

# Prakash Kumar

www.prakashk.com • prakashk@usc.edu • 248-882-2897 • www.linkedin.com/in/prakash1296 • www.github.com/pkash16

## Professional Summary

PhD candidate developing fast MRI reconstruction methods for real-time clinical applications. Expertise in traditional signal processing, deep learning, computer vision, and systems engineering to enable low-latency image reconstruction for cardiac and speech imaging at 0.55T

## Education

**University of Southern California,**

PhD, Electrical Engineering. Ongoing. GPA: 3.72/4.0

*Los Angeles, CA*

Expected 2026

**University of Michigan**

B.S.E, Computer Engineering. Minor in Multidisciplinary Design. GPA: 3.72/4.0

*Ann Arbor, MI*

2020

## Experience

### **Magnetic Resonance Engineering Laboratory**

*Los Angeles, CA*

*PhD Candidate (6<sup>th</sup> year)*

*Aug 2020 – Present*

- Designed MRI sampling and reconstruction (C++/Cuda/CuPy) techniques for fast volumetric dynamic cardiac imaging to guide interventional procedures.
- Created AI physics-informed MRI reconstruction techniques for imaging applications in cardiac function and speech production, with fast frame rates (40ms/frame)
- Released eight public code/data repositories promoting open science, managed automation scripting and docker environments to streamline open science and share of research with other institutions
- Served as head of MRI protocol development for the USC Speech Production MRI (SPAN) group (12 members), and developed advanced reconstruction and acquisitions systems for collection of large-scale (290+) speech-production datasets
- Authored or co-authored 5 publications, 2 conference papers, and 16 conference abstracts, with presented work at international meetings (ISMRM)
- Research Visit: National Institutes of Health, National Heart Lung and Blood Institute (July - October 2024)

### **Keysight Technologies**

*Novi, MI*

*R&D Engineer, Co-op, Automotive Engineering*

*Jan 2020 – Aug 2020*

- Developed real-time signal separation algorithms in MATLAB, eliminating need for specialized hardware and wire cutting by instead utilizing external current probes
- Replicated an expired patent with reverse-engineering and developed an algorithm using 1D signal processing techniques with strict latency requirements (<200ms), and documented insights for integration by teammates

## Skills & Interests

**Technical:** MATLAB, Python, Pytorch, Julia, C++, Bash/Unix, DevOps, Optimization Theory, Deep Learning, MR Physics

**Interests:** Clinical translation, Accessibility in imaging, AI image reconstruction, Open science, Real-time MRI

## Activities/Honors/Involvement

**Honors:** USC Annenberg Graduate Fellowship (2020-), ISMRM Summa Cum Laude Abstract (2025)

**ISMRM Cardiac Trainee Events:** Moderated trainee programming (2025)

**IEEE K-12 Signal Processing Education:** Created the medical imaging team as a part of an outreach initiative from the IEEE to educate high-school students in signal processing topics

**Minds Matter Southern California:** Mentored and provided college application support to low-income high school students (2020-2024)

# Prakash Kumar

## Journal Publications

In reverse-chronological order:

1. DH Le, **P Kumar**, E Yagiz, Y tian, KS Nayak. "Online spatiotemporally constrained reconstruction for real-time dynamic MRI". *Magnetic Resonance in Medicine*. 2025. Accepted.
2. **P Kumar**, KS Nayak. "Feasibility of Tagged MRI at 0.55T." *Magnetic Resonance in Medicine*. 2025. Early View.
3. S Malik, E Shimron, S Schauman, KS Nayak, **P Kumar**, ME Caligiuri, F Santini, N Stikov, L Bell, C Montalba, P Jezzard. "Code review facility in Magnetic Resonance in Medicine". *Magnetic Resonance in Medicine*. February 2025.
4. Lim Y, **Kumar P**, Nayak KS. Speech production real-time MRI at 0.55 T. *Magnetic Resonance in Medicine*. 2024;91(1):337-343. Doi:[10.1002/mrm.29843](https://doi.org/10.1002/mrm.29843)
5. Ponrartana S, Nguyen HN, Cui SX, et al. Low-field 0.55 T MRI evaluation of the fetus. *Pediatr Radiol*. 2023;53(7):1469-1475. Doi:[10.1007/s00247-023-05604-x](https://doi.org/10.1007/s00247-023-05604-x)

## Conference Papers

In reverse-chronological order:

1. Y Zhang, **P Kumar**, Y Tian, Z Zhao, K Huang, K Lee, H Hsu, S Narayanan, KS Nayak, L Goldstein, "Co-registration of real-time MRI and respiration for speech research". Interspeech 2025.
2. **P Kumar**, Y Tian, Y Lim, SX Cui, C Hagedorn, D Byrd, UK Sinha, S Narayanan, KS Nayak. "State-of-the-art speech production MRI protocol for new 0.55T scanners." Interspeech (2024). Accepted.

