

Laboratory: LAAS-CNRS (Gepetto), Toulouse, France

Thematic: Human-like movement

Keywords: Musculoskeletal model, whole-body motion, inverse dynamics, humanoid robot

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Title: Musculoskeletal mannequin animation

Our team has developed a strong expertise in the generation of whole-body motion for real-size humanoid robots. This know-how gives us among the best performances of our community for animating complex multi-body models.

We would like now to use this methodology to study in a virtual environment the movements of the human body. The target of this work is twofold. On the one hand, the artificial movement would be used to quantify the ergonomics of a virtual prototype or work task and to optimize it automatically. On the other



Images from the web

hand, the synergies used by the human body could be extracted to help to reduce the complexity of the computations performed by a robot during a complex movement.

The post-doc would develop from the state of the art or compile from available software a musculoskeletal human model. This model would then be animated using the motion generation tools of the team (multi-objectives control and motion planning). The naturalness of the generated movements would be tested against the movements of human subjects using the motion-capture system of the laboratory. Depending on the interests of the post-doc, the technics might be applied to the humanoid robot HRP-2 as well.

The post-doc will interact with other members of the laboratory, supervised first Master students then PhD students. The work will happen in close collaboration with the Mimetic team at INRIA Bretagne (Rennes, France). Depending on the choice of the candidate, a leading role into the French project with INRIA could also be considered.

Requirements:

- PhD degree in EE/CS, biomechanics or applied mathematics
- Expertise in biomechanics or a strong experience in robotics or numerical computing
- Good programming skills in C/C++
- A strong mathematical or control background is desirable

Environment:

Located in the University town of Toulouse, in the south-west of France, the Gepetto group belongs to the CNRS-LAAS, laboratory for the analysis and architecture of systems, a 640 man-strong research center with about 90 people working in robotics. Among our robot fleet, we have access to HRP-2, the only full-size walking humanoid robot in France, while two other humanoid robots are expected within the year. The laboratory benefits from strong connections to the adjoining universities and the space and aeronautics industry.