



Harnessing Human Touch

Today it's keyboards and mice, but I expect interactions, conversational interactions, gestural interactions to be normal . . . including the possibility of haptic interactions – touch. Not just touch screens, but the ability to remotely interact with things.

— Vint Cerf, Father of the Internet, September 4, 2008

Welcome to the Age of Experience. We stand at the edge of a new yet primal human experience. Though the advent of the microchip ushered in an “Information Age” defined by personal computing, always-on Internet access, digital media, and device proliferation, the full impact of this young technology will not be felt until it engages us through *all* of our human senses, not just sight or sound. The experience delivered by today's digital technology is almost completely one way: a flow of information from device to user.

A truly compelling experience requires technology that lets us do more than just “observe and respond.” It engages reflex and instinct to link “action and reaction” in a two-way sensory conduit called touch. The company that can harness *touch*, that most obvious and intimate messenger, will radically alter the way we connect to the world and to each other. It will guide us out of the Information Age with its single-minded focus on *access to* and *quantity of* data, and into something new: an “Experiential Age” focused instead on the *integration* of data and the *quality* of our interactions with it.

At the Core of Personal Experience: Touch

Haptic touch is the ability to feel the world through the tools we hold, how we “feel the road . . . through the wheels of a car we are driving,” says Prof. Andy Clark of the University of Edinburgh. Of the five human senses, touch is the most direct means of communication, the only sense capable of simultaneous input and output. It is at the core of personal experience, and the key discovery of the Age of the Experience. Touch is more than just the passive experience of “feeling” something. It is a means of communicating through direct experience. For example, petting a dog is more than “feeling fur.” It is the enjoyment that comes from sharing a moment with a beloved companion.

Haptic experiences will push our current technological worldview off its foundation and into another framework entirely, and Immersion is leading the way. We will make haptic output as essential to our technology experience as digital text, audio, and video are today.

From Observation to Feeling

Until recently, technology innovators have ignored this most obvious and powerful means of communication. Today, even with our high-end mobile devices, high-definition displays, and digital surround sound, the experience delivered is still something *outside* ourselves, only as close to us as our eyes and ears. Digital information remains two dimensional: something we look *at*, listen *to*, and read *about*. Haptic touch is the missing piece, the sensory element that will transform information into *experience*.

More than sight and sound, touch is the most powerful connection between humans and our world, linking “action and reaction,” providing unmistakable confirmation of our actions with reactions that are innately and automatically understood, not just seen or heard. While the dashed yellow lines on a highway provide a system that let us “observe and respond,” they can’t actually prevent a collision. It is the physical bumps on the road that jolt our bodies and trigger instinct when we cross them, causing us to steer the other direction, back into our lane without a thought. Action and reaction, linked through human touch. Indisputable validation and confirmation, felt from within.

Innovation – Use – Opportunity

Engaging that action/reaction potential of haptic touch, technology in the “Age of the Experience” will bring to life completely new market and economic opportunities in healthcare, telecommunications, entertainment, safety, education and commerce, to name just a few. The potential economic impacts promise equally profound potential for societal transformation as well. Just as movable type democratized literacy and fueled massive social change in the 15th century through growth of *written* information, haptic experience will pave the way to something new in the 21st Century: new ways of learning, exploring, sharing, and understanding the world through direct sensory experience – transmitted, simulated, or recorded. We will move beyond the mere digital exchange of information “for the brain” to a more holistic, all-sensory experience “with the body.”

Bringing the Digital Universe to Life

Immersion is building this new world one layer at a time, addressing the untapped potential of haptic communication through two primary lines of business: Medical and Touch. Around the world, Immersion’s medical solutions enable clinicians to save lives by maintaining and growing surgical expertise through interactive simulation training. These training simulators replicate the look, sound, and feel of actual minimally invasive procedures. Through its Touch line of business, Immersion opens the doors to new ways of interacting and communicating with our digital world in several key market segments including mobile phones, consumer electronics, automotive controls, and industrial and commercial equipment.

