Rushdi Zahid Rusho

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Objective

To work in an energetic environment where I can leverage my various skills in AI, signal/image processing, inverse problem, biomedical engineering, and contribute towards developing next generation medical imaging systems.

Research Interests

Magnetic Resonance Imaging (MRI) Reconstruction, Computational Imaging, Dynamic Imaging, Model-based reconstruction, Inverse Problems, Machine Learning, Deep Learning, Image processing.

Education

The University of Iowa — Iowa City, IA
Ph.D. in Biomedical Engineering, CGPA 4.00/4.00 — *2019 – August 2024*

The University of Dhaka — Dhaka, Bangladesh
M.S. in Biomedical Physics and Technology, CGPA 3.88/4.00 — *2015 – 2017*

Khulna University of Engineering and Technology — Khulna, Bangladesh
B.S. in Electrical and Electronic Engineering, CGPA 3.89/4.00 — *2010 – 2014*

Research Experience

Graduate Fellow, Lung Imaging Training Program (NIH T32 Grant HL 144461) — Sep. 2023 – Present
Roy J. Carver Dept. of Biomedical Engineering, The University of Iowa — *Iowa City, IA*

- Research Advisor: Dr. Sajan Goud Lingala, Assistant Professor, Dept of BME & Radiology, The University of Iowa
- Working on novel reconstruction techniques for rapid dynamic MRI of larynx

Graduate Research Assistant, Dept. of Radiology — Aug. 2019 – Aug. 2023
Laboratory of Quantitative and Dynamic Magnetic Resonance Imaging, The University of Iowa — *Iowa City, IA*

- Research Advisor: Dr. Sajan Goud Lingala, Assistant Professor, Dept of BME & Radiology, The University of Iowa
- Worked on novel reconstruction techniques for rapid dynamic MRI of upper airway
- Leveraged advances in spiral imaging, and custom coil based parallel imaging
- Developed new data-driven reconstruction constraints to model arbitrary speech dynamics (e.g., manifold learning, deep generative models)

Internship Experience

Research Scientist Intern, MRI — May 2023 – Aug. 2023
Canon Medical Research USA, Inc. — *Cleveland, OH*

- Mentor: Hassan Haji-Valizadeh, Senior Research Scientist at Canon Medical Research USA, Inc.
- Worked on novel deep learning based MRI coil compression techniques

Employment History

Assistant Professor, Dept. of Biomedical Engineering — May 2018 – July 2019
Khulna University of Engineering and Technology — *Khulna, Bangladesh*

Lecturer, Dept. of Biomedical Engineering — Feb. 2017 – May 2018
Khulna University of Engineering and Technology — *Khulna, Bangladesh*

Lecturer, Dept. of Electrical and Electronic Engineering — Oct. 2015 – Feb. 2017
Bangladesh University of Business and Technology — *Dhaka, Bangladesh*

Personal Information

US work authorization: Authorized to work in USA
Legal status: Permanent Resident of the United States

Skills

Programming Languages: Python, MATLAB
Deep Learning Frameworks: PyTorch, TensorFlow, Keras
Medical Software: 3D Slicer, Horos
Simulation and Design Tools: NI Multisim, Proteus, COMSOL MPH
Operating Systems: Windows, Linux, macOS
Languages: English (fluent), Bengali (native)
Others: MS office, LaTeX

Relevant Graduate Level Courses at The University of Iowa

Medical Imaging Physics, Digital Image Processing, Scientific Computing & Machine Learning, Deep Learning, Machine Learning, Principles of Magnetic Resonance Imaging, Applied Machine Learning, Advanced Data Analytics and Informatics.

