Best Practices for Teaching Haptics

Tutorial

Abstract

The goal of this half-day tutorial is to communicate best practices for teaching haptics courses. This will be accomplished through presentations from experienced haptics instructors who have used a variety of content, haptics development platforms, and teaching styles over a collective 30+ years of teaching haptics, primarily at the graduate level. In addition, tutorial attendees will communicate their own identified best practices and participate in small group exercises to identify challenges, and solutions to those challenges, in teaching haptics.

Motivation

As the field of haptics technology expands, both as a field of academic study and as an important component of interfaces in consumer and industrial products, there is an increasing need to educate the next generation of haptics researchers and practitioners. The maturation of some areas of haptics technology (in particular, kinesthetic interfaces) has over the last decade resulted in a set of principles and algorithms that provide a common framework for teaching and learning haptics. In addition, strategies for teaching and documenting successful techniques in emerging areas of haptic technology are needed.

Primary Objectives

At the end of this tutorial, we expect that participants will:
• Understand the current landscape of haptics teaching worldwide
• Identify the range of technical content that could be included in a haptics course
• Have learned about strategies for conducting haptics course laboratories and projects
• Have access to useful haptics teaching resources (books, published tutorials, software, hardware, etc.)
• Participate actively in small group activities to define and communicate their own best practices for teaching haptics

Target Audience

Instructors, future instructors (e.g. students interested in academic careers), and employees at companies and research institutes with some familiarity with the haptics field and are interested in:
• Developing a course on haptics at their own institution
• Improving an existing haptics course
• Exchanging haptics teaching strategies with other instructors
• Writing tutorials or textbooks on haptics
• Developing software and hardware platforms for haptics education
• Identifying which core concepts a haptics researcher/practitioner should know

Speakers

Prof. Allison M. Okamura (organizer)
Department of Mechanical Engineering, Stanford University
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Allison is an Associate Professor in the Mechanical Engineering Department at Stanford University, and was previously a Professor at Johns Hopkins University. She is an Aassociate editor of the IEEE Transactions on Haptics and has been a co-chair of the IEEE Haptics Symposium. Allison developed a course at Johns Hopkins called "Haptic Systems for Teleoperation and Virtual Reality", which has been taught since 2000. Her lab URL is http://charm.stanford.edu/.

Sonny Chan
Department of Computer Science, Stanford University

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Sonny is a Ph.D. candidate working under Prof. Kenneth Salisbury at Stanford University. He is actively engaged in haptic rendering research with applications in surgical simulation, and co-teaches the "Experimental Haptics" course with François Conti and Ken Salisbury. The course, with its roots in the Computer Science Department and nearly a decade of history, focuses on haptic rendering techniques and culminates with a challenging, but fun software project. His lab URL is http://jks-folks.stanford.edu/.

Blake Hannaford
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Blake is a Professor of Electrical Engineering at the University of Washington in Seattle. His currently active interests include haptic displays on the internet and surgical robotics. He is the founding editor of Haptics-e, The Electronic Journal of Haptics Research (www.haptics-e.org), and member of the steering committee of the World Haptics Conference. He developed a haptics course called "Haptics Enabled Systems". His lab URL is http://brl.ee.washington.edu.

Karon MacLean
Department of Computer Science, University of British Columbia
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Karon is a Professor in the Department of Computer Science at University of British Columbia. She is an Associate Editor of the IEEE Transactions on Haptics and co-Chair of the 2012 Haptics Symposium. Her research aims to restore physicality to computer interaction, embedding it in the world at the best point of use. Her courses on Human Computer Interaction and Physical Interface Design, in continuous evolution since 2000, emphasize a physical prototyping/evaluation cycle and project-based learning. Her lab URL is http://www.cs.ubc.ca/labs/spin/.

William Provancher
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William is an Associate Professor in the Department of Mechanical Engineering at the University of Utah. He is an associate editor of the IEEE Transactions on Haptics and has been web, publicity and sponsorship chairs for the IEEE Haptics Symposium. William co-developed a haptics course at the University of Utah with Jake Abbott. He has developed new haptics lab exercises for his course that incorporate the use of CHAI-3D and custom-developed hardware. William has been successful in working with students from several of his haptics class projects to produce publishable research. His lab URL is http://heml.eng.utah.edu/.

Schedule		Description
8:30- 9:00	Allison Okamura	*Haptics curriculum design*
9:00-9:30	Sonny Chan	*Teaching haptic rendering*
9:30-10:00	Karon MacLean	*Teaching interaction design*
10:00-10:30	Moderator: Allison Okamura	*Small group activity: Challenges and best practices in teaching hands-on haptics courses*

Schedule		Description
10:30-11:45		Break
10:45-11:15	Blake Hannaford	***Devices for teaching haptics***
11:15-11:45	William Provancher	***Teaching haptics research through course projects***
11:45-12:00	Moderator: Allison Okamura	***Panel Q&A / Discussion***