

# Yohan Jun

POSTDOCTORAL RESEARCH FELLOW, PH.D.

Athinoula A. Martinos Center for Biomedical Imaging, Bldg 149 13th St Rm 2301, Charlestown MA 02129

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## Research Interests

**Magnetic Resonance Imaging** Fast Magnetic Resonance Imaging (MRI), MR Image Reconstruction, Rapid MR Parameter Mapping  
**Computer-aided Diagnosis (CAD)** Automatic Detection, Segmentation, and Diagnosis using Medical Images

## Education

### Yonsei University

PH.D. IN ELECTRICAL & ELECTRONIC ENGINEERING

Seoul, S.Korea

Mar. 2016 - Feb. 2022

- **Thesis:** "Model-based Deep Learning Reconstruction Methods for Fast Magnetic Resonance Imaging"
- **Scholarship:** Brain Korea 21 Plus Outstanding Student Fellow Scholarship of Korea Research Foundation

### Yonsei University

B.S. IN ELECTRICAL & ELECTRONIC ENGINEERING

Seoul, S.Korea

Mar. 2012 - Feb. 2016

- **Scholarship:** National Scholarship for Science & Engineering of Korea Student Aid Foundation

## Research Experience

### Athinoula A. Martinos Center for Biomedical Imaging

Boston, US

RESEARCH FELLOW @ ATHINOULA A. MARTINOS CENTER FOR BIOMEDICAL IMAGING, MASSACHUSETTS GENERAL HOSPITAL (MGH), HARVARD MEDICAL SCHOOL (HMS), **ADVISOR: PROF. BERKIN BILGIC, PROF. MICHAEL GEE**

Mar. 2022 - Now

- **Accelerating Quantitative MRI**
  1. **Subspace Reconstruction for Multiparametric Mapping:**
    - Developed a zero-shot deep subspace reconstruction network (**Zero-DeepSub**) for fast multiparametric quantitative MRI.
  2. **Rapid Quantitative MRI:**
    - Developed a self-supervised learning scheme for multiparametric mapping using QALAS (**SSL-QALAS**).
- **Rapid and Motion-Robust Fetal and Pediatric Imaging**
  - **Advanced HASTE imaging:** Developing a fast and motion-robust T2-weighted fetal/pediatric imaging.

### Yonsei University

Seoul, S.Korea

RESEARCH ASSISTANT @ MEDICAL ARTIFICIAL INTELLIGENCE LAB, **ADVISOR: PROF. DOSIK HWANG**

Jan. 2016 - Feb. 2022

- **Accelerating MR Imaging with Deep Learning Techniques**
  1. **Accelerating MRI:**
    - Developed a joint deep model-based MR image and coil sensitivity reconstruction network (**Joint-ICNet**) for fast MRI.
    - Validated domain-transform manifold learning in phase-encoding direction for accelerating cartesian MRI (**DOTA-MRI**).
    - Implemented cross-domain CNNs (**KIKI-net**) for reconstructing undersampled MR images.
  2. **Rapid MR Parameter Mapping:** Developed a deep model-based MR parameter mapping network (**DOPAMINE**) for a fast T1 mapping.
  3. **Parallel Imaging in TOF-MRA:** Developed a deep multistream CNNs (**DPI-net**) for parallel imaging in TOF-MRA.
- **Computer-aided Diagnosis (CAD) for Brain Tumors**
  1. **Metastasis:** Developed a deep learning model for automatic detection and segmentation of brain metastases.
  2. **Meningioma:** Implemented meningioma segmentation and grading models using two-stage deep learning models.
  3. **Glioblastoma:** Developed an automatic deep-learning-based segmentation model for glioblastoma analysis.
- **MRI Applications**
  1. **Standardization of Quantitative MRI:** Developed a deep-learning-based model for standardization of MOLLI T1 mapping.
  2. **Increasing MRI SNR:** Analyzed a denoising method based on tissue characteristics for High-SNR multiple T2(\*)-contrast MRI.
  3. **MRI-compatible Sensor:** Validated a megahertz-wave-transmitting conducting polymer electrode (MRI-compatible pressure sensor).