Relevant Course Projects at The University of Iowa

Spring 2021: Contrast modality transfer by learning a bidirectional mapping between T1 and T2 weighted upper airway MR images using Cycle-GAN. (Course: ECE 5995 Applied Machine Learning)

- Curated open source multi-speaker speech MR dataset from USC and selected 280+ T1 weighted and 110+ T2 weighted images
- Applied Cycle-GAN architecture and tuned hyper-parameters of the network to achieve the desired modality transfer

Spring 2020: Upper airway MR Image Reconstruction using Convolutional Neural Networks. (Course: ISE 6380 Deep learning)

- Collected 500+ speech MR images from MR Scanner, and created training, test and validation pairs of dataset
- Applied a deep cascade of convolutional neural network architecture to recover fully-sampled images from corresponding undersampled zero-filled reconstructed images

Awards and Honors

- National Institutes of Health Predoctoral Training Grant T32 HL 144461, Pl's Eric A. Hoffman and Joseph M. Reinhardt
- Recipient of GPSG and GSS travel grant, The University of Iowa 2024, 2023
- Recipient of an ISMRM 2021 summa cum laude merit award
- Recipient of Trainee (Educational) Stipend for annual meeting of ISMRM 2024, 2023 & 2021
- Full tuition scholarship during Ph.D. program at the University of Iowa
- Recipient of Dean's merit list award during undergraduate study

Publications (Google Scholar)

Book Chapter
Published

1. S. G. Lingala, **R. Z. Rusho**,"Effects of motion in sparsely sampled acquisitions," in *Motion correction in MR: Correction of Position, Motion and Dynamic Field Changes*, Vol 6, Elsevier, 2022, ISBN: 978-0-12-824460-9 (edited by Andre J. W. van der Kouwe and Jalal B. Andre).

Journals (IF: Impact factor)
Published

1. **R. Z. Rusho**, A. H. Ahmed, S. Kruger, W. Alam, D. Meyer, B. Story, M. Jacob, S. G. Lingala, *"Prospectively accelerated dynamic speech magnetic resonance imaging at 3 T using a self-navigated spiral-based manifold regularized scheme,"* NMR in Biomedicine.2024; e5132. (IF: 2.9)
2. W. Alam, S. Reineke, M. R. Viswanath, **R. Z. Rusho**, D. V. Daele, D. Meyer, J. Liu, S. G. Lingala, *"A flexible 16 channel custom coil array for accelerated upper and infra glottic airway MRI at 3 Tesla,"* Magnetic Resonance in Medicine (MRM), 2022. (IF: 3.3)
3. D. Meyer, **R. Z. Rusho**, W. Alam, G.E. Christensen, D.M. Howard, J. Atha, E.A. Hoffman, B. Story, I.R. Titze, S.G. Lingala,*" High-resolution three-dimensional hybrid MRI + low dose CT vocal tract modeling: A cadaveric pilot study,"* Journal of Voice, 2022, ISSN 0892-1997. (IF: 2.3)

4. M. Asaduzzaman, T. Solaiman, **R. Z. Rusho**, M. S. Alam, and M. A. Hossain, *"Combined FIM-PHI-Based Wearable Biosensor,"* in IEEE Sensors Journal, vol. 21, no. 2, pp. 2176-2183, 15 Jan.15, 2021. (IF: 3.073)

Conference Proceedings/ Abstracts

Accepted

1. **R. Z. Rusho**, M. R. Hoffman, C. S. Apfelbach, W. Alam, H. Oya, M. A. Howard, D. Meyer, M. Jacob, S. G. Lingala, *"Characterizing laryngeal dynamics during voicing and breathing with real-time multi-slice variational manifold learning,"* accepted to annual meeting of ISMRM, May 2024, Singapore.