## Conference Abstracts (Refereed)

In reverse-chronological order:

1. D Le, **P Kumar**, E Yagiz, Y Tian, KS Nayak. "Online spatiotemporally constrained reconstruction for real-time dynamic MRI". ISMRM 2025; accepted.
2. **P Kumar**, R Ramasawmy, A Javed, D Le, K O'Brien, A Jaimes, K Chow, KS Nayak, AE Campbell-Washburn. "Low-latency real-time 3D imaging for interventional cardiovascular MRI at 0.55T". ISMRM 2025; accepted.
3. **P Kumar**, R Ramasawmy, A Javed, KS Nayak, AE Campbell-Washburn. "Volumetric real-time imaging for interventional CMR at 0.55T". Accepted SCMR 28th Annual Scientific Sessions. Washington DC, 2025.
4. S Kapai, **P Kumar**, E Yagiz, RM Kato, Y Tian, NG Lee, M Chen, M Ferrada, AE Campbell-Washburn, KS Nayak. "Evaluation of Tracheomalacia Using Novelk 0.55T MRI". Am J Respir Crit Care Med 2024;209:A4491.
5. NY Can, **P Kumar**, NG Lee, Y Tian, KS Nayak. "Improved Large-FOV Dynamic MRI at 0.55T with Concomitant Field Correction". Accepted. ISMRM 32nd Scientific Session, Singapore, 2024.
6. C Bilgi, **P Kumar**, AN Moghaddam, N Pahlevan. "Quantitative Flow Visualization in a Patient-Specific Compliant Type B Aortic Dissection Phantom using 0.55T MRI". Accepted. ISMRM 32nd Scientific Session, Singapore, 2024.
7. R Ramasawmy, A Javed, DA Herzka, **P Kumar**, KS Nayak, RJ Lederman, AE Campbell-Washburn. "Four-dimensional iterative motion correction (iMoCO) for isotropic stack-of-spirals cine imaging". Accepted. ISMRM 32nd Scientific Session, Singapore, 2024.
8. S Kapai, **P Kumar**, E Yagiz, Y Tian, R Kato, M Chen, M Ferrada, AE Campbell-Washburn, KS Nayak. "Real-Time Imaging of Lower Airway Collapse at 0.55T". Accepted. ISMRM 32nd Scientific Session, Singapore, 2024.
9. K Lee, **P Kumar**, K Iskarous, KS Nayak. "Curation of Training Data for Supervised Deep Learning Reconstruction of Real-Time Speech MRI". Accepted. ISMRM 32nd Scientific Session, Singapore, 2024.
10. **P Kumar**, R Ramasawmy, A Javed, Y Tian, AE Campbell-Washburn, KS Nayak. "Practical sampling strategies for volumetric cardiac RT-MRI at 0.55T". Accepted. ISMRM 32nd Scientific Session, Singapore, 2024.
11. C Hagedorn, **P Kumar**, B Villegas, M OuYoung, S Cui, M Sheth, S Narayanan, KS Nayak, U Sinha. "Role Of High-Performance Low Field Magnetic Resonance Imaging In Management Of Tongue Cancer". Proc. AHNS 11th International Conference, Montreal, July 2023. <https://ahns.jnabstracts.com/Detail?ID=129269>
12. J Wong, **P Kumar**, KS Nayak, Y Tian. "Artifact reduction for real-time spiral MRI using out-in sampling at 0.55T". Proc. ISMRM 31st Scientific Session, Toronto, June 2023, p4882.
13. **P Kumar**, B Tasdelen, KS Nayak. "Open-source dynamic MRI workflow for reproducible research". Proc. ISMRM 31st Scientific Session, Toronto, June 2023, p7625.
14. **P Kumar**, KS Nayak. "Real-time deep learning non-Cartesian image reconstruction using a causal variational network.". Proc. ISMRM 31st Scientific Session, Toronto, June 2023, p6387
15. **P Kumar**, KS Nayak. "Low latency real-time MRI at 0.55T using self-calibrating Through-Time GRAPPA." Proc. ISMRM 30th Scientific Session, London, May 21, p2348.
16. **P Kumar**, Y Lim, KS Nayak. "Feasibility of Super Resolution Speech RT-MRI using Deep Learning." Proc.

# **Prakash Kumar**

ISMRM 29th Scientific Session, Online, May 21, p2196.