### Philips Korea

INTERNSHIP

Seoul, S.Korea

Oct. 2017 - Dec. 2017

- DFI Project Intern

### Philips Korea & Gyrotools

COURSE CERTIFICATE

Seoul, S.Korea

Sep. 25-30. 2017

- Philips Pulse Programming Course

## Teaching Experience

### Yonsei University

GUEST LECTURER, TEACHING ASSISTANT

Seoul, S.Korea

Sep. 2021 - Dec. 2021

- **Introduction Artificial Intelligence**
  - Presented a lecture on principles of deep learning and convolutional neural networks

GUEST LECTURER, TEACHING ASSISTANT

Mar. 2021 - Jun. 2021

- **Medical Imaging Artificial Intelligence**
  - Presented a lecture on MR image reconstruction using deep learning methods

GUEST LECTURER, TEACHING ASSISTANT

Sep. 2020 - Dec. 2020

- **Medical Artificial Intelligence**
  - Presented a lecture on principles of MRI and reconstruction methods for fast MRI

TEACHING ASSISTANT

Mar. 2018 - Jun. 2018

- **Introduction to Bioengineering for Electrical and Electronic Engineering**

TEACHING ASSISTANT

Mar. 2017 - Jun. 2017

- **Electrical and Electronic Engineering Capstone Design**

## Honors & Awards

### INTERNATIONAL

2021	<b>1st Rank</b> , Cross-Modality Domain Adaptation for Medical Image Segmentation (crossMoDA-2021 challenge)	Virtual Conference
2021	<b>ISMRM Magna Cum Laude (1)</b> , The ISMRM 29th Annual Meeting	Virtual Conference
2021	<b>ISMRM Magna Cum Laude (2)</b> , The ISMRM 29th Annual Meeting	Virtual Conference
2020	<b>3rd Rank</b> , fastMRI Challenge 2020, Facebook AI Research & NYU Langone Health	Virtual Conference
2020	<b>ISMRM Summa Cum Laude</b> , The ISMRM 28th Annual Meeting	Virtual Conference
2020	<b>ISMRM The Poster Award of 2nd Place (Silver)</b> , 2020 ISMRM Workshop on Data Sampling & Image Reconstruction	Sedona, US
2019	<b>4th Rank</b> , fastMRI Challenge 2019, Facebook AI Research & NYU Langone Health	Vancouver, Canada
2017	<b>ISMRM Summa Cum Laude</b> , The ISMRM 25th Annual Meeting	Hawaii, US

### DOMESTIC

2021	<b>Excellence Award</b> , Medical Artificial Intelligence Datathon 2021, Ministry of Science and ICT and National Information Society Agency	Seoul, S.Korea
2021	<b>Excellence Award</b> , Hackathon of Development of AI-based Image Diagnosis using Medical Big Data 2021, Korea Testing Laboratory (KTL)	Seoul, S.Korea
2021	<b>Best Paper Award</b> , Graduate Student Paper Award, Yonsei University	Seoul, S.Korea
2019	<b>Participation Prize</b> , Samsung Humantech Paper Award (first author)	Seoul, S.Korea
2019	<b>1st Rank and Grand Prize</b> , HeLP Challenge 2018, Brain Tumor Segmentation Contest	Seoul, S.Korea
2018	<b>Participation Prize</b> , Samsung Humantech Paper Award (co-author)	Seoul, S.Korea
2017	<b>Grand Prize</b> , Yonsei Junior Convergence Science	Seoul, S.Korea

