# Magnetic Resonance Imaging Method and Apparatus for High-resolution Spatial and Temporal Data-driven Reconstructions ("Self-navigating" or "Self-gating")

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## Technology description

Value Proposition:
The new method for self-navigated MR includes an imaging pulse sequence that is fast, efficient and produces high-spatial and temporal resolution data that does not require any additional sensors. It is also compatible with both 2-dimensional (2D) and 3D imaging, as well as with diverse phase encoding orders, parallel imaging, and diverse contrast inducing mechanisms. The methods include several variants of balanced steady state free precession (SSFP)-based MR pulse sequences for the acquisition of multiple imaging echoes as well as one or more projection-based echoes to be used for self-navigation. The method described here includes navigator data processing steps as well as several acquisition strategies that can be used for different imaging applications.
Technical Details:
Recently, the concept of self-navigation has entered the field of MR. Self-navigation attempts to use the raw MR imaging data itself to identify, measure and compensate for motion. Standard cardiac MR methods typically use breath-holds or external sensors (i.e. ECG, respiratory bellows, pulse oximeter, etc) to compensate for motion or to synchronize the acquisition with motion. Other techniques navigation techniques use independent data specifically acquired for motion detection and not for imaging (i.e. respiratory navigators). The self-navigation approach attempts to use raw data itself to detect motion, and may or may not include that data in the final image reconstruction. Hence, self-navigation describes a data-driven approach to reconstruction that would permit imaging without having to disturb the patient and would extend the patient population that could undergo successful cardiac (or abdominal) MR examinations but which are currently unsuccessful.

## Application area

This invention should provide an excellent method for the free-breathing acquisition of high-resolution images. By using the raw data itself to monitor cardiac and respiratory motion, it is possible to simply scan, letting the patient rest, yet still reconstruct high-resolution cine images, or even high-resolution respiratory-cardiac cine image spaces.

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