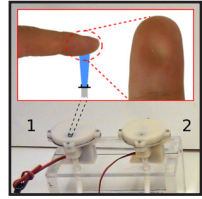


giving the new manikin significantly higher ratings for haptic realism and perceived utility as a training tool.

Design and Control of an Air-Jet Lump Display

James C. Gwilliam, Alperen Degirmenci, Matteo Bianchi, Allison M. Okamura

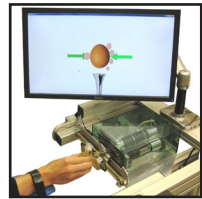
We developed a novel adjustable aperture air-jet pneumatic lump display that directs a thin stream of pressurized air through an aperture onto the fingerpad. The display is designed to produce the sensation of a lump to the finger, with minimal hardware requirements. It has two degrees of freedom, enabling independent control of pressure and aperture size. We describe the construction of the display and demonstrate how the output is controlled using discrete and continuous aperture designs. Display output measured using capacitive tactile sensors illustrates the range of output sizes and pressures obtainable with the lump display.



High-Fidelity Rendering of Virtual Objects with the ReHapticKnob – Novel Avenues in Robot-Assisted Rehabilitation of Hand Function

Jean-Claude Metzger, Olivier Lamercy, Roger Gassert

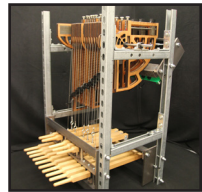
In this paper the Z-width and haptic interaction quality of a 2 degree-of-freedom end-effector based hand rehabilitation robot called the ReHapticKnob are evaluated and strategies to improve these parameters are investigated. An impedance-based controller with force feedback was implemented to modulate the apparent impedance of the robot's end-effector. Additionally, a discrete-time adaptive velocity estimator was used to increase the Z-width of the device. The resulting impedance is evaluated and compared to a commercial haptic device (Phantom Premium 1.5) and the achieved Z-width is analyzed in frequency space and on a K-B-plot.



A Haptically Accurate Practice Carillon

Joseph B. Brink, Ying (Jean) Zheng, John B. Morrell

Mastery of musical instruments remains both a rewarding and challenging haptic task. The carillon is a particularly difficult instrument to practice due to its public nature and variability between locations. A dynamic model of the carillon key (baton) is presented and a design for a haptically accurate practice carillon is proposed. The Passive Dynamics Practice Carillon (PDPC) is able to emulate a range of actual carillons using adjustment of passive masses and a spring. To evaluate the necessary fidelity of such a design, a study was conducted in which participants were asked to discriminate between batons with differing impedance parameters.



Thermal Bilateral Control for Reproduction of Thermal Contact between Remote Places

Hidetaka Morimitsu, Seiichiro Katsura

Haptic sense has recently been getting attention as the third multimedia information in the communication engineering, and this research focuses on the transmission of thermal sensation among the components of the tactile sensation. For the transmission of the sensation, this research utilizes Peltier device as a thermal actuator. Then, the temperature and heat flow of master and slave systems are simultaneously controlled to reproduce the thermal admittance of objects on the systems mutually. By using the constructed system, it becomes possible to realize the state that the objects on the systems exchange heat as if these were directly contacted.

