Evan Cummings

cumminge@med.umich.edu

Education

B.S. Biomedical Engineering, Devices and Instrumentation Track — Cumulative GPA: 3.816
Case Western Reserve University, Cleveland, Ohio — Graduated: May 2019

M.S. Biomedical Engineering, Imaging and Ultrasonics Track — Cumulative GPA: 3.841
University of Michigan, Ann Arbor, Michigan — Graduated: May 2021

Ph.D. Biomedical Engineering, Imaging and Ultrasonics Track — Cumulative GPA: 3.902
University of Michigan, Ann Arbor, Michigan — Expected Graduation: May 2024

Research Experience

Seiberlich Lab — March 2017-Present

Rosette MR Fingerprinting for T1, T2, T2*, and Fat Fraction (January 2020-Present)

- Developed a reconstruction pipeline for Rosette MRF data to simultaneously estimate T1, T2, T2*, and fat fraction maps based on a single-breathhold sequence to improve non-invasive quantitative assessment of conditions such as NAFLD and iron overload
- Optimized acquisition and reconstruction techniques for cardiac and low-field liver applications
- Investigated iterative and deep learning-based techniques to improve reconstruction quality
- Results presented at ISMRM Annual Meeting (2021, virtual and 2022, London), Low-Field Workshop (2022, virtual), Acquisition and Reconstruction Workshop (2021, virtual), and RSNA Annual Meeting (2023, Chicago)

MR Fingerprinting Development Kit

- Worked with the Siemens pre-clinical team to implement 3D prostate and free-running cardiac MRF sequences in the MRFDK framework
- Provided feedback to the development team for future research projects

Multipoint Reconstruction for Radial GRAPPA (May-December 2017)

- Worked with the through-time radial GRAPPA reconstruction algorithm to improve the speed and memory requirements for reconstructing highly undersampled data, allowing clinicians to have more freedom to switch slice positions and orientations during a real-time scan or interventional procedure
- Findings presented at the Annual Meetings of ISMRM (2018, Paris) and BMES (2017, Phoenix), and published in MRM (2022)

Additional Projects

- Deep Learning Free-breathing MRF Navigator (September 2018-December 2019)
- Deep Learning Reconstruction of Non-Cartesian Cine Data (May-August 2019)
- GRAPPA Weight Interpolation Across Slices (January-April 2018)

Publications

Ahad J, Cummings E, Franson D, Hamilton J, Seiberlich N. Optimization of through-time radial GRAPPA with coil compression and weight sharing. *Magn Reson Med* 88:1244-1254 (2022)

Cummings E, MacDonald JA, Seiberlich N (2021). Parallel Imaging. In Prieto C, Doneya M, Akacaya C, *MRI Reconstruction: Theory, Methods, and Applications.* Elsevier.

Conference Abstracts

Cummings E, Cruz G, Liu Y, Jiang Y, Hamilton J, Seiberlich N. Simultaneous Single-breathhold Cardiac T1, T2, T2*, and PDFF Mapping with Rosette MR Fingerprinting. *Proceedings of Radiological Society of North America Annual Meeting*, 2023.

Cummings E, Liu Y, Jiang Y, Ropella-Panagis K, Hamilton J, Seiberlich N. Simultaneous Mapping of T1, T2, and T2* at 0.55T with Rosette MR Fingerprinting. *Proceedings of the International Society for Magnetic Resonance in Medicine Annual Meeting*, 2022.

Cummings E, Liu Y, Jiang Y, Ropella-Panagis K, Hamilton J, Seiberlich N. Simultaneous Mapping of T1, T2, T2*, and Fat Fraction at 0.55T with Rosette MRF. *ISMRM Low-Field Workshop*, 2022.

Cummings E, Liu Y, Ropella-Panagis K, Hamilton J, Seiberlich N. Rosette MRF for Simultaneous T1, T2, and R2* Mapping. *Proceedings of the International Society for Magnetic Resonance in Medicine Annual Meeting,* 2021

Cummings E, Franson D, Hamilton J, Seiberlich N. Sharing Radial GRAPPA Weight Sets Across k-Space to Decrease Memory Requirements for Real-Time Imaging. *Proceedings of the International Society for Magnetic Resonance in Medicine Annual Meeting*, 2018

Cummings E, Franson D, Hamilton J, Seiberlich N. Improving Radial GRAPPA Efficiency by Reconstructing Multiple Points from a Single Weight Set. *Proceedings of the Biomedical Engineering Society Annual Meeting*, 2017

Teaching Experience

Teaching Assistant, Modeling of Biomedical Systems Spring 2019

- Assisted in teaching Modeling of Biomedical Systems, a Junior-level course that covers basic modeling techniques for a variety of biomedical applications, including drug delivery, cell population dynamics, neuron activation, and musculoskeletal motion.
- Held weekly office hours to assist students and helped run weekly MATLAB-based simulation laboratories.

Teaching Assistant, Biomedical Signals and Systems Fall 2018

- Assisted in teaching Biomedical Signals and Systems, a Junior-level course that covers solving differential equations in time and frequency domains, linear system analysis, continuous and discrete Fourier transforms, and basic filter design.
- Planned and ran weekly recitations for around 20 undergraduate students to help them prepare for quizzes and exams in the class.