

#### 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

Seoul, S.Korea

Mar. 2016 - Feb. 2022

Ph.D. in Electrical & Electronic Engineering

• 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 Seoul, S.Korea

B.S. IN ELECTRICAL & ELECTRONIC ENGINEERING

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

Mar. 2022 - Now

(MGH), HARVARD MEDICAL SCHOOL (HMS), ADVISOR: PROF. BERKIN BILGIC, PROF. MICHAEL GEE · Accelerating Quantitative MRI

- 1. Subspace Reconstruction for Multiparametric Mapping:
  - Developed a zero-shot deep subspace reconstruction network (**Zero-DeepSub**) for fast multiparametric quantiative 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** Seoul, S.Korea

DFI Project Intern

INTERNSHIP

Oct. 2017 - Dec. 2017

#### **Philips Korea & Gyrotools**

Seoul, S.Korea

Course Certificate

Sep. 25-30. 2017

• Philips Pulse Programming Course

**Teaching Experience Yonsei University** Seoul, S.Korea GUEST LECTURER, TEACHING ASSISTANT 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 Sep. 2020 - Dec. 2020 · Medical Artificial Intelligence - Presented a lecture on principles of MRI and reconstruction methods for fast MRI 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 1st Rank, Cross-Modality Domain Adaptation for Medical Image Segmentation (crossMoDA-2021 challenge) Virtual Conference 2021 ISMRM Magna Cum Laude (1), The ISMRM 29th Annual Meeting Virtual Conference ISMRM Magna Cum Laude (2), The ISMRM 29th Annual Meeting Virtual Conference 2021 3rd Rank, fastMRI Challenge 2020, Facebook AI Research & NYU Langone Health Virtual Conference 2020 2020 ISMRM Summa Cum Laude, The ISMRM 28th Annual Meeting Virtual Conference ISMRM The Poster Award of 2nd Place (Silver), 2020 ISMRM Workshop on Data Sampling & Image 2020 Sedona, US 4th Rank, fastMRI Challenge 2019, Facebook AI Research & NYU Langone Health 2019 Vancouver, Canada ISMRM Summa Cum Laude, The ISMRM 25th Annual Meeting 2017 Hawaii, US DOMESTIC Excellence Award, Medical Artificial Intelligence Datathon 2021, Ministry of Science and ICT and National 2021 Seoul, S.Korea Information Society Agency Excellence Award, Hackathon of Development of Al-based Image Diagnosis using Medical Big Data 2021, 2021 Seoul, S.Korea Korea Testing Laboratory (KTL) Best Paper Award, Graduate Student Paper Award, Yonsei University 2021 Seoul, S.Korea 2019 Participation Prize, Samsung Humantech Paper Award (first author) Seoul, S.Korea 1st Rank and Grand Prize, HeLP Challenge 2018, Brain Tumor Segmentation Contest 2019 Seoul, S.Korea Participation Prize, Samsung Humantech Paper Award (co-author) Seoul, S.Korea 2018 Grand Prize, Yonsei Junior Convergence Science 2017 Seoul, S.Korea Scholarship \_\_\_\_\_