Published

1. **R. Z. Rusho**, B. H. Story, D. Meyer, M. Jacob, and S. G. Lingala, *"Synthesizing speech through a tube talker model informed by dynamic MRI-derived vocal tract area functions,"* (oral presentation), annual meeting of ISMRM, June 2023, Toronto, Canada. **"Selected as one of 100 abstracts to be displayed in AMPC selection area at ISMRM 2023 annual meeting"**
2. **R. Z. Rusho**, B. H. Story, D. Meyer, M. Jacob, and S. G. Lingala, *"Towards High Spatio-Temporal Resolution Pseudo-3D Dynamic Imaging of Vocal Tract Shaping During Speech Production,"* ISMRM Workshop on Data Sampling & Image Reconstruction in Sedona, AZ, USA, Jan 2023.
3. W. Alam*, **R. Z. Rusho***, J. Liu, D. V. Daele, M. Jacob, and S. G. Lingala, *"Accelerated Imaging of Airway Collapse in Obstructive Sleep Apnea with Variable Density Spirals & Variational Manifold Learning,"* ISMRM Workshop on Data Sampling & Image Reconstruction in Sedona, AZ, USA, Jan 2023. **equal contribution*
4. **R. Z. Rusho**, Q. Zou, W. Alam, S. Erattakulangara, M. Jacob, S. G. Lingala, *"Accelerated pseudo 3D dynamic speech MR imaging at 3T using unsupervised deep variational manifold learning,"* In Medical Image Computing and Computer Assisted Intervention–MICCAI 2022: 25th International Conference, Singapore, September 18–22, 2022, Proceedings, Part VI, pp. 697-706. 2022.
5. **R. Z. Rusho**, Q. Zou, M. Jacob, S.G. Lingala, *"Joint recovery of time aligned multi-slice dynamic speech MR images from under-sampled data using a deep generative manifold model,"* (digital poster presentation), annual meeting of ISMRM, May 2022.
6. **R. Z. Rusho**, W. Alam, A. Ahmed, S. Kruger, M. Jacob, S. G. Lingala, *"Rapid dynamic speech imaging at 3Tesla using combination of a custom airway coil, variable density spirals and manifold regularization,"* (oral presentation), annual meeting of ISMRM, May 2021. **"Recipient of an ISMRM summa cum laude merit award"**
7. W. Alam, **R. Z. Rusho**, S. Reineke, M. Raja, S. Kruger, J.M. Reinhardt, J. Liu, D.V.Daele, S.G. Lingala, *"A novel 16 channel flexible coil for highly accelerated upper-airway MRI"* (digital poster presentation), annual meeting of ISMRM, May 2021.
8. M. R. Islam, **R. Z. Rusho** and S. M. R. Islam, *"Design and Implementation of Low Cost Smart Syringe Pump for Telemedicine and Healthcare,"* 2019 Int'l Conference on Robotics,Electrical and Signal Processing Techniques (ICREST), 2019, pp. 440-444, doi: 10.1109/ICREST.2019.8644373.
9. **R. Z. Rusho** and M. A. Kadir, *"Subcutaneous vein detection using pigeon hole imaging: Simulation study,"* 2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC), 2017, pp. 363-366, doi: 10.1109/R10-HTC.2017.8288975.
10. **R. Z. Rusho** and M. A. Kadir, *"Reconstruction algorithm for Pigeon Hole Imaging (PHI),"* 2017 3rd Int'l Conference on Electrical Information and Communication Technology (EICT), 2017, pp. 1-6, doi: 10.1109/EICT.2017.8275137.
11. M. K. Hasan, **R. Z. Rusho**, T. M. Hossain, T. K. Ghosh and M. Ahmad, *"Design and simulation of cost effective wireless EEG acquisition system for patient monitoring,"* 2014 International Conference on Informatics, Electronics & Vision (ICIEV), Dhaka, 2014, pp. 1-5.
12. M. K. Hasan, **R. Z. Rusho** and M. Ahmad, *"A direct noninvasive brain interface with computer based on steady-state visual-evoked potential (SSVEP) with high transfer rates,"* 2013 2nd International Conference on Advances in Electrical Engineering (ICAEE), 2013, pp. 341-346, doi: 10.1109/ICAEE.2013.6750360.

Professional References

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