

# Yongwan Lim

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RESEARCH INTERESTS Magnetic Resonance Imaging (MRI)

- Real-time imaging, compressed sensing, image reconstruction, image deblurring, data and image analysis
- Application of MRI to the study of speech production

Signal and Image Processing

- Machine learning, deep learning, inverse problems

EDUCATION **PhD, Electrical and Computer Engineering, Computer Science (minor)** *Expected*, Summer 2020  
[University of Southern California \(USC\)](#), Los Angeles, CA, USA

- Advisors: [Krishna S. Nayak](#), Ph.D. and [Shrikanth S. Narayanan](#), Ph.D.
- GPA: 3.79/4

**Master of Science, Electrical Engineering,** Feb 2014  
[Korea Advanced Institute of Science and Technology \(KAIST\)](#), Daejeon, Korea

- Thesis: *Free-breathing abdominal MR imaging for reduction of respiratory motion artifacts*
- Advisor: [HyunWook Park](#), Ph.D.
- GPA: 4.26/4.3

**Bachelor of Science, Electrical Engineering,** Feb 2012  
[Sogang University](#), Seoul, Korea

- GPA: 3.88/4.3 (Major: 4.19/4.3), *Summa Cum Laude*

RESEARCH EXPERIENCE **Graduate Research Assistant** Aug 2015 – present  
[Magnetic Resonance Engineering Lab](#) and [Signal Analysis and Interpretation Lab](#), USC  
Advisors: [Krishna S. Nayak](#), Ph.D. and [Shrikanth S. Narayanan](#), Ph.D.

- Lead research efforts in the Speech Production and Articulation kNowledge (SPAN) group
- Serve as an MRI technician for collecting morphological and function speech MRI data from >72 subjects (>100 hours) for various linguistic studies
- Work on developing open MRI dataset for machine learning applications
- Work on developing self-supervised speech MRI video alignment method
- Developed *model-based* and *CNN-based* deblurring methods for real-time MRI
- Developed a rapid 3D real-time MRI technique that visualizes entire vocal organs during speech at 14 fps

**Research Summer Intern** July 2018  
[Samsung Fire & Marine Insurance](#), Seoul, Korea

- Developed a deep learning method for document classification

**Research Intern** June 2014 – June 2015  
[Image Media Research Center](#), [Korea Institute of Science and Technology \(KIST\)](#), Seoul, Korea  
Advisor: [Jaemin Hwang](#), Ph.D.

- Improved computer vision failure case in 3D tracking algorithm for augmented reality system with smartphones by implementing sensor fusion

**Graduate Research Assistant** Feb 2012 – Feb 2014  
[Image Computing System Lab](#), KAIST, Daejeon, Korea  
Advisor: [HyunWook Park](#), Ph.D.

- Reduced respiratory motion artifacts in abdominal MRI by implementing efficient data acquisition and reconstruction methods

**Undergraduate Research Assistant** June 2011 – Jan 2012  
[Image Processing Lab](#), [Sogang University](#), Seoul, Korea  
Advisor: [Rae-Hong Park](#), Ph.D.

- Developed a 3D environment reconstruction method using the Kinect sensor

5. **Y. Lim**, Y. Bliesener, S. Narayanan, and K. S. Nayak, “Deblurring for spiral real-time MRI using convolutional neural networks,” *Magnetic Resonance in Medicine*. 2020. In press. (arXiv:2001.09427)
4. **Y. Lim**, Y. Zhu, S. G. Lingala, D. Byrd, S. Narayanan, and K. S. Nayak, “3D dynamic MRI of the vocal tract during natural speech,” *Magnetic Resonance in Medicine*, vol. 81, no. 3, pp. 1511–1520, Mar. 2019. (IF: 3.858)
3. **Y. Lim**, S. G. Lingala, S. Narayanan, and K. S. Nayak, “Dynamic off-resonance correction for spiral real-time MRI of speech,” *Magnetic Resonance in Medicine*, vol. 81, no. 1, pp. 234–246, Jan. 2019. (IF: 3.858)
2. S. G. Lingala, Y. Zhu, **Y. Lim**, A. Toutios, Y. Ji, W-C. Lo, N. Seiberlich, S. Narayanan, K. S. Nayak, “Feasibility of spiral through-time GRAPPA for low latency accelerated real-time MRI of speech,” *Magnetic Resonance in Medicine*, vol. 78, no. 6, pp. 2275–2282, Dec. 2017. (IF: 3.858)
1. J. S. Choi, H. S. Seo, **Y. W. Lim**, Y. J. Han, and H. W. Park, “Sliding TOF: Sliding time of flight MR angiography using a dynamic image reconstruction method,” *Magnetic Resonance in Medicine*, vol. 72, no. 3, pp. 1177–1183, Mar. 2015. (IF: 3.858)