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

Invited Talk	
Deep Model-based MR Parameter Mapping Network (DOPAMINE) for Fast MR Reconstruction	Seoul, S.Korea
<ul> <li>KSIIM Conference, 2020</li> <li>Korean Society of Imaging Informatics in Medicine</li> </ul>	17. Oct. 2020
Medical Imaging Research using Artificial Intelligence HUFS AIM LAB, 2020  • The Catholic University of Korea, Eunpyeong St. Mary's Hospital	Seoul, S.Korea 7. Jan. 2020
Publications - Preprints	
SSL-QALAS: Self-Supervised Learning for Rapid Multiparameter Estimation in Quantitative MRI Using 3D-QALAS  Y Jun, J Cho, X Wang, M Gee, PE Grant, B BILGIC, B GAGOSKI  • arXiv preprint arXiv:2302.14240	2023
COSMOS: Cross-Modality Unsupervised Domain Adaptation for 3D Medical Image Segmentation based on Target-aware Domain Translation and Iterative Self-Training H Shin, H Kim, S Kim, Y Jun, T Eo, D Hwang  • arXiv preprint arXiv:2203.16557	2022
Self-Training Based Unsupervised Cross-Modality Domain Adaptation for Vestibular Schwannoma and Cochlea Segmentation  H Shin, H Kim, S Kim, Y Jun, T Eo, D Hwang  • arXiv preprint arXiv:2109.10674	2021
Results of the 2020 fastMRI Challenge for Machine Learning MR Image Reconstruction  MJ Muckley, B Riemenschneider,, Y Jun, H Shin, D Hwang,, Florian Knoll  • arXiv preprint arXiv:2012.06318	2020
Publications - Peer-Review Journal	
Intelligent Noninvasive Meningioma Grading with a Fully Automatic Segmentation using Interpretable Multiparametric Deep Learning  Y Jun*, YW PARK*, H SHIN*, Y SHIN, JR LEE, K HAN, SS AHN, SM LIM, D HWANG, SK LEE  ***Co-first Authors, European Radiology (In press)	2023
Ultrathin crystalline-silicon-based strain gauges with deep learning algorithms for silent speech interfaces  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	2022
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

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

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

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

2021

2021

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*, <b>Y Jun</b> , 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, <b>Y Jun</b> , 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	2017
method based on tissue characteristics	2017
T Eo, T Kim, <b>Y Jun</b> , H Lee, SS Ahn, DH Kim, D Hwang	
• Journal of Magnetic Resonance Imaging, 45(6):1835-1845	
Publications - Conference Papers	
SDC LIDA. Valumatric Uncurrenticed Demain Adoptation Francourant for Slice Direction	
SDC-UDA: Volumetric Unsupervised Domain Adaptation Framework for Slice-Direction Continuous Cross-Modality Medical Image Segmentation	2023
H Shin, H Kim, S Kim, Y Jun, T Eo, D Hwang	
IEEE Conference on Computer Vision and Pattern Recognition (CVPR) (Accepted)	
Evaluation of the Robustness of Learned MR Image Reconstruction to Systematic	2021
Deviations Between Training and Test Data for the Models from the fastMRI Challenge	
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	2021
(Joint-ICNet) for Fast MRI	
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	2018
Learning for Accelerating Magnetic Resonance Imaging	
T Eo, H Shin, T Kim, Y Jun, D Hwang	
<ul> <li>International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI), pp. 241-249</li> </ul>	

