



## Tracking patient orientation during MRI scans

UCT researchers have developed a device that tracks accidental / inadvertent motion during magnetic resonance imaging (MRI) scans. An MRI scanner applies magnetic fields to a body to generate an image of internal structures and the quality of the images are impacted by even small movements. For this reason it is very difficult to image children, or elderly patients suffering from diseases that result in involuntary motion.

The inventor observed that the earth's gravitational field and the main magnetic field of the scanner are perfectly orthogonal, which led to the creation of a simple and cost effective device capable of tracking the movement of a patient during long scans by determining the orientation of the device. These measurements are used to correct for scanning error introduced by movement, resulting in improved image quality and the accuracy of scans.

### Benefits

- No scanner-specific calibration is required unless very high accuracy scans are necessary, in which case a once-off calibration can be performed.
- Orientation estimates are transmitted either optically or wirelessly out of the scanner for further data processing.
- The device can be made very small, for example to fit into a patient's ear, and only a single point needs to be used.

### Market

MRI manufacturers / users

### Technical Description

The orientation tracking device includes:

- memory for storing reference data relating to the direction of the static magnetic field of an MRI scanner in a reference co-ordinate frame and the direction of the gravitational field of the earth in the reference co-ordinate frame,
- a three axis accelerometer for measuring an acceleration vector in the device's co-ordinate frame,
- a three axis magnetometer for measuring a magnetic field vector in the device's co-ordinate frame,
- a communication module and a processor for determining the orientation of the device.

#### Keywords:

MRI, patient tracking, MRI orientation, image correction

#### Intellectual Property Rights:

Britain (priority founding): 1513558.5

#### Technology Readiness Level:

4 - Validated in Relevant Environment

#### Contact:

Francois Oosthuizen,  
Project Manager,  
Research Contracts &  
Innovation,  
University of Cape Town

francois.oosthuizen@uct.ac.za  
www.rci.uct.ac.za

The inventor is Adam Van Niekerk.