16. **Y. Lim**, S. Narayanan, and K. S. Nayak, “Attention-gated convolutional neural networks for off-resonance correction of spiral real-time MRI,” in *Proc. 28th Int. Society for Magnetic Resonance in Medicine (ISMRM) Scientific Sessions*, Aug, 2020. (Oral presentation) *To appear*.
15. Z. Zhao, **Y. Lim**, D. Byrd, S. Narayanan, and K. S. Nayak, “Improved 3D real-time MRI with Stack-of-Spiral (SOSP) trajectory and variable density randomized encoding of speech production,” in *Proc. 28th Int. Society for Magnetic Resonance in Medicine (ISMRM) Scientific Sessions*, Aug, 2020. (Oral presentation) *To appear*.
14. **Y. Lim**, S. Narayanan, and K. S. Nayak, “Deblurring for spiral real-time MRI using convolutional neural networks,” *Medical Imaging with Deep Learning*, Montréal, July 2020.
13. Z. Zhao, **Y. Lim**, D. Byrd, S. Narayanan, and K. S. Nayak, “Improved 3D real-time MRI with Stack-of-Spiral (SOSP) trajectory and variable density randomized encoding of speech production,” in *Proc. ISMRM Workshop on Data Sampling and Image Reconstruction*, Sedona, Arizona, Jan. 2020. (Oral presentation)
12. **Y. Lim**, Y. Bliesener, S. Narayanan, and K. S. Nayak, “Calibrationless deblurring of spiral RT-MRI of speech production using convolutional neural networks,” in *Proc. 27th Int. Society for Magnetic Resonance in Medicine (ISMRM) Scientific Sessions*, Montreal, Canada, May 2019. (Power pitch presentation)
11. S. G. Lingala, **Y. Lim**, S. Kruger, and K. S. Nayak, “Improved spiral dynamic MRI of vocal tract shaping at 3 Tesla using dynamic off resonance artifact correction,” in *Proc. 27th Int. Society for Magnetic Resonance in Medicine (ISMRM) Scientific Sessions*, Montreal, Canada, May 2019. (Oral presentation)
10. S. Sudhakara, **Y. Lim**, W. Chen, S. Narayanan, and K. S. Nayak, “Low-latency reconstruction for real-time speech MRI,” in *Proc. 27th Int. Society for Magnetic Resonance in Medicine (ISMRM) Scientific Sessions*, Montreal, Canada, May 2019. (E-poster presentation)
9. **Y. Lim**, Y. Zhu, S. G. Lingala, D. Byrd, S. Narayanan, and K. S. Nayak, “3D real-time MRI of vocal tract shaping,” in *Proc. 26th Int. Society for Magnetic Resonance in Medicine (ISMRM) Scientific Sessions*, p. 3541, Paris, France, June 2018. (E-poster presentation)
8. W. Chen, **Y. Lim**, Y. Bliesener, S. Narayanan, and K. S. Nayak, “Comparison of leading reconstruction techniques for real-time speech MRI,” in *Proc. 26th Int. Society for Magnetic Resonance in Medicine (ISMRM) Scientific Sessions*, p. 3516, Paris, France, June 2018. (E-poster presentation)
7. **Y. Lim**, S. G. Lingala, S. Narayanan, and K. S. Nayak, “Correction of dynamic off-resonance in spiral 2D real-time MRI of speech,” in *Proc. 25th Int. Society for Magnetic Resonance in Medicine (ISMRM) Scientific Sessions*, p. 4017, Honolulu, HI, USA, Apr. 2017. (E-poster presentation)