## Scholarship

2023	<b>ISMRM Trainee Stipend</b> , ISMRM Workshop on Data Sampling and Image Reconstruction	US
2021	<b>Dissertation Fellowship</b> , Graduate Students Idea Incubation Fund, Yonsei University	S.Korea
2021	<b>Academy Research Fellowship</b> , Graduate Students Idea Incubation Fund, Yonsei University	S.Korea
2021	<b>Best Paper Award Scholarship</b> , Graduate Student Paper Award, Yonsei University	S.Korea
2020	<b>ISMRM Trainee Stipend</b> , ISMRM Workshop on Data Sampling and Image Reconstruction	US
2017-2019	<b>ISMRM Educational Stipend</b> , ISMRM	US
2019	<b>Brain Korea 21 Plus Outstanding Student Fellow Scholarship</b> , Korea Research Foundation	S.Korea
2018	<b>Teaching Assistant Scholarship</b> , Yonsei University	S.Korea
2017-2020	<b>Brain Korea 21 Plus Scholarship</b> , Korea Research Foundation	S.Korea
2016	<b>Research Assistant Scholarship</b> , Yonsei University	S.Korea
2012-2015	<b>National Scholarship for Science &amp; Engineering</b> , Korea Student Aid Foundation	S.Korea

## Invited Talk

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### Deep Model-based MR Parameter Mapping Network (DOPAMINE) for Fast MR Reconstruction

Seoul, S.Korea

34TH KSIIIM CONFERENCE, 2020

17. Oct. 2020

- Korean Society of Imaging Informatics in Medicine

### Medical Imaging Research using Artificial Intelligence

Seoul, S.Korea

HUFS AIM LAB, 2020

7. Jan. 2020

- The Catholic University of Korea, Eunpyeong St. Mary's Hospital

## Publications - Preprints

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### COSMOS: Cross-Modality Unsupervised Domain Adaptation for 3D Medical Image Segmentation based on Target-aware Domain Translation and Iterative Self-Training

2022

H SHIN, H KIM, S KIM, Y JUN, T EO, D HWANG

- *arXiv preprint arXiv:2203.16557*

## Publications - Peer-Review Journal

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### Ultrathin crystalline-silicon-based strain gauges with deep learning algorithms for silent speech interfaces

2022

T KIM\*, Y SHIN\*, K KANG\*, K KIM\*, G KIM\*, Y BYEON\*, ..., JR LEE, G SON, T KIM, Y JUN, ..., HG KANG, D HWANG, KJ YU

- *Nature Communications*, 13:5815

### Results of the 2020 fastMRI Challenge for Machine Learning MR Image Reconstruction

2021

MJ MUCKLEY\*, B RIEMENSCHNEIDER\*, ..., Y JUN, H SHIN, D HWANG, ..., FLORIAN KNOLL

- *IEEE Transactions on Medical Imaging*, 40(9):2306-2317

### Deep model-based magnetic resonance parameter mapping network (DOPAMINE) for fast T1 mapping using variable flip angle method

2021

Y JUN, H SHIN, T EO, T KIM, D HWANG

- *Medical Image Analysis*, 70:102017

### Robust performance of deep learning for automatic detection and segmentation of brain metastases using three-dimensional black-blood and three-dimensional gradient echo imaging

2021

YW PARK\*, Y JUN\*, Y LEE, K HAN, C AN, SS AHN, D HWANG, SK LEE

- \*Co-first Authors, *European Radiology*, 31:6686-6695

### The Latest Trends in Attention Mechanisms and Their Application in Medical Imaging

2020

H SHIN, J LEE, T EO, Y JUN, S KIM, D HWANG

- *Journal of the Korean Society of Radiology*, 81(6):1305-1333

### Accelerating Cartesian MRI by domain-transform manifold learning in phase-encoding direction

2020

T EO\*, H SHIN\*, Y JUN, T KIM, D HWANG

- *Medical Image Analysis*, 63:101689

### Parallel imaging in time-of-flight magnetic resonance angiography using deep multistream convolutional neural networks

