

Acousto-Optical Sensors for MRI Safety Evaluation

Implants can cause hot spots and burns during MRI scans

Patients undergoing MRI scans sometimes experience hot spots and burns, mostly due to external or implanted metallic objects such as pacemakers or orthopedic implants. This is caused by radio frequency (RF)-induced heating as the current distribution over the patient's body can cause the temperature to rise. This cannot be avoided because MR systems work by imaging phantoms to determine specific absorption rates (SAR) or temperature rise in the patient.

Therefore, there is a need for a small sensor that can provide information about the local RF field during imaging procedures. Furthermore, all medical implants need to be evaluated for SAR impact during the development phase.

New innovation helps improve patient safety by ensuring MRI compatibility with implants

Researchers at Georgia Institute of Technology have developed an acousto-optical sensor that is compact and flexible for easy attachment to the patient during an MRI procedure. It is RF-immune and can directly measure SAR. Furthermore, it can be used to judge the SAR impact of medical implants to judge their compatibility with MRIs as well as it can be used to optimize MRI sequences by providing real-time, local RF field measurements.

The invention is an acousto-optical sensor that can measure the SAR (specific absorption rate) in its environment through temperature and the radio frequency (RF) field. It can be used to improve patient safety during MRI scans and to ensure MRI-compatibility for medical implants.

Summary Bullets

- The invention is an acousto-optical sensor that can measure the SAR (specific absorption rate) in its environment through temperature and the radio frequency (RF) field.
- The innovation can be used to improve patient safety during MRI scans and to ensure MRI-compatibility for medical implants.
- The solution is more compact and flexible than market alternatives

Solution Advantages

- More compact and flexible than market alternatives
- RF-immune, high Signal-to-Noise Ratio (SNR) E-field measurement
- Direct measurement of SAR through temperature and RF field
- Direct, RF-immune measurement of induced currents on implants

Potential Commercial Applications

- MRI safety sensor during scanning
- Use to measure MRI compatibility for implants

Inventors

- Dr. F. Degertekin
George W. Woodruff Chair in Mechanical Systems and Professor - Georgia Tech School of Mechanical Engineering

IP Status

<p>Patent application has been filed</p>: US20210298606A1

Publications

[Acousto-optic-based time domain electric field sensor for magnetic resonance imaging applications](#), Optical Engineering, Vol. 63, Issue 3. - 2024

Images

Visit the Technology here:

[Acousto-Optical Sensors for MRI Safety Evaluation](#)

<https://s3.sandbox.research.gatech.edu//print/pdf/node/4273>