6. J. Chen, S. G. Lingala, **Y. Lim**, A. Toutios, S. Narayanan, and K. S. Nayak, "Task-based optimization of regularization in highly accelerated speech RT-MRI," in *Proc. 25th Int. Society for Magnetic Resonance in Medicine (ISMRM) Scientific Sessions*, p. 1409, Honolulu, HI, USA, Apr. 2017. (Poster presentation)
5. **Y. Lim**, S. G. Lingala, A. Toutios, S. Narayanan, and K. S. Nayak, "Improved depiction of tissue boundaries in vocal tract real-time MRI using automatic off-resonance correction," in *Proc. Interspeech*, pp. 1765–1769, San Francisco, CA, USA, Sep. 2016. (Poster presentation)
4. S. G. Lingala, A. Toutios, J. Toger, **Y. Lim**, Y. Zhu, Y-C. Kim, C. Vaz, S. Narayanan, and K. S. Nayak, "State of the art MRI protocol for comprehensive assessment of vocal tract structure and function," in *Proc. Interspeech*, pp. 475–479, San Francisco, CA, USA, Sep. 2016. (Oral presentation)
3. J. Toger, **Y. Lim**, S. G. Lingala, S. Narayanan, K. S. Nayak, "Sensitivity of quantitative RT-MRI metrics of vocal tract dynamics to image reconstruction settings," In *Proc. Interspeech*, pp. 165–169, San Francisco, CA, USA, Sep. 2016. (Oral presentation)
2. **Y. W. Lim**, Y. J. Han, and H. W. Park, "A robust data acquisition method for reduced respiratory motion artifact in free-breathing image," In *Proc. Int. Society for Magnetic Resonance in Medicine (ISMRM)*, p. 4368, Milan, Italy, Apr. 2014. (E-poster presentation)
1. **Y. W. Lim**, H.-Z. Lee, N.-E. Yang, and R.-H. Park, "3-D reconstruction using the Kinect sensor and its application to a visualization system," in *Proc. 2012 IEEE Int. Conf. Systems, Man, and Cybernetics*, pp. 3343–3348, Seoul, Korea, Oct. 2012. (Oral presentation)

#### PATENT

2. H. W. Park, **Y. W. Lim**, and Y. J. Han, "Magnetic resonance imaging apparatus and control method," Appl. No.: 14/804678, Filed Date: Jul. 21, 2015, U.S. Pub. No.: US 2016/0018497 A1, Pub. Date: Jan. 21, 2016.
1. H. W. Park, **Y. W. Lim**, and Y. J. Han, "Magnetic resonance imaging device and control method thereof," KOREA 10-2014-0091888, Aug. 2014.

#### AWARDS

##### Travel Awards

- ISMRM Educational Stipend Award 2017–2019
- Travel Grant, Graduate Student Government, USC 2016–2018

##### Student Awards

- Ming Hsieh Institute PhD Scholar Finalist, USC 2019
- Best Paper Award, 25th Korea Signal Processing Conference Sep 2012
- Golden Medal Award of the Academic Competition, Sogang University Nov 2011
- Merit-based Scholarship (top 15 among 1.5k), Sogang University 2009–2011

#### TEACHING EXPERIENCE

##### Mentoring

- Advised one undergraduate student and four graduate students on independent research projects 2015–present

##### Lecture Courses

- EE 591 - Magnetic Resonance Imaging and Reconstruction, Guest Lecturer, USC Spring 2019
  - Delivered a 2-hours lecture about Nyquist sampling theory
- HSS189 - EE Freshmen Seminar, Teaching Assistance, KAIST Spring 2013
  - Prepared and delivered lectures for large introductory lecture class

##### Outreach Activities

- Youngnak Borinwon: The sisterhood relationship orphanage, Lecturer, Korea 2011
  - Developed curriculum and taught math and science to high school students

OTHER	Reviewer	
EXPERIENCE	<ul style="list-style-type: none"> <li>• Magnetic Resonance in Medicine</li> <li>• Journal of Speech, Language, and Hearing Research</li> <li>• IEEE International Symposium on Biomedical Imaging</li> <li>• ISMRM Annual Conference</li> <li>• Precision and Future Medicine</li> </ul>	2020 2020 2020 2019 2018
	Military Service	
	<ul style="list-style-type: none"> <li>• Sergeant (Administrative Specialist)</li> </ul>	Jan 2007 – Jan 2009
	The Army of Republic of Korea, Choongju, Korea	
SOFTWARE	Computer Programming:	
SKILLS	<ul style="list-style-type: none"> <li>• Fluent: Python, MATLAB, UNIX shell, L<sup>A</sup>T<sub>E</sub>X</li> <li>• Prior experience: C/C++, Java, and others</li> </ul>	
LANGUAGES	Korean and English	