2019

Y JUN, T EO, H SHIN, T KIM, HJ LEE, D HWANG

- *Magnetic Resonance in Medicine*, 81(6):3840-3853

### Megahertz-wave-transmitting conducting polymer electrode for device-to-device integration

2019

T KIM, G KIM, H KIM, HJ YOON, T KIM, Y JUN, TH SHIN, S KANG, J CHEON, D HWANG, BW MIN, W SHIM

- *Nature Communications*, 10:653

**Deep-learned 3D black-blood imaging using automatic labelling technique and 3D convolutional neural networks for detecting metastatic brain tumors**

2018

Y JUN, T EO, T KIM, H SHIN, D HWANG, SH BAE, YW PARK, HJ LEE, BW CHOI, SS AHN

- *Scientific Reports*, 8:9450

**KIKI-net: cross-domain convolutional neural networks for reconstructing undersampled magnetic resonance images**

2018

T EO, Y JUN, T KIM, J JANG, HJ LEE, D HWANG

- *Magnetic Resonance in Medicine*, 80(5):2188-2201

**High-SNR multiple T2 (\*)-contrast magnetic resonance imaging using a robust denoising method based on tissue characteristics**

2017

T EO, T KIM, Y JUN, H LEE, SS AHN, DH KIM, D HWANG

- *Journal of Magnetic Resonance Imaging*, 45(6):1835-1845

## Publications - Conference Papers

**Evaluation of the Robustness of Learned MR Image Reconstruction to Systematic Deviations Between Training and Test Data for the Models from the fastMRI Challenge**

2021

PM JOHNSON, ..., H SHIN, Y JUN, T EO, S KIM, T KIM, D HWANG, ..., F KNOLL

- *International Workshop on Machine Learning for Medical Image Reconstruction (MLMIR)*, pp. 25-34

**Joint Deep Model-based MR Image and Coil Sensitivity Reconstruction Network (Joint-ICNet) for Fast MRI**

2021

Y JUN, H SHIN, T EO, D HWANG

- *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pp. 5266-5275

**Translation of 1D Inverse Fourier Transform of K-space to an Image Based on Deep Learning for Accelerating Magnetic Resonance Imaging**

2018

T EO, H SHIN, T KIM, Y JUN, D HWANG

- *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, pp. 241-249

## Publications - Conference Abstracts

**Deep Subspace Reconstruction with Zero-Shot Learning for Multiparametric Quantitative MRI**

2023

Y JUN, Y AREFEEN, J CHO, X WANG, M GEE, B GAGOSKI, B BILGIC

- [**\*Oral Presentation**] *International Society for Magnetic Resonance in Medicine (ISMRM) Workshop on Data Sampling and Image Reconstruction*

**Improved T1 and T2 mapping in 3D-QALAS using temporal subspaces and flip angle optimization enabled by auto-differentiation**

2023

Y AREFEEN, B GAGOSKI, Y JUN, B BILGIC, E ADALSTEINSSON

- *International Society for Magnetic Resonance in Medicine (ISMRM) Workshop on Data Sampling and Image Reconstruction*

**Model-Based Phase-Difference Reconstruction for Accelerated Phase-Based T2 Mapping**

2023

X WANG, J CHO, Y JUN, B GAGOSKI, B BILGIC

- *International Society for Magnetic Resonance in Medicine (ISMRM) Workshop on Data Sampling and Image Reconstruction*

**VUDU-SAGE: Efficient T2 and T2\* Mapping using Joint Reconstruction for Motion-Robust, Distortion-Free, Multi-Shot, Multi-Echo EPI**

2023

J CHO, TH KIM, AJL BERMAN, Y JUN, X WANG, B GAGOSKI, B BILGIC

- *International Society for Magnetic Resonance in Medicine (ISMRM) Workshop on Data Sampling and Image Reconstruction*