Medical

In the medical industry, hospitals, educational institutions, insurance companies, and government agencies are searching for ways to improve training, education, and patient care while reducing medical errors, risk, and the soaring costs of healthcare delivery and malpractice insurance. According to the Institute of Medicine, more people die from medical errors in hospitals than from motor vehicle accidents, breast cancer, or AIDS.

Medical and surgical simulators are revolutionizing healthcare education and the practice of medicine in general. Although 3D medical graphics look realistic, they cannot convey what it actually *feels* like to break through a venal wall with a needle, for example, or cut through the tissue surrounding the gall bladder. A simulated surgical environment with 3D images and haptic touch feedback technology allows a trainee to practice procedures for the first time without ever touching a patient—or for a practicing physician to rehearse a delicate operation *before* going into the operating room. These physicians can traverse a surgical “obstacle course” using realistic medical tools, as touch feedback creates a true-to-life experience.

Thanks to Immersion technology, medical simulators allow healthcare professionals to practice and improve their skills in an environment that poses no risk to patients, where mistakes have no dire consequences, and the use of cadavers and animals is avoided. Gastrointestinal endoscopy procedures are some of the most common, yet the fine-motor skills necessary to perform them are extremely difficult to

master. Immersion's surgical simulators replicate the look, feel, and even the sounds associated with a number of common medical procedures.

Trainee and practicing physicians can “act and react” to hone their skills using surgical simulators: act by navigating an endoscope through the esophagus, feel the deformation of tissue, and then react to the sensation by altering the movement of their hands and fingers. These physicians can learn through a multimodal immersive experience of sight, sound, and touch, which allows them to feel, manipulate, and “operate” on computer-simulated virtual reality tissues and organs, improving precision and lowering patient risk.

Touch: Mobility

Technology advances have transformed our mobile devices from mere phones into the ultimate digital companions for anytime, anywhere information, communications, productivity, and entertainment. But in so doing, they have not only exhausted the limits of what Information Age technology has to offer, they have also exhausted consumers, who suffer from information overload, strained eyes, small keyboards, and the challenge of interacting with tiny buttons and clumsy interfaces. Still, mobile carriers look for new revenue opportunities, new ways to differentiate their products and services by delivering something that will create a better and differentiated user experience.

That something is touch. Despite the fact that we can distinguish between a wide array of tactile sensations, touch feedback has been virtually absent from our mobile experience. Now with Immersion, mobile devices deliver haptic communication for an entirely new, different, and transformational experience. Touch is a high bandwidth communications channel that will become a fundamental aspect of user experience, giving people more fulfilling interactions through their devices—engaging not just eyes and ears, but fingers and hands for greater clarity and simplicity.

Far from the “dumb buzz” of today's cell phones, devices will soon provide a wide range of haptic sensations when pressing virtual buttons, scrolling, or pushing “send.” The haptic dimension makes typing, dialing, Web browsing, and navigation easier and more natural. Type or dial without looking at the touchscreen. Categorize email messages or quickly distinguish between messages received from friends, family, and colleagues simply because you can feel the difference between them. Text messaging, ring tones, call waiting, Bluetooth connections, calendar reminders, battery status, or dropped calls can be understood through a variety of intuitive tactile sensations and cues, not just sounds or colors. When playing mobile games and videos, or watching a movie trailer on a mobile device, people can experience a tactile “thud” to underscore the action of an explosion or crash. Haptic engagement enlivens every aspect of the mobile experience.

Touch: Consumer Electronics

Immersion technology is transforming our interaction with consumer electronic devices into a multisensory entertainment experience. Force feedback and rumble that engage the realm of physical has become the standard experience in video console systems. An off-road racing game ought to allow players to feel every detail of the terrain as they drive and skid over gravel, rocks, sand, and mud, feeling the vehicle's response to terrain features through the steering wheel—and making any appropriate steering adjustments to stay on course. Immersion offers gamers a sophisticated, realistic experience, which is why our TouchSense® vibration technology is behind the “rumble” feature in Sony's DualShock game controller. Immersion delivers a richer, more intense and enjoyable experience for gamers with uncanny realism.

In other portable consumer products such as personal media players, navigation devices, and cameras,

touchscreen controls offer no feedback, making it unclear whether the right “button” has been pressed. A haptic response leads to fewer repeat presses, higher data input