



## TouchSense® Solution for Printers and Multifunction Peripherals

As printers and other office equipment become more capable, their user interfaces become more complex. Touchscreens provide a simpler user interface that eliminates control clutter, but that lacks confirming tactile response. Loss of tactile response reduces usability, user satisfaction, speed, and accuracy. The TouchSense system solves these problems and provides additional advantages.

A TouchSense tactile feedback system integrated into printer touchscreens restores the certainty of response and tactile qualities people like about mechanical buttons and switches.

### Highlights

- Allows touchscreens to “touch back,” supplying quiet yet unmistakable confirmation
- Helps reduce errors and increase user satisfaction, input speed, and accuracy
- Enables eliminating or minimizing mechanical controls on touchscreen devices
- Replaces distracting audio feedback in quiet office environments
- Contributes to increased touchscreen and LCD longevity

## With the certainty of response that tactile feedback supplies, you can eliminate mechanical controls and expand design options.

### The touchscreen solution

The touchscreen interface offers many user experience benefits. Perhaps the most obvious is clear presentation of only the options relevant to the task at hand, which makes the unfamiliar — for example, scanning a document and forwarding it as a PDF via email — very clear and simple. On a touchscreen, functions that consumers have come to expect on other devices, like scrolling through contact lists with a swipe of a finger, can be easily implemented. And with fewer mechanical buttons, industrial design opportunities expand, making sleek designs possible.

However, one thing touchscreens don't supply is certainty of response. Visual feedback is often not effective because fingers can obscure graphical changes. Audio cues can be distracting in quiet office environments.

A TouchSense® tactile feedback system integrated into printer touchscreens restores the certainty of response and tactile qualities people like about mechanical buttons and switches. TouchSense tactile feedback is direct, private, and quiet, just like mechanical buttons.

Touchscreens with TouchSense tactile feedback can help you create intuitive access to a growing number of features — and supply a better user experience.

### Haptic feedback is ideal

Immersion's TouchSense tactile feedback system provides an ideal solution for touchscreen printers. On a TouchSense-enabled touchscreen, the user perceives that buttons feel real. They seem to press and release like on a mechanical keyboard. This heightened interactivity helps increase user speed and accuracy, restoring them to levels comparable to when using mechanical keys. Independent research also shows that users prefer tactile feedback in their interactions.\*

TouchSense tactile feedback:

- Restores the intuitive mechanical feel that users like about mechanical controls
- Enables more efficient use of touchscreen real estate without degrading usability
- Projects quality and responsiveness
- May improve device lifetime by helping to eliminate repeated and forceful taps

With the TouchSense system, users know immediately that their press registered, so fewer repeated and less forceful taps on the touchscreen my result. Alleviating excessive pressing and force directly contributes to increased touchscreen and LCD longevity and can reduce the incidence of mechanical failures. In addition, tactile feedback is private. It replaces distractive audio touchscreen feedback in quiet office environments.

TouchSense technology permits smaller touchscreen controls because it reduces reliance on visual feedback cues. With tactile feedback, most, if not all, mechanical controls can be eliminated — reducing the number of SKUs needed for controls labeled in different languages.

\*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).

## A competitive advantage

You can use the touchscreen's flexible display capability and the TouchSense system's natural interaction to guide and even delight the user. For example, many touchscreens can provide physics-based scrolling through contact lists and printing options. The interaction is characterized by more mechanical-like behavior and a feeling of mass. Adding a slight pulse or the feel of small detents during scrolling gives the interaction more familiarity and the user more sense of control.

## How it works

In response to presses on a touchscreen, TouchSense software and firmware control an actuator in producing a wide variety of vibrations or effects.

TouchSense system components include:

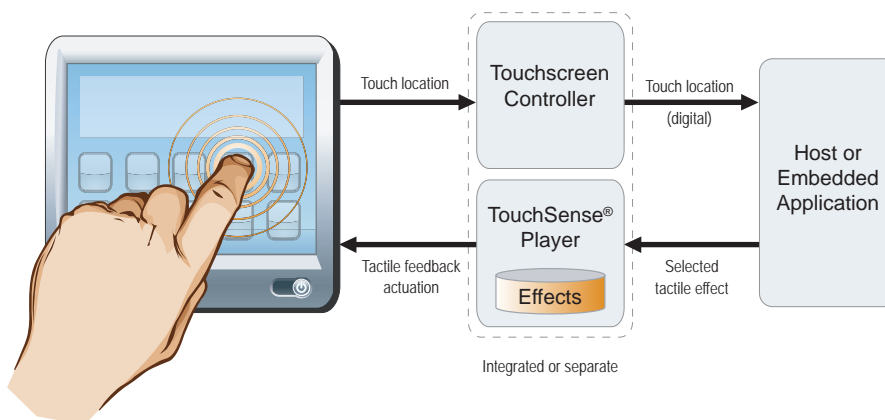
- TouchSense player
- Off-the-shelf, eccentric rotating mass (ERM) actuator
- Tactile effects library for common touchscreen actions

When the user touches the screen, a position signal is sent to the host application. The host application interprets this signal and commands the TouchSense player to control the actuator in playing one of a wide range of tactile effects. These effects are as varied as reproducing the press and push-away characteristics of mechanical switches to complex nonlinear vibrations. The actuator, a component standard in billions of mobile phones, transfers its vibrations to the touchscreen, which gives the user the perception of pressing a button, flipping a switch, or sliding a scrollbar.

The compact TouchSense player software and tactile effects library are embedded in a microcontroller that has been field-tested in tens of millions of products. The library contains predefined effects that can be customized to provide distinctive feedback for various user-interface functions, such as button location, button press, printer adjustment sliders, and contact list navigation. Consisting of readily available components, the entire haptics subsystem is fast and easy to implement. Detailed electromechanical design and integration guidelines help ensure an optimal implementation into the target device.



On a TouchSense-enabled touchscreen, the user perceives that buttons feel real. They seem to press and release like on a mechanical keyboard.





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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 printers or multifunction peripherals, 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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