Tutorial: Conducting Human-Subject Experiments with Virtual and Augmented Reality

As virtual and augmented reality hardware and software have grown more mature over the past decade, the focus of the field is shifting away from the basic engineering technology, and towards the science and applications of VR and AR techniques. Increasingly, virtual and augmented reality researchers are conducting human-subject experiments, both to understand the way humans perceive, manipulate, and cognate with VR and AR information, and to quantify the utility of VR and AR in different application contexts.

This tutorial is for researchers and engineers, working in the field of VR and AR, who wish to conduct a human-subject experiment. It will present the basic principles of experimental design and analysis generally, with an emphasis on human-subject experimentation. This will include topics such as generating empirically testable hypotheses, standard statistical designs, independent and dependent variables, counterbalancing, statistical tests, the character of behavioral data, measurement scales, psychophysical measurement, and separating human performance from system performance. It will also cover usability engineering and evaluation techniques, and describe how these activities can greatly increase the validity of subsequent experiments.

In all cases the information will be tuned to the particular requirements of VR and AR. To illustrate the discussed principles and techniques, the course will include case studies of actual human-subject experiments conducted with VR and AR systems.

Lecturers
J. Edward Swan II, Naval Research Laboratory
Joseph Gabbard, Virginia Polytechnic Institute and State University
Deborah Hix, Virginia Polytechnic Institute and State University
Steve Ellis, NASA Ames Research Center
Bernard Adelstein, NASA Ames Research Center

Tutorial: Introduction to Augmented Reality

As computers become more and more invisible, Augmented Reality (the overlaying of virtual images on the real world) is becoming an increasingly important application area for computer graphics and user interface design. This tutorial will provide a detailed introduction to the field of Augmented Reality, as well as the open-source software tools needed to get started building their own AR applications. It is particularly designed to provide a cutting edge introduction to research on Augmented Reality, so that attendees will leave knowing which are the key unexplored areas for AR research. Attendees will be given a detailed introduction to AR technology and current areas of AR research, with reviews of important topics as such as tracking and registration, interaction techniques, wearable AR systems and hybrid AR interfaces. They will also be able to try several AR demonstrations to experience the technology for themselves, and will be given an introduction to ARToolKit, a software library that enables developers to easily build their own applications.

Lecturer
Mark Billinghurst, University of Washington