INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Model-based Reconstruction for Looping-Star Pulse Sequences in MRI

TECHNOLOGY NUMBER: 2022-179

Technology ID
2022-179

Category
Medical Devices
Life Sciences

Inventor
Douglas Noll
Haowei Xiang
Jeffrey Fessler

Further information
Michelle Larkin
michcote@umich.edu

Learn more

OVERVIEW

MRI scans are an important diagnostic tool but may be accompanied by loud acoustic noises

- Scanning manufacturers have produced quieter machines with degraded image quality
- New software that decreases noise levels for T2* weighted images, QSM, and fMRI

BACKGROUND

Magnetic resonance imaging (MRI) scanning is a non-invasive diagnostic technology that produces three dimensional anatomical images through the excitement and subsequent detection of protons found in water located in human tissues. One of the drawbacks to the patient experience is a loud acoustic noise that can reach 130 decibels during the MRI study. That noise can cause patient apprehension, it can diminish communication between the patient and the radiation technologist, and it may negatively influence data collection, especially in a subset of studies known as functional MRIs. Companies which produce MRI scanners have created machines that are less noisy, though quieter scanning is generally limited to the acquisition of T1, or structural, images. This technology is less successful while obtaining quiet scans for T2* weighted images, quantitative susceptibility mapping (QSM), and functional MRI (fMRI) scanning. In these situations, signals are generated from multiple, simultaneous excitation pulses that create overlapping signals, or echos. Existing software can analyze these echos, though with a resulting degradation in image resolution or increased scanning time.

INNOVATION

Researchers at the University of Michigan have developed software that maintains high resolution scanning while preserving low acoustic noise associated with quiet scanners produced by several machine companies. The inventors created a program that takes advantage of the use of multiple matrices during image reconstruction, successfully removing background noise and increasing signal amplitude and uniformity to yield high-quality anatomic scans. The United States saw 30 million MRI scans ordered in 2021, and the goal will be for this technology to be utilized with existing scanners to quiet acquisition of T2* weighted images, QSM, and fMRI. The potential users of this technology will be companies that produce MRI scanners such as Phillips, GE Healthcare, and Siemens.