Conducting a Real-Time Remote Handshake with Haptics

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Demonstration Abstract

As the Internet and other communication channels mature, many industries are looking at these mediums to not only display information but also to perform real time tasks such as remote vehicle control, remote tuning, interactive collaborations, etc.. These tasks rely heavily on visual senses and the users ability to process information in a timely manner. As networked based applications become more prevalent, so too does the possibility of overloading the visual senses which could lead to reduced performance and perhaps more catastrophic outcomes. However, if the user or operator were also able to utilize the sense of touch to process information, the visual sense overload potential can be alleviated.

Many tasks that are candidates for on-line deployment have, in their more non-networked form, relied on the sense of touch. Take, for example, telesurgery. There are documented cases of telesurgical procedures whereby a surgeon has operated on a patient in a remote location via a telesurgical robot [1]. Even though the value of telesurgical procedures is evident, one of the consequences is the loss of tactile and touch feedback – a sense a surgeon relies on heavily. One of the historical barriers to augmenting such procedures with the sense of touch is the network delay/latency and/or computational latency. It is well known that bilateral force feedback applications are very sensitive to time delays[2].

A demonstration has been developed that illustrates a bilateral telehaptics platform to enable a local user and a remote user to shake hands in real time over a telecommunications network. The platform has been developed around an off-the-shelf six DOF haptic manipulator and a real time operating system. Only the first three DOF of the device are enabled with haptics. The application also includes a proprietary time delay compensation solution to enable a bilateral force feedback interaction even in the presence of round trip network delays on the order of 300 msec as well as packet loss. Not only is the application stable under these circumstances but an accurate force transaction is possible. A picture of a user interfacing with the six DOF haptic device is illustrated in Figure 1.

The demonstration will show two devices connected in a bilateral telehaptic configuration on a local network with a network traffic simulator in between the two devices. This configuration has been successfully deployed in the past over a dedicated network between Geneva, Switzerland and Ottawa, Canada [3]. Video of this event will also be shown.

Figure 1. Remote Handshake with Haptics

