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Nonrigid Motion Correction Through Autofocusing

Dr. Shreyas Vasanawala and collaborators have developed a nonrigid motion correction technique that will allow for motion-free Magnetic Resonance (MR) images to be obtained even during lengthy scans. Motion is a major source of image artifacts for MR studies. A typical sequence prescribed on the scanner takes anywhere from a couple seconds to a number of minutes. As a result, the scan is sensitive to motion. Motion can come from any number of sources including respiration, cardiac motion, blood flow and unintentional patient movement. To help overcome this limitation, the inventors developed this technique to correct for data corruption from both rigid and nonrigid motion during image reconstruction. This technology will make MR imaging more accessible to a wider patient population.

Stage of Research
The correction technique has been applied to free-breathing abdominal patient studies. In these scans, the artifacts due to complex, nonrigid motion were reduced.

Applications

- MR imaging, including:
    - Free-breathing abdominal imaging
    - Cardiac imaging
    - Head imaging

Advantages

- Provides high quality diagnostic images from lengthy scans
- Can be used with any type of MR imaging scheme and with any type of reconstruction strategy

- Computationally efficient
- Nonrigid motion can be compensated through simple reconstruction steps
- Allows MR imaging to be more accessible to more patients

Publications

- Cheng JY, Alley MT, Cunningham CH, Vasanawala SS, Pauly JM, Lustig M. Nonrigid motion correction in 3D using autofocusing with localized linear translations. Magn Reson Med. 2012 Dec;68(6):1785-97.

Patents

- Published Application: 20140210469
- Issued: 9,797,974 (USA)

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