Laboratoire d'**I**nformatique et **S**ystèmes, LIS – UMR CNRS 7020

Call for application: Postdoctoral fellowship

Observation and characterization of 3D deformation of soft tissue organs with ultra-fast MRI.

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Project aim:

The research is focused on developing a novel medical analysis technique to improve healthcare of patient living with pelvic floor disorders. These diseases lead to mechanical dysfunction of the pelvic organs support structures. To enhance the understanding, we advocate a process to observe the main organs over time in 3D by developing a MRI acquisition sequence associated with a volume reconstruction adapted to the visualization of organ movement in 3D. The postdoctoral researcher will develop methods and tools related to volume modelling from ultra-fast multi-planar MRI. Visualization of deformations and motions of those organs is a first. Besides, mathematical features will be proposed to provide quantitative analysis and evaluation of the reconstructed volume surfaces.

Scientific and work environment:

The postdoctoral position will take place in Marseille at the "laboratoire d'informatique et des systèmes" (LIS) - St Jérôme Faculty. The LIS UMR 7020 brings together more than 375 members; 190 permanent researchers and teacher-researchers, more than 125 doctoral students, more than 40 post-doctoral students and 20 IT/IATSS. Research is structured within poles (calculation, data science, systems analysis and control, signal and image), and focuses on fundamental and applied activities in the fields of computing, automation, signal and image. The postdoctoral researcher will have to move to the Timone University Hospital site occasionally in order to participate to MRI acquisitions and setting at CRMBM and to collaborate with the practitioners involved. With a multidisciplinary staff of 80 basic scientists, engineers and clinicians, the CRMBM is one of the largest biomedical MR centres in Europe and a national research facility for preclinical and clinical MR imaging. It is backed by CEMEREM, which is the MRI platform with 1.5T, 3T and 7T imagers among others.

Requirements:

The candidate must have a PhD degree in a field related to geometric modelling or surface characterization or segmentation with 3D MRI images. The applicant will show interest for an interdisciplinary project in medical imaging. Strong skills in applied mathematics and python programming would be valued.
Project start: early 2019. Duration: 12 - 16 months. Salary: 2300 - 2700 €/month.

To apply, send cover letter, CV and 2 letters of recommendation by e-mail to the indicated supervisors.

References:
• Augustin C. Ogier, Stanislas Rapacchi, Arnaud Le Troter, Marc-Emmanuel Bellemare. "3D Dynamic MRI for Pelvis Observation - a First Step". IEEE International Symposium on Biomedical Imaging, Apr 2019, Venise, Italy.
• Z. CHEN - P. JOLI - Z.-Q. FENG - Mehdi RAHIM - Nicolas PIRRÓ - Marc-Emmanuel BELLEMARE, "Female patient-specific finite element modeling of pelvic organ prolapse (POP)", Journal of Biomechanics, Vol. 48 (22), pp. 238-245, jan 2015
• Rapacchi S, Han F, Natsuaki Y, Kroeker R, Plotnik A, Lehman E, Sayre J, Laub G, Finn JP, Hu P: "High spatial and temporal resolution dynamic contrast-enhanced magnetic resonance angiography using compressed sensing with magnitude image subtraction ". Magnetic Resonance in Medicine 2013.
• Thierry BAY - Jean-Christophe CHAMBELLAND - Romain RAFFIN - Marc DANIEL - Marc-Emmanuel BELLEMARE, "Geometric modeling of pelvic organs", 33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, EMBC2011, IEEE, pp. 4329-4332, Boston, MA, USA.

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