**Interpretable Meningioma Grading and Segmentation with Multiparametric Deep Learning**

2022

Y JUN\*, YW PARK\*, H SHIN, Y SHIN, JR LEE, K HAN, SM LIM, SK LEE, SS AHN, D HWANG

- *International Society for Magnetic Resonance in Medicine (ISMRM)*, pp. 3064

<b>Joint Generation of Multi-contrast Magnetic Resonance Images and Segmentation Map Using StyleGAN2-based Generative Network</b> G SON, T EO, <u>Y JUN</u> , H SHIN, D HWANG • [ <b>*Oral Presentation</b> ], <i>International Society for Magnetic Resonance in Medicine (ISMRM)</i> , pp. 0102	2022
<b>Arbitrary Missing Contrast Generation Using Multi-Contrast Generative Network with An Encoder Network</b> G SON, <u>Y JUN</u> , S KIM, D HWANG, T EO • <i>International Society for Magnetic Resonance in Medicine (ISMRM)</i> , pp. 4308	2022
<b>Deep residual network with data consistency for subsampled Fourier ptychographic microscopy</b> HG KIM, KW KIM, KC LEE, TJ EO, K LEE, <u>Y JUN</u> , SA LEE, D HWANG • <i>Quantitative Phase Imaging VIII</i> , p. PC119700B. SPIE	2022
<b>Deep Learning-based Automatic Detection and Segmentation of Brain Metastases Using Multi-Task Learning with 3D Black-Blood and GRE Imaging</b> <u>Y JUN</u> *, YW PARK*, Y LEE, K HAN, C AN, SK LEE, SS AHN, D HWANG • [ <b>*Oral Presentation</b> ] <i>International Society for Magnetic Resonance in Medicine (ISMRM)</i> , pp. 0662	2021
<b>Joint Reconstruction of MR Image and Coil Sensitivity Maps using Deep Model-based Network</b> <u>Y JUN</u> , H SHIN, T EO, D HWANG • [ <b>*Oral Presentation</b> ] <i>International Society for Magnetic Resonance in Medicine (ISMRM)</i> , pp. 0206	2021
<b>Results of the 2020 fastMRI Brain Reconstruction Challenge</b> B RIEMENSCHNEIDER, ..., <u>Y JUN</u> , H SHIN, D HWANG, F KNOLL • [ <b>*Oral Presentation</b> ] <i>International Society for Magnetic Resonance in Medicine (ISMRM)</i> , pp. 0063	2021
<b>Deep Model-based MR Parameter Mapping Network (DOPAMINE) for Fast MR Reconstruction</b> <u>Y JUN</u> , H SHIN, T EO, T KIM, D HWANG • [ <b>*Oral Presentation</b> ] <i>International Society for Magnetic Resonance in Medicine (ISMRM)</i> , pp. 0988	2020
<b>Deep Model-based Network for Fast MR Parameter Map Reconstruction</b> <u>Y JUN</u> , H SHIN, T EO, T KIM, D HWANG • <i>International Society for Magnetic Resonance in Medicine (ISMRM) Workshop on Data Sampling and Image Reconstruction</i>	2020
<b>Parallel Imaging in Time-of-Flight Magnetic Resonance Angiography Using Deep Multi-Stream Convolutional Neural Networks</b> <u>Y JUN</u> , T EO, H SHIN, T KIM, H LEE, D HWANG • <i>International Society for Magnetic Resonance in Medicine (ISMRM)</i> , pp. 4659	2019
<b>Parallel Imaging based on k-x Domain Interpolation using Deep Neural Networks</b> H SHIN, T EO, <u>Y JUN</u> , T KIM, H LEE, D HWANG • <i>International Society for Magnetic Resonance in Medicine (ISMRM)</i> , pp. 4660	2019
<b>Deep-learned 3D black-blood imaging using automatic labeling technique and 3D convolutional neural networks for detection of metastatic brain tumors</b> <u>Y JUN</u> , T EO, T KIM, H SHIN, D HWANG, S BAE, Y PARK, H LEE, B CHOI, S AHN • <i>International Society for Magnetic Resonance in Medicine (ISMRM)</i> , pp. 4857	2018
<b>Brain Vessel Extraction without MRA / V using Deep Convolutional Neural Network</b> H SHIN, <u>Y JUN</u> , T KIM, T EO, S AHN, D HWANG • <i>International Society for Magnetic Resonance in Medicine (ISMRM)</i> , pp. 3171	2018
<b>Automatic Selection of Optimal Regularization Parameters in Compressed Sensing using No Reference Magnetic Resonance Image Quality Assessment</b> K BANG, J JANG, <u>Y JUN</u> , H JANG, H LEE, D HWANG • <i>International Society for Magnetic Resonance in Medicine (ISMRM)</i> , pp. 2816	2018
<b>Deep Sinogram Learning for Radial MRI: Comparison with k-space and Image Learning</b> T KIM, T EO, D PARK, <u>Y JUN</u> , D HWANG • <i>International Society for Magnetic Resonance in Medicine (ISMRM)</i> , pp. 2799	2018

