



Faster, Distortion-Free MRI Near Metallic Implants

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WARF: P150006US01

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method to improve parallel imaging in the presence of metal and cut scan time by 30 percent.

Overview

Surgical replacement of joints with mechanical prostheses is on the rise. Unfortunately, complications such as infection and loosening are common and often diagnosed in the late stages, compelling repeat implant surgery. A major challenge for doctors is distinguishing between 10 or more different complications, which requires high-quality soft tissue image contrast.

Magnetic resonance imaging (MRI) is a great option. However, MRI in the presence of metallic implants is highly challenging because metal distorts the main magnetic field, leading to errors in the images.

Several methods have been developed to overcome this issue, including MAVRIC, SEMAC and a suite of single-point techniques invented at UW–Madison that are excellent at imaging close to metal implants ([see WARF reference number P120310US01](#)). However, lengthy scan times are still a problem.

The Invention

Improving upon their earlier work, UW–Madison researchers have developed a method to accelerate MRI scans performed near metal. The new method can work with existing techniques such as MAVRIC.

The new method efficiently measures coil sensitivities across a broad off-resonance spectrum, enabling the use of externally calibrated PMRI techniques. The method saves significant time by eliminating the need to obtain fully sampled calibration regions for all of the acquisitions at different resonance frequency offsets.

Applications

- Distortion-free MRI in the presence of metal

Key Benefits

- Cuts scan time from hours to minutes
- Method can be used in conjunction with existing technologies.

Stage of Development

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The researchers have conducted a number of successful experiments using physical phantoms and have already on volunteers with total knee replacements. The new method has been shown to reduce the scan time of existing clinical technologies by about 30 percent.



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Additional Information

Related Technologies

- [See WARF reference number P120310US01 for more information about the researchers' work related to accelerated MRI in the presence of metal.](#)
- [See WARF reference number P120191US01 for information about improving 3-D MRI near metal using a spectrally resolved system free of frequency encoding distortions.](#)

Publications

- Smith M.R., Artz N.S., Koch K.M., Samsonov A. and Reeder S.B. 2014. Accelerating Sequences in the Presence of Metal by Exploiting the Spatial Distribution of Off-Resonance. Magn. Reson. Med. 72, 1658-1667.
- Wiens C. N., Artz N. S., Jang H., McMillan A. B. and Reeder S. B. 2016. Externally Calibrated Parallel Imaging for 3D Multispectral Imaging Near Metallic Implants Using Broadband Ultrashort Echo Time Imaging. Magn Reson Med. doi: 10.1002/mrm.26327

Tech Fields

- [Medical Imaging : MRI](#)

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846

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