Haptic Overlay Device for Flat Panel Touch Displays

David Wang, Kevin Tuer, Mauro Rossi, Joseph Shu
Handshake Interactive Technologies Inc.
Suite 50, 40 Weber St. E.
Kitchener, ON, N2H 6R3 Canada
ktuer@handshakeinteractive.com

Demonstration Abstract

In an effort to present users with an increasing amount of information, many industries including automotive and aerospace are adopting flat panel touch displays as a user interface. These interfaces are becoming popular due to their reconfigurability so that control and display functions can be embedded in multiple layers or menus. However, one of the disadvantages of this approach is the need for the user to constantly look at the display to operate it.

Conventional interfaces such as automobile dashboards are comprised of a series of sliders, buttons, rotary dials and switches to enable and control functionality. After enough practice, the user develops muscle memory in that the user is able to locate and operate a control device without having to look at it. Replacing these mechanical devices with a touch panel means that the user can no longer rely on muscle memory. As a result, the user is more distracted from the task at hand.

In this demonstration, a Haptic Overlay Device (HOD) is used to address user distraction issues. The HOD is comprised of a conventional off the shelf touch screen display, a custom haptic device, electronics and software. The haptic device has been designed to fit over top of the touch screen. With the HOD, a user is able to feel items, such as buttons and sliders, on the screen. The HOD is further augmented with audio feedback to help the user to identify the specific control device being actuated by the user. Thus, the user can utilize the tactile feedback to identify the class of control device (e.g. slider, button, rotary dial, etc.) and the audio feedback can be used to identify the specific control device (e.g. volume, tuner, temperature control, etc.).

The HOD has 2 degrees of freedom in translational motion with haptic effects being applied in both degrees of freedom. The user operates the HOD by bringing their finger in contact with the overlay material of the device. The overlay material is wrapped around the display over top of driver rollers. These drive rollers are in turn connected to motors. Via the HOD software, haptic effects are translated to the overlay material by the rollers. Alternatively, the motors can be replaced with solenoids resulting in a passive version of the HOD, which relies on a braking mechanism to implement a subset of the effects that can be implemented with the fully active version. Moreover, the mechanical design of the haptic portion of the HOD can be scaled to accommodate a wide range of different flat panels and displays. A picture of the HOD is illustrated in Figure 1.

Figure 1. Haptic Overlay Device.