayak**, Y Lim, A Campbell-Washburn, J Steeden. "Real-Time MRI." *Journal of Magnetic Resonance Imaging*. 55(1):81-99. January 2022.
2. F Kober, T Jao, T Troalen, **KS Nayak**, Myocardial Arterial Spin Labeling. *Journal of Cardiovascular Magnetic Resonance*. 18:22. April 2016.
3. **KS Nayak**, JF Nielsen, MA Bernstein, M Markl, P Gatehouse, R Botnar, D Saloner, C Lorenz, H Wen, BS Hu, F Epstein, J Oshinski, SV Raman. CMR Phase Contrast Imaging. *Journal of Cardiovascular Magnetic Resonance*. 2015 Aug 9;17(1):71
4. **KS Nayak** and RJ Fleck Jr. "Seeing Sleep: Dynamic Imaging of Upper Airway Collapse and Collapsibility in Children." *IEEE Pulse*. 5(5):40-44. September 2014.

[Google Scholar](#) [MyNCBI Profile](#)

## PATENTS (out of >10 US Patents)

1. CH Cunningham, **KS Nayak**, JM Pauly, "RF field mapping for magnetic resonance imaging," U.S. Patent #7,446,526. issued Nov. 2008. Licensed to GE, Siemens, and Philips.
2. **KS Nayak** and BA Hargreaves, "Steady-State Free-Precession MRI with Increased Signal Bandwidth," U.S. Patent #7,332,908. issued Feb. 2008. Licensed to GE, Siemens, and Philips.
3. KI Iourcha, **KS Nayak**, Z Hong, "System and Method for Fixed-rate Block-based Image Compression with Inferred Pixel Values," U.S. Patent #5,956,431, issued Sept. 1999. Continuation: U.S. Patent #6,658,146, issued Dec. 2003. Continuation: U.S. Patent #6,683,978, issued Jan. 2004. Continuation: U.S. Patent #6,775,417, issued Aug. 2004. Continuation: U.S. Patent #7,039,244, issued May 2006. Continuation: U.S. Patent #7,043,087, issued May 2006. Continuation: U.S. Patent #7,801,363, issued Sept. 2010.

## EDUCATION

- Ph.D. Electrical Engineering Stanford University 2001  
(Advisors: Dwight Nishimura, John Pauly, Bob Hu)
- M.S. Electrical Engineering Stanford University 1996
- B.S. Electrical Engineering, Computer Science, & Applied Math Florida State University 1995

## MEMBERSHIP

ISMRM, IEEE (Fellow), SCMR (Fellow), AIMBE (Fellow), AHA, AAAS, ASEE

## INTERESTS

Healthy Living, Parenting, Behavioral Economics, Ultimate Frisbee, Basketball, Chess, Board Games