## Reconstruction of brain vessel signals from undersampled time-of-flight magnetic resonance angiography using deep learning

2018

Y JUN, T EO, H SHIN, T KIM, HJ LEE, H JANG, D HWANG

- The 21th Annual Meeting of the the Korean Society for Brain and Neural Sciences (KSBNS), pp. 1097

## Deep Convolutional Neural Network for Acceleration of Magnetic Resonance Angiography (MRA)

2017

Y JUN, T EO, T KIM, J JANG, D HWANG

- [\*Oral Presentation] International Society for Magnetic Resonance in Medicine (ISMRM), pp. 0686

## Cascaded convolutional neural network (CNN) for reconstruction of undersampled magnetic resonance (MR) images

2017

T EO, Y JUN, T KIM, J JANG, D HWANG

- International Society for Magnetic Resonance in Medicine (ISMRM) pp. 3974

## Patents

2022	Method And Device For Correcting Medical Image Using Phantom, Registered, 10-2481027	S.Korea
2022	Apparatus And Method For Reconstructing MR Parameter Map, Registered, 10-2352004	S.Korea
2021	Device And Method For Reconstructing Magnetic Resonance Image Thereof, Registered, 10-2233996	S.Korea
2021	Makeup evaluation system and operation method thereof, Registered, US11113511B2	US
2020	Make-up Evaluation System and Operating Method Thereof, Registered, 10-2066892	S.Korea
2019	Makeup evaluation system and operation method thereof, Applied, EP3579176A1	Europe
2019	Capacitive Pressure Sensor And Method Of The Same, Applied, 10-2019-0145371	S.Korea
2018	Learning Apparatus and Method for Generating Encephaloma Discriminative Image, Apparatus and Method for Generating Encephaloma Discriminative Image, and Recording Medium thereof, Registered, 10-1928213	S.Korea
2018	Device and Method for Reconstructing Undersampled Magnetic Resonance Image, Registered, 10-1886575	S.Korea

## Skills

Programming Languages	Python, Matlab, Pytorch, Tensorflow/Keras, C/C++ Korean, English
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## Activities

Reviewer	<ul style="list-style-type: none"><li>• IEEE Transactions on Medical Imaging (IEEE TMI)</li><li>• IEEE Sensors Letters</li><li>• Magnetic Resonance in Medicine</li><li>• International Society for Magnetic Resonance in Medicine (ISMRM 2022-2023)</li><li>• International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2020-2022)</li></ul>
Poster Facilitator	<ul style="list-style-type: none"><li>• International Society for Magnetic Resonance in Medicine (ISMRM 2021)</li></ul>
Membership	<ul style="list-style-type: none"><li>• Trainee Member of International Society for Magnetic Resonance in Medicine (ISMRM)</li><li>• Quantitative MR</li><li>• Pediatric MR</li></ul>
ISMRM Study Groups	<ul style="list-style-type: none"><li>• High Field Systems and Applications</li><li>• MR of Cancer</li><li>• MR Engineering</li></ul>

## References

Available upon request