Computational Magnetic Resonance Imaging

EE 381V / CSE 397 ■ Spring 2021

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Website: https://bit.ly/35Io3vq
Lecture: Tu/Th 12:30-2pm (online)

Magnetic resonance imaging (MRI) is a safe and non-invasive medical imaging modality that incorporates all facets of engineering. Advances in numerical image reconstruction and computational hardware have led to a computational imaging renaissance, benefiting all aspects of the MRI system.

This course provides an introduction to MRI, particularly focusing on computational co-design of the signal acquisition and post-processing algorithms. The course will cover:

Introduction to MRI

- Fourier transforms and linear systems
- MRI physics and nuclear spins
- Numerical simulation
- Imaging principles
- Imaging considerations
- Image reconstruction

Advanced Topics

- Rapid and parallel imaging
- Quantitative imaging
- Compressed sensing
- Machine learning

Labs include:

Remote experimentation and scanning on a 3 Tesla clinical system at the UT Biomedical Imaging Center.