



## TouchSense® Solution for Portable Navigation Devices

Drivers deal with many distractions — don't let your navigation device be one of them. Immersion's TouchSense tactile feedback system can reduce navigation-device distraction by increasing users' confidence that their input was accepted.

Adding Immersion TouchSense tactile feedback to navigation devices not only improves the user experience, it promotes safer operation within the car and contributes to less touchscreen wear and fewer product returns.

### Highlights

- Allows touchscreens to “touch back,” supplying quiet yet unmistakable, confirmation
- Helps reduce errors, and increase user satisfaction, input speed, and accuracy
- Reduces ‘glance time’—the time drivers take their eyes off the road to control the device
- Provides an alternative to intrusive audio feedback
- Contributes to increased touchscreen and LCD longevity

\*For a summary of recent published findings on the value of tactile feedback in human-computer interaction, see the Immersion white paper *The Value of Haptics*, available at [www.immersion.com/docs/Value-of-Haptics\\_Jun10-v2.pdf](http://www.immersion.com/docs/Value-of-Haptics_Jun10-v2.pdf).



Adding touch feedback to navigation-system touch screens can lead to fewer and less forceful touchscreen presses because the user immediately understands when their input is received: the touchscreen touches them back.

#### **Clear confirmation, less wear and glance time**

Touchscreens are efficient for both user input and data display, but using them while driving presents a challenge. Their sound cues can be hard to hear over noise, and visual cues requiring glance time are often hard to see in direct sunlight. The result is that the user cannot be certain that the device took their input, which can be frustrating and distracting. A common reaction is to repeatedly press the touchscreen—or to press much harder to get a response—which can increase wear on the device.

Adding touch feedback to navigation-system touchscreens can lead to fewer and less forceful touchscreen presses because the user immediately understands when their input is received: the touchscreen touches them back. TouchSense tactile feedback supplies a familiar sense of confirmation very much like mechanical buttons provide.

Adding touch feedback can both increase touchscreen longevity and reduce mechanical failures. Tactile confirmation can also support safer operation by minimizing glance time.

#### **Greater usability**

Independent research\* shows that a touchscreen incorporating touch feedback can:

- Increase speed and accuracy of data input
- Reduce cognitive loading
- Reduce user frustration
- Increase user satisfaction

#### **The TouchSense system**

The Immersion TouchSense system uses software to control an actuator in producing vibrations, or tactile “effects,” in response to touchscreen presses. These effects provide immediate and unmistakable confirmation to the user that their input was accepted by the system.

TouchSense system components include:

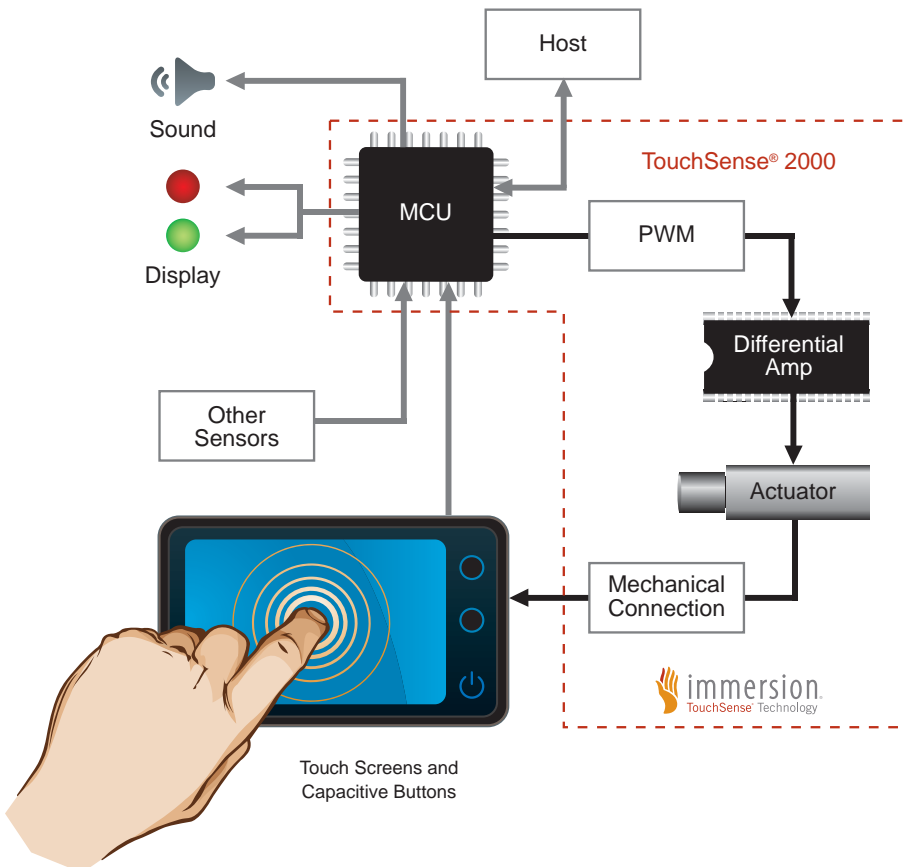
- TouchSense player
- Off-the-shelf, eccentric rotating mass (ERM) actuator
- Tactile effects library for common touchscreen actions

## How it works

When the user touches the screen, a position signal is sent to the microprocessor. The host application interprets this position and commands the lightweight TouchSense player, embedded on the processor, to play a specified tactile effect. The player responds by exerting control over a small actuator, causing it to play the tactile effect, which gives the user the perception of pressing a button.



TouchSense tactile feedback supplies a familiar sense of confirmation very much like mechanical buttons provide.



The tactile effects library, stored in microcontroller memory, supplies a rich tactile feedback vocabulary. It contains predefined waveforms that vary in frequency, magnitude, wave shape, and duration, creating a wide range of tactile effects—from those that reproduce the press and push-away characteristics of various mechanical switches to complex nonlinear vibrations. Customized effects can be added to achieve unique tactile sensations for various UI functions, such as button-press confirmation, map scrolling, and map zooming.

For PNDs, the TouchSense player and effects library can be embedded on a microcontroller that has been field-tested in tens of millions of products. The system works with a selection of market-proven third-party actuators, like those used in billions of mobile phones. Detailed electromechanical design and integration guidelines help ensure an optimal implementation of the TouchSense system in your device.



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## About Immersion

Haptic technologies are transforming digital devices everywhere. Electronics manufacturers are providing digital controls with authentic tactile confirmation. Industrial and commercial manufacturers are increasing the accuracy, efficiency, and safety of the user experience. Content developers are creating a more engaging experience for mobile handset users. Game developers are captivating users with more intense and enjoyable entertainment. Medical schools and hospitals create a more realistic and engaging multisensory experience for surgical simulation training. Immersion technology puts the sensation of touch in the hands of visionary manufacturers worldwide.

Founded in 1993, Immersion Corporation is the recognized leader in digital touch technology and products. Immersion's technology is deployed across automotive, consumer electronics, entertainment, industrial, medical training, and mobile products. Immersion holds more than 900 issued or pending patents in the U.S. and other countries

For more information about adding tactile feedback to your navigation device, visit [www.immersion.com/products/touchsense-tactile-feedback/2000-series/](http://www.immersion.com/products/touchsense-tactile-feedback/2000-series/) or e-mail: [touch@immersion.com](mailto:touch@immersion.com).

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