



Postdoc researcher on Spectro-Dynamic MRI at the UMC Utrecht

Biomechanical System Identification on a Millisecond Scale

The project

Accurate quantification and characterization of biomechanical processes under dynamic conditions can lead to better diagnosis, prevention and therapy of societal relevant diseases such as cardiovascular and musculoskeletal disorders. Diagnostic tools which can map the dynamics at high spatial and temporal resolution are therefore necessary. Among imaging modalities, Magnetic Resonance Imaging (MRI) is the most versatile but it reveals severe limitations when dealing with motion; given the slow nature of the imaging process, dynamic information in 3D is difficult to obtain.

The novel Spectro-Dynamic MRI technique [van Riel et al, IEEE Access 2021] relies on the speed of data acquisition in the spectral domain (k -space), which is the natural measuring domain for MRI and therefore is better suited to encode motion. Merging concepts from MR-physics, biomechanics and model-based reconstruction will enable mapping of currently inaccessible mechanical information such as velocity, strain and stress at video frame-rates.

Preliminary results on simple in-silico and in-vitro results show the potential for Spectro-Dynamic MRI. The focus of this postdoctoral project is to bring the technology closer to in-vivo applications. Therefore, biomechanical models need to be defined and applied for different use-cases of Spectro-Dynamic MRI.

Your profile

We are looking for someone with a background in (applied) Mathematics, Physics, electrical, mechanical or biomedical engineering with an affinity for (continuum) mechanics, biomechanical modelling, numerical methods and experimentation.

The position

The project will be carried out in the computation Imaging group of the University Medical Centre Utrecht. The research team consists of mathematicians, MRI-physicists and clinicians. More information about the research team can be found at www.cig-utrecht.org. We offer a position for 36 months (full-time).

Contact

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