BIOMECHANICAL MODELING AND SIMULATION

WITHIN A MEDICAL SIMULATOR FRAMEWORK

-- 18 months post-doctoral position offer --

Context: the SAGA project « Simulateurs pour l'Apprentissage des Gestes de l'Accouchement », funded by the French ANR MN 2012, aims to the development of a Virtual Reality environment in the context of a medical simulator dedicated to the learning of the childbirth gestures. This simulator will be composed of a numerical simulation coupled to a haptic device.

Within the framework of this project, the SAARA team from the LIRIS Lab. (http://liris.cnrs.fr/~saara) is involved in the elaboration of an optimal biomechanical model supporting the simulation of the interaction between the pelvic dynamics of the expectant mother and fetus during childbirth, in connection with a haptic interface.

Proposed mission: To carry out that project, the SAARA team needs to recruit a computer science researcher, who will be involved in the development of modules for bio-mechanical modeling and simulation, and their integrated within a framework (i.e. SOFA framework http://www.sofa-framework.org, or other to be defined).

The mission concerns the improvement of the physically-based models that have been elaborated by the SAARA team and its partners (TIMC-IMAG Lab., CAOR ParisTech), and of realizing an efficient coupling between the numerical simulation and the haptic device, allowing user' interactions with considered organs. The model will be:

1) Realistic and generic, to support didactic concerns;
2) Fast enough to feed the haptic device.

The scientific and technical obstacles related to that work essentially concern:

1) The definition of the interaction models (slide, friction and more generally continuous contact),
2) The computations' optimization to fitful interactive time constraints (parallelization, use of adaptive or multi-scale geometries).

Contract: Fixed term contract available from January 2013 (18 months, approx. 2300€ net monthly wage).

Required Skills: The candidate, bearer of a PhD in Computer Science, is requested good experience in Computer Graphics and Software development in C++ language. Skills in modeling and biomechanical simulation will be appreciated.

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