

Spatial Tracking of Catheters in Interventional MRI (#7952)

A catheter device with improved safety by eradicating heat and improved positioning during MRI procedures.

Inventors at Georgia Tech have created a clinical-grade catheter device that does not need long conductor transmission lines for active device visualization under MRI. The active catheter design incorporates a distal loop coil that is electrically connected to an ultrasonic transducer that interacts with a dielectric optical fiber that runs along the catheter shaft intend to eradicate RF induced heating within interventional MRIs. The inventors intend to track the distal tip of the catheter which would provide the spatial position (and/or temperature) information of the catheter tip and shaft to guide the interventional procedures without RF heating that are associated with conducting signal lines.

Benefits/Advantages

- **Increased safety** — eradicates RF induced heating while providing position of catheters in the body during iMRI procedures
- **Simultaneous measurements** — offers temperature measurements, orientation, and other parameters

Potential Commercial Applications

Interventional MRI

- Tumor resection
- Lesions biopsy

Background/Context for This Invention

Magnetic resonance imaging (MRI) is a diagnostic tool that is used to obtain an image of the anatomy or physiological processes of the body. Interventional MRI (iMRI) is the use of the MRI to guide minimally-invasive procedures. iMRI systems are often utilized to perform biopsies and resections of tumors. Spatial tracking of the distal tip of catheters within vasculature during the operation/procedure (real-time) is vital during an iMRI. Conventionally, this is achieved by embedding active and passive markers into the device.

Active markers use conductive transmission lines to carry the received radio-frequency (RF) signal to the MR scanner. Consequently, high exposure to RF energy can cause heating which can be harmful to biological tissue, and raises a safety concern for the individual undergoing iMRI procedure.

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Publications

[*Acousto-Optic Catheter Tracking Sensor for Interventional MRI Procedures*](#), IEEE Transactions on Biomedical Engineering, April 2019

For more information about this technology, please visit:

<https://licensing.research.gatech.edu/technology/spatial-tracking-catheters-interventional-mri>