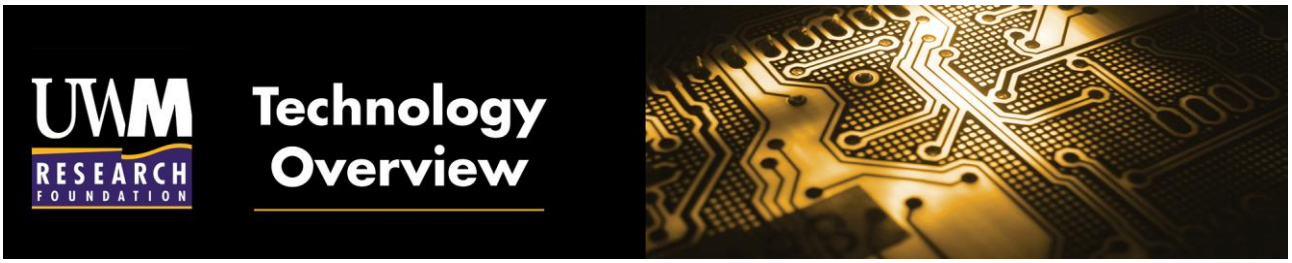


Motion Tracking System for Real Time Adaptive Imaging and Spectroscopy

OTT ID# 1124

TECHNOLOGY

While most healthy adults can stay still and tolerate longer scan times, some patients such as infants, children, and claustrophobic patients often have difficulty remaining still. Sedation and/or restraint systems can be helpful with adults, but are not effective with children. Any patient motion reduces image quality and, if extreme, can degrade the image to the point that it is compromised and the scan must be repeated.
The typical way to control motion in real-time adaptive magnetic resonance imaging (MRI) and spectroscopy is to sedate the patient and/or use a restraint system (e.g. straps) or fixtures that remind the patient to remain still. The use of post-processing techniques can help clean-up images affected by motion but these are not an ideal solution or as effective. A two-camera motion detection system is being developed to subtract out motion, but to date has not solved the problem.
The current invention addresses the issue of external patient motion with a hardware and software solution that compensates in real-time for patient movement during an MRI acquisition. Retrograde reflector (RGR) technology is utilized for real-time motion detection and correction. The positional change data is fed to the MRI acquisition control system and the gradients are adjusted accordingly to maintain the center of the acquisition plane – thus eliminating motion artifacts.

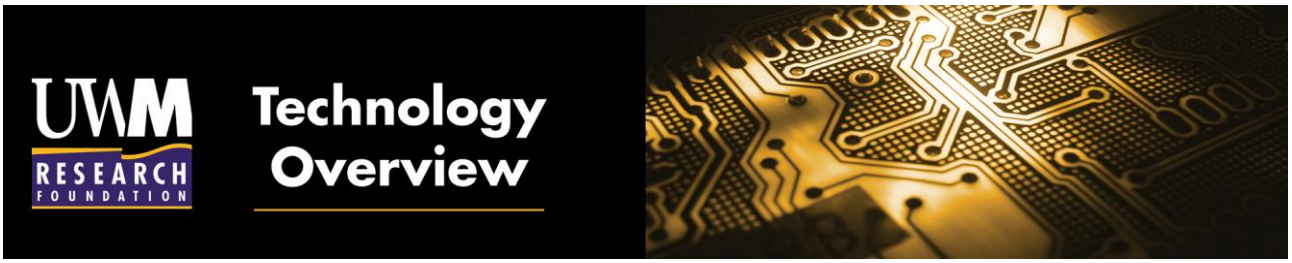
FEATURES/BENEFITS

- **Better quality –**Provides optimized image quality by reducing or eliminating motion-induced artifacts
- **Lower costs –**Reduces need for sedation and decreases call-backs and re-scans
- **New Revenues –**Accommodates new patients who were previously unable to lie still or were uncooperative
- **Novel detection system –**Six degrees of motion detection provide faster tracking speed and better stability
- **Scalable –**The technology can take advantage of faster digital signal processors as they become available

MARKETS

The costs incurred by hospitals and imaging centers due to the need to repeat MRI scans because of patient motion are estimated to be $1 billion annually in the U.S. alone. Motion compromises image quality, eroding clinical confidence and making it difficult to make an accurate diagnosis. According to a 2006 IMV Medical Information Division, Inc. report, there are approximately 11,000 facilities in the county with MRI. Equipment revenues alone in 2006 were well over $1 billion in the U.S.

This system will be of interest to MRI manufacturers to provide their customers (hospitals, imaging centers, etc.) with an automatic system that virtually eliminates re-scans due to motion artifacts. Other applications for this technology include guidance systems in manufacturing, motion detection measurement for sports injury and rehabilitation systems.



INVENTOR(S)

Brian S. R. Armstrong

Dr. Brian Armstrong is a Professor in the Department of Electrical Engineering and Computer Science at the University of Wisconsin-Milwaukee. He received his Ph.D. in Electrical Engineering/Robotics from Stanford University in 1988. With support of a $4 million grant from the National Institutes of Health (NIH), Dr. Armstrong and collaborators at the Medical College of Wisconsin and the University of Hawaii are developing the system to compensate for the motion of a patient during MRI scans.

INTELLECTUAL PROPERTY

U.S. Patent Application 11/804,417
Multiple International Patent Applications Pending

This technology is part of an active and ongoing research program, has been successfully modeled, a prototype is under construction, and is seeking partners for development of the final product. It is available for developmental research support/licensing under either exclusive or non-exclusive terms.

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