

# Guest Editorial

## Special Section on VECIMS 2006

**B**RINGING a methodical instrumentation and measurement perspective to the theory and practice of virtual and virtualized environments and human-computer interfaces by focusing on the quantitative aspect of these technologies and their interactive applications in telerobotics, remote control, engineering design, environment sensing and monitoring, training, education, the arts, and computer security is a major challenge.

In this Special Section on Virtual Environments, Human-Computer Interfaces, and Measurement Systems (VECIMS), we review the current trends and latest developments in the aforementioned fields. We start with the paper by Polushin *et al.*, where the authors address the stability problem of force-reflecting teleoperation where the communication between the master and the slave is subject to multiple time-varying discontinuities and unbounded communication delays. This is followed by He and Chen's research on six-degree-of-freedom haptic rendering of the telerobotic operation method using virtual joint coupling. In this research, the authors decouple the rigid body dynamic simulation from the haptic thread to alleviate the computation demand by integrating a physically based simulation library Open Dynamics Engine into the proposed simulation system. In the next paper, Alamri *et al.* present a haptic virtual rehabilitation system with several daily life exercises. The performance analysis of the exercises within their proposed system has shown its validity and effectiveness as a diagnosis system to analyze the patients' data. Monroy *et al.* discuss an agent-based profiling approach in the form of a virtual interface that models user behavior and satisfaction with the objective of improving the performance of high-performance computing centers. Some experiments are carried out, and they show that modeling the user and taking user satisfaction into account help improve system performance. Pazzi *et al.* then address remote rendering and interactive visualization of 3-D virtual environments

on wireless mobile devices. They propose an end-to-end streaming and rate control protocol as well as buffering and scheduling mechanisms to support the requirements of bandwidth-demanding multimedia systems. They also discuss their experimental setup and the performance evaluation of their proposed approach. Gueaieb and Miah discuss a mobile robot navigation technique using Radio Frequency Identification (RFID) technology. They place RFID tags in the 3-D space so that the lines linking their projections on the ground define the "free ways" along which robots move. This is followed by Cretu *et al.*'s work on neural network mapping and clustering of elastic behavior from tactile and range imaging for virtualized reality applications. The discussed composite neural architecture allows encoding of the complex force/deformation relationship without the need for sophisticated mathematical modeling tools. Finally, Alsulaiman *et al.* show the result of their study concerning 3-D passwords for secure authentication by computing the sequence of actions and interactions with the 3-D objects inside the 3-D environment. They present and analyze the measured password space.

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