

Smart Multimedia Haptic Training Simulation

Session Chairs:

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Many professions require dexterous manipulation and so initial and continuing hands-on training. For example, in the medical context, simulators such as animals, cadavers or phantoms have been a convenient way to learn by trial for decades. Yet these training supporting resources are expensive, non-continuously available, may raise ethical issues, and provide a limited set of study cases to practice on. These difficulties limit the opportunities of trainee populations in performing hands-on training during their curriculum. It is necessary to provide cost-efficient solutions facilitating the hands-on practice on any study case at any time as often as necessary.

For a decade, Virtual Reality (VR) simulators have been designed to overcome the aforementioned drawbacks. With such devices, which can be parameterized on-line, it becomes possible to provide an infinite set of study cases and, further, to adapt difficulty level to a specific learning curve. VR simulators have been progressively improved to provide trainees with a more realistic environment in 2D and more recently in 3D. With haptic training simulators, the additional force feedback provides a realistic interaction, which has been demonstrated as an efficient training for advanced tasks in some medical contexts. Airplane pilot simulators are a sample of a widespread solution for hands-on training on difficult situations without taking any risk and with the ability to objectively assess each performance. They have become a necessary step before training on real planes.

This special session aims to is to provide a forum for researchers and developers in the multimedia community to present novel and original research in providing effective haptic feedback. The topics include but are not limited to:

- Haptic rendering
- Computer graphics
- Virtual/augmented/mixed reality,
- Variable Stiffness Actuators
- Multimodal simulation
- Training simulation
- Motion capture/analysis, cognitive performance

Sylvain Bouchigny is a researcher in Human-Computer Interaction at the CEA LIST institute, France. Trained in Physics, he received a M. Eng. in scientific instrumentation from the National Engineering School in Caen in 1998 and a Ph.D. in nuclear physics from the University of Paris Sud 11 (Orsay) in 2004. However, in 2007, he joined CEA LIST to work on physics applied to

human interaction which was closer to his interest. His research focus on Multimodal Human-Computer Interaction, haptics and virtual environment applied to education, training and rehabilitation. He conducted projects on tangible interactions on interactive tables for education and post-stroke rehabilitation and, for the last ten years, leads the development of a VR haptic platform for surgical education.

Arnaud Lelevé has been associate professor at INSA Lyon since 2001. He received his PhD in Robotics in 2000 from Université de Montpellier, France. He first worked in a Computer Science laboratory on Remote-Lab systems and then joined Ampère lab in 2011. Since 2016, he leads the Robotics team of Ampère lab and is the scientific coordinator of He has conducted numerous R&D projects including INTELO (mobile robot for bridge inspection) and Greenshield project (which aims at replacing pesticides by farming robots in the crops), and medical-robotics-based research projects such as SoHappy (pneumatic master for tele-echography). He has also participated to the development of hands-on training projects such as SAGA (birth simulator) or PeriSim (Epidural needle insertion simulator). He has strong skills in applied mechatronics, real-time computer science, and a good experience in scientific program management.

Carlos Rossa is an Associate Professor in the Department of Systems and Computer Engineering at Carleton University, Ottawa, ON, Canada. He received his BEng and MSc degrees in Mechanical Engineering from the Ecole Nationale d'Ingénieurs de Metz, Metz, France, both in 2010, and earned his PhD degree in Mechatronics and Robotics from the Sorbonne Université (UPMC), Paris, France, in Dec 2013 under the auspices of the Commissariat à l'Energie Atomique. His research interests include medical robotics, image guided surgery, instrumentation, and haptics.