

## **ELECTIVE IN ROBOTICS 2012/13**

### **List of presentations in Module “Locomotion and Haptic Interfaces”**

#### **1) How does a CAVE work**

- C. Cruz-Neira, D.J. Sandin, T.A. DeFanti, R.V. Kenyon, and J.C. Hart, “The CAVE: Audio visual experience automatic virtual environment,” Comm. of the ACM, vol. 35, no. 6, pp. 64-72, 1992.
- C. Cruz-Neira, D.J. Sandin, and T.A. DeFanti, “Surround-screen projection-based virtual reality: The design and implementation of the CAVE,” Proc. of SIGGRAPH '93, pp. 135-142, 1993.
- Search on the web for other CAVE realizations: see e.g., [http://en.wikipedia.org/wiki/Cave\\_automatic\\_virtual\\_environment](http://en.wikipedia.org/wiki/Cave_automatic_virtual_environment) (links to many videos)

#### **2) The Torus treadmill**

- H. Iwata, “Walking about virtual environments on an infinite floor,” IEEE Virtual Reality Conf., 1999.
- See also [http://intron.kz.tsukuba.ac.jp/torustreadmill/torustreadmill\\_j.html](http://intron.kz.tsukuba.ac.jp/torustreadmill/torustreadmill_j.html). Include the latest compact version (videos available).

#### **3) The Gaitmaster locomotion interface**

- H. Yano, H. Noma, H. Iwata, and T. Miyasato, “Shared walk environment using locomotion interfaces,” Proc. of ACM Conf. on Computer Supported Cooperative Work (CSCW'00), pp. 163-170, 2000.
- H. Yano, K. Kasai, H. Saitou, and H. Iwata, “Development of a gait rehabilitation system using a locomotion interface,” J. of Visualization and Computer Animation, vol. 14, no. 5, pp. 243-252, 2003.
- H. Yano, S. Tamefusa, N. Tanaka, H. Saitou, and H. Iwata, “Gait rehabilitation system for stair climbing and descending,” IEEE World Haptics Symp., 2010.
- Include Gaitmaster design from version 2 to 5 (videos available).

#### **4) Passivity-based control of haptic interfaces**

- R.J. Adams and B. Hannaford, “Control law design for haptic interfaces to virtual reality,” IEEE Trans. on Control Systems Technology, vol. 10, no. 1, pp. 3-13, 2002.
- B. Hannaford and J.-H. Ryu, “Time-domain passivity control of haptic interfaces,” IEEE Trans. on Robotics and Automation, vol. 18, no. 1, pp. 1-10, 2002.

#### **5) Control schemes for kinesthetic haptic interfaces**

- M. Ueberle and M. Buss, “Control of kinesthetic haptic interfaces,” TUM Internal Report, 2004.
- M.-W. Ueberle, “Design, Control, and Evaluation of a Family of Kinesthetic Haptic Interfaces,” PhD Thesis, TU München, 2006 (mainly Chapter 3).

#### **6) How to buy a haptic device for use in robotics**

Suppose you wish to buy a desk-top haptic device for use in robotics (as interface for teleoperation, robot control, etc.). Which are the main characteristics to be considered? Explain meaning and relevance of various technical features and performance indicators for such a device. Do a practical product comparison analysis (two-three products on the web), including also cost.

- M.-W. Ueberle, “Design, Control, and Evaluation of a Family of Kinesthetic Haptic Interfaces,” PhD Thesis, TU München, 2006 (mainly Chapter 2).
- E. Samur, “Guidelines for haptic interface evaluation: Physical & psychophysical methods,” Presentation at Haptic Systems Work. on Hardware Evaluation, 2012.