Publications - Conference Abstracts	
Zero-DeepSub: Zero-Shot Deep Subspace Reconstruction for Multiparametric Quantitative MRI Using QALAS	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) (Accepted)	
SSL-QALAS: Self-Supervised Learning for Multiparametric Quantitative MRI Using QALAS  Y Jun, J Cho, X Wang, M Gee, PE Grant, B BILGIC, B GAGOSKI  International Society for Magnetic Resonance in Medicine (ISMRM) (Accepted)	2023
Improved T1 and T2 mapping in 3D-QALAS using temporal subspaces and Cramer-Rao-bound flip angle optimization enabled by auto-differentiation  Y AREFEEN, Y Jun, B GAGOSKI, B BILGIC, E ADALSTEINSSON  • [*Oral Presentation] International Society for Magnetic Resonance in Medicine (ISMRM) (Accepted)	2023
Self-Supervised Deep Learning Reconstruction for Highly Accelerated Diffusion Imaging  A VURANKAYA, Y Jun, J CHO, B BILGIC  • [*Oral Presentation] International Society for Magnetic Resonance in Medicine (ISMRM) (Accepted)	2023
Model-based phase-difference reconstruction for accelerated phase-based T2 mapping  X Wang, J Cho, Y Jun, B Gagoski, B Bilgic  International Society for Magnetic Resonance in Medicine (ISMRM) (Accepted)	2023
VUDU-SAGE: Efficient T2 and T2* Mapping using Joint Reconstruction for Motion-Robust, Distortion-Free, Multi-Shot, Multi-Echo EPI J CHO, TH KIM, AJL BERMAN, Y JUN, X WANG, B GAGOSKI, B BILGIC	2023
<ul> <li>International Society for Magnetic Resonance in Medicine (ISMRM) (Accepted)</li> <li>Deep Subspace Reconstruction with Zero-Shot Learning for Multiparametric Quantitative</li> <li>MRI</li> <li>Y Jun, Y Arefeen, J Cho, X Wang, M Gee, B Gagoski, B Bilgic</li> </ul>	2023
$\bullet \ \ [\textbf{*Oral Presentation}] \ International Society for Magnetic Resonance in Medicine (ISMRM) Workshop on Data Sampling and Image Reconstruction (ISMRM) and I$	onstruction
Improved T1 and T2 mapping in 3D-QALAS using temporal subspaces and flip angle optimization enabled by auto-differentiation  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	2023
Model-Based Phase-Difference Reconstruction for Accelerated Phase-Based T2 Mapping  X Wang, J Cho, <u>Y Jun</u> , B Gagoski, B Bilgic  International Society for Magnetic Resonance in Medicine (ISMRM) Workshop on Data Sampling and Image Reconstruction	2023
VUDU-SAGE: Efficient T2 and T2* Mapping using Joint Reconstruction for Motion-Robust,  Distortion-Free, Multi-Shot, Multi-Echo EPI  J Cho, TH Kim, AJL Berman, Y Jun, X Wang, B Gagoski, B Bilgic	2023
<ul> <li>International Society for Magnetic Resonance in Medicine (ISMRM) Workshop on Data Sampling and Image Reconstruction</li> <li>Interpretable Meningioma Grading and Segmentation with Multiparametric Deep</li> </ul>	
Learning  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	2022
Joint Generation of Multi-contrast Magnetic Resonance Images and Segmentation Map Using StyleGAN2-based Generative Network G Son, T Eo, Y Jun, H Shin, D Hwang	2022

Arbitrary Missing Contrast Generation Using Multi-Contrast Generative Network with An

• [\*Oral Presentation], International Society for Magnetic Resonance in Medicine (ISMRM), pp. 0102

