

Virtual Reality & Sports

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?



Professor 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/>



Dr. Richard Kulpa's bio

Richard Kulpa is senior lecturer at the M2S Laboratory in the University Rennes 2 and the INRIA MimeTIC team. His research topics covers both the use of virtual reality to better understand the interactions between athletes and the biomechanical analysis of the gesture. After working on virtual human animation from 1996 to 2000 in the IRISA, he joined the M2S lab to work on the coupling of biomechanical knowledge with the methods of movement adaptations to provide realistic virtual humans used as virtual opponents. He have then objectively examined interactions with this opponent and began studying its use for training.



Dr. Ferran Argelaguet's bio

Ferran Argelaguet is currently an Inria SRP researcher at the Inria Rennes Hybrid team. He received his PhD in Computer Science from the Universitat Politècnica de Catalunya on 2011. His research activity is mainly focused on human interaction computer interaction in virtual environments especially on 3D User Interfaces (3DUI) research field. 3DUI is multidisciplinary research field involving Virtual Reality, Computer Graphics, Human Factors, Ergonomics and Human Perception. His research is focused on the improvement of the usability in virtual reality applications, particularly, the analysis of the major factors influencing performance and in the understanding of how humans perceive virtual environments. He is involved in major conferences as program committee member such as the IEEE Virtual Reality and the IEEE symposium on 3D User Interfaces.