New Methods in Motion Tracking to Generate Motion-Corrected Tomographic Images

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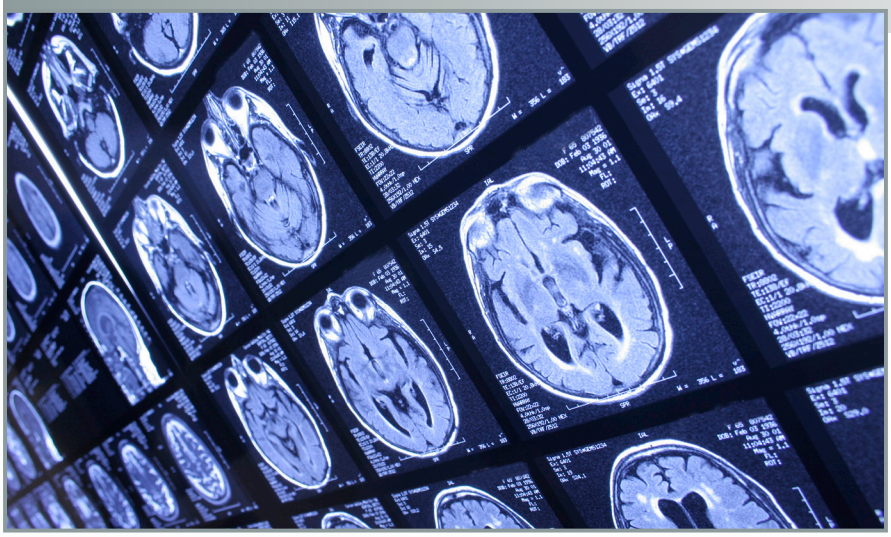

Technology Summary

High quality three-dimensional images from conventional MRI, CT, PET, or SPECT scans require that the subject being imaged remain stationary during the scan. Any motion during the scan significantly reduces the quality of the resulting images. Although sedation and physical restraint can be used to impede live subject motion, both methods have the potential to alter the neurological and physiological processes under analysis. This invention corrects for any motion during a scan, improving the quality of the images obtained.

This ORNL invention provides a new method for generating motion-corrected tomographic images of small animal subjects. The method enables clinical medical imaging systems to obtain high-resolution CT, PET, and SPECT images of unrestrained live subjects. Data from these systems are critical to medical and pharmaceutical research.

Using this method, researchers at ORNL have demonstrated the ability to reduce or completely eliminate the effects of multiple reflections on an optical image by applying at least three spaced retro-reflective optical markers at regions of interest. A filtered camera is then used to selectively detect and distinguish illumination reflected by the markers from illumination reflected by or originating from other sources. Motion data, relative to an initial reference position, are calculated and used to correct the tomographic images.

Advantages

- Provides tomographic imaging of small animal subjects for research purposes without the need to sedate or immobilize subjects
- Reduces reflections during scanning and removes features from the optical image that can result in measurement error or inability to properly track motion

Potential Applications

- Awake subject imaging for SPECT/PET/CT/MRI medical applications and cancer research
- Testing the effectiveness of new drugs and modeling of human diseases

Patents

James S. Goddard and Justin S. Baba. *System and Method for Tracking Motion for Generating Motion Corrected Tomographic Images,* U.S. Patent Application US2008/0317313A1, filed December 25, 2008.

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