

# Physical Activity in Virtual Reality



## Professor Franck Multon

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### **Abstract**

Virtual Reality is now widely used in many domains, for entertainment but also serious applications, such as analyzing the behaviors of subjects, or training skills in highly controlled environment. VR is based on interactions between a user and numerical simulation through interfaces. This paradigm is a unique chance to control multi-sensory feedbacks and analyze the perception-action loop in complex and almost ecological situations. The talk will be organized in three parts. The first part of this talk focuses on experiments that have been carried-out to analyze such a perception-action loop duel situation in sports, such as thrower-goal interactions in handball, deceptive motions in rugby and free-kick in soccer. The goal is identify the kinematic and kinetic variables used by a user in order to anticipate the final goal of an opponent. Each such highly constrained situations any unrealistic behavior of the simulation would compromise the experiments.

In the second part of the talk, we discuss about how technological choices may interfere with such type of experience. Visual feedbacks computed by the computer thanks to an approximation of the real world. Is this approximation a problem in such perception-action loop? In addition to vision, other multisensory feedbacks are difficult to manage, such feeling the mass and contact with a ball. Thus, we are currently exploring original methods to compensate the weakness of current physical interfaces to make users feel the forces in the virtual environment.

The last part of the talk is dedicated to training motor skills in such type of environment, which raises the problem of transferring skills from virtual environments to real situations. This training process requires to design a virtual coach that would be able to automatically detect errors or possible improvements in the users' performance, which is still a challenge. Once such errors are identified, what type of feedback is most convenient one to make users adapt accordingly and improve their performance?

## **Franck Multon's bio:**

Franck Multon is a Professor in University Rennes2 in France. He is performing his research in biomechanics (M2S Lab) and in character simulation (MimeTIC/Inria group). His research interests are biomechanics and character simulation, as well as interaction between real and virtual humans. He proposed original example-based methods for virtual human simulation. He developed innovative approaches using Virtual Reality in Sports, for perception-action analysis, training and testing the impact of technological choices on motor skills in VR. He defended his PhD in 1998 in INRIA Rennes on motion control of virtual humans. Since 1999, he was Assistant Professor in University Rennes2, has defended his "authorization to supervise research" in 2006, and has been hired as full Professor in 2008.

More information here: <http://www.m2slab.com/>