

## **Role of Haptics in Human-Computer Interactions**

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### **Project Staff**

Mandayam A. Srinivasan, W. L. Sachtler, Jung Kim

We have upgraded the Virtual Workbench, which serves as a visuo-haptic testbed in which graphical and haptic renditions of 3-D objects can be overlaid in space in such a way that virtual objects can be touched where they are seen. Aided by advances in graphics cards targeted at the video game market, the system is now based on a dual-processor Pentium III PC, which facilitates communication between the haptics and graphics rendering pipelines. The haptic interface consists of a Sensable Technologies Phantom, which is now controlled via the commercially available GHOST software package, facilitating rapid model and application prototyping. Graphics are rendered on a standard monitor fitted with a Crystal Eyes system to permit 3-D viewing of scenes.

The system supports a number of research projects by providing software libraries developed on site that (1) permit auto-calibration of the haptic device at startup, (2) provide a unified framework for loading parameters to align the haptic and graphic coordinate systems within an application, and (3) facilitate regular measurement and update of the calibration settings.

We are investigating the use of this system for human-computer interaction methods that make use of our intuitive facility for object manipulation.