Scholarship of Graduate School “Computational Biophotonics”

PhD-Project (Dr. rer. nat. or Dr. sc. hum.):
“Translational MRI/CT-Imaging of Physiological Parameters”

Duration: 24 months (third year will be financed by the institute)
Place of work: Computer Assisted Clinical Medicine, Mannheim, Germany
Starting date: flexible

The Medical Faculty Mannheim at Heidelberg University has a strong focus on Medical Technology and uses imaging for modern diagnostics as well as treatment planning and monitoring. Our institution is equipped with modern Magnetic Resonance Imaging (MRI) whole-body systems at 1.5 and 3 Tesla and has also access to a 9.4 Tesla animal system at the Central Institute of Mental Health (ZI). Our group is doing basic research in developing new MR-techniques for measuring perfusion, diffusion, oxygenation, and X-Nuclei (sodium, chlorine, potassium) in the human brain or other organs like lung, liver, or heart. Another field of research is the evaluation and post processing of imaging data in Computed Tomography (CT). Our institution is also equipped with a novel CT-system enabling measurements of physiological parameters in abdominal CT-imaging. We are composed of scientists from physics, electrical engineering, and computer science and are working in close co-operation with the local medical departments. We have know-how and expertise in fundamental MR/CT-physics, MR-sequence programming, and data post processing with its application in in-vivo animal/human studies.

Candidates should have a strong background in Mathematics, Physics, or Computers Science and knowledge of programming in languages such as C/C++ and MATLAB. For the project we have proposed and implemented innovative methodologies and imaging protocols for dynamic imaging of physiological tissue parameters in MRI, like tissue perfusion, diffusion or oxygenation. New applications comprise 3D MRI of X-Nuclei, like sodium, chlorine, and potassium for in-vivo measurement of tissue viability using concentration maps of the sodium/potassium pump. The work will also involve implementation of novel imaging techniques at an experimental 9.4 T animal scanner (rat/mouse/cells) with translation on 1.5 and 3 T whole-body human MR systems. Other modern imaging modalities like CT also provide access to information about organ function. From such measurements multimodal and multi-dimensional CT/MRI-image data arises. The functional information has to be extracted by post processing techniques like image registration/segmentation in combination with modeling physiological processes and pattern recognition.

For more information on the project or for application please contact: Prof. Dr. rer. nat. Lothar R. Schad, Director, Chair in Computer Assisted Clinical Medicine, Medical Faculty Mannheim, Heidelberg University, Theodor-Kutzer-Ufer 1-3, 68167 Mannheim, Germany.
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