**Encoder Network** 

G Son, Y Jun, S Kim, D Hwang, T Eo

• International Society for Magnetic Resonance in Medicine (ISMRM), pp. 4308

2022

Deep residual network with data consistency for subsampled Fourier ptychographic microscopy  HG KIM, KW KIM, KC LEE, TJ EO, K LEE, Y JUN, SA LEE, D HWANG  • Quantitative Phase Imaging VIII, p. PC119700B. SPIE	2022
Deep Learning-based Automatic Detection and Segmentation of Brain Metastases Using Multi-Task Learning with 3D Black-Blood and GRE Imaging  Y Jun*, YW PARK*, Y LEE, K HAN, C AN, SK LEE, SS AHN, D HWANG  • [*Oral Presentation] International Society for Magnetic Resonance in Medicine (ISMRM), pp. 0662	2021
Joint Reconstruction of MR Image and Coil Sensitivity Maps using Deep Model-based Network Y Jun, H Shin, T Eo, D Hwang	2021
• [*Oral Presentation] International Society for Magnetic Resonance in Medicine (ISMRM), pp. 0206  Results of the 2020 fastMRI Brain Reconstruction Challenge  B RIEMENSCHNEIDER,, Y JUN, H SHIN, D HWANG, F KNOLL	2021
• [*Oral Presentation] International Society for Magnetic Resonance in Medicine (ISMRM), pp. 0063  Deep Model-based MR Parameter Mapping Network (DOPAMINE) for Fast MR  Reconstruction	2020
• [*Oral Presentation] International Society for Magnetic Resonance in Medicine (ISMRM), pp. 0988  Deep Model-based Network for Fast MR Parameter Map Reconstruction	2020
Y Jun, H Shin, T Eo, T Kim, D Hwang  • International Society for Magnetic Resonance in Medicine (ISMRM) Workshop on Data Sampling and Image Reconstruction  Parallel Imaging in Time-of-Flight Magnetic Resonance Angiography Using Deep	2010
Multi-Stream Convolutional Neural Networks  Y Jun, T Eo, H Shin, T Kim, H Lee, D Hwang  • International Society for Magnetic Resonance in Medicine (ISMRM), pp. 4659	2019
Parallel Imaging based on k-x Domain Interpolation using Deep Neural Networks  H Shin, T Eo, Y Jun, T Kim, H Lee, D Hwang  • International Society for Magnetic Resonance in Medicine (ISMRM), pp. 4660	2019
Deep-learned 3D black-blood imaging using automatic labeling technique and 3D convolutional neural networks for detection of metastatic brain tumors  Y Jun, T Eo, T Kim, H Shin, D Hwang, S Bae, Y Park, H Lee, B Choi, S Ahn  International Society for Magnetic Resonance in Medicine (ISMRM), pp. 4857	2018
Brain Vessel Extraction without MRA / V using Deep Convolutional Neural Network H Shin, Y Jun, T Kim, T Eo, S Ahn, D Hwang  • International Society for Magnetic Resonance in Medicine (ISMRM), pp. 3171	2018
Automatic Selection of Optimal Regularization Parameters in Compressed Sensing using No Reference Magnetic Resonance Image Quality Assessment K Bang, J Jang, Y Jun, H Jang, H Lee, D Hwang  • International Society for Magnetic Resonance in Medicine (ISMRM), pp. 2816	2018
Deep Sinogram Learning for Radial MRI: Comparison with k-space and Image Learning T KIM, T Eo, D PARK, Y Jun, D HWANG  • International Society for Magnetic Resonance in Medicine (ISMRM), pp. 2799	2018
Reconstruction of brain vessel signals from undersampled time-of-flight magnetic resonance angiography using deep learning  Y Jun, T EO, H SHIN, T KIM, HJ LEE, H JANG, D HWANG	2018
<ul> <li>The 21th Annual Meeting of the the Korean Society for Brain and Neural Sciences (KSBNS), pp. 1097</li> <li>Deep Convolutional Neural Network for Acceleration of Magnetic Resonance Angiography (MRA)</li> <li>Y Jun, T EO, T KIM, J JANG, D HWANG</li> </ul>	2017
• [*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
	Learning Apparatus and Method for Generating Encephaloma Discriminative Image, Apparatus and	
2018	Method for Generating Encephaloma Discriminative Image, and Recording Medium thereof, Registered,	S.Korea
	10-1928213	
2018	Device and Method for Reconstructing Undersampled Magnetic Resonance Image, Registered,	S Korea
	10-1886575	s.noreu

### Skills\_

**Programming** Python, Matlab, Pytorch, Tensorflow/Keras, C/C++

**Languages** Korean, English

## Activities

- IEEE Transactions on Medical Imaging (IEEE TMI)
- IEEE Sensors Letters
- **Reviewer** Magnetic Resonance in Medicine
  - International Society for Magnetic Resonance in Medicine (ISMRM 2022-2023)
  - International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2020-2022)

- Poster Facilitator International Society for Magnetic Resonance in Medicine (ISMRM 2021)
  - **Membership** Trainee Memmber of International Society for Magnetic Resonance in Medicine (ISMRM)
    - Quantitative MR
    - Pediatric MR
- **ISMRM Study Groups** High Field Systems and Applications
  - MR of Cancer
  - · MR Engineering

### References \_\_\_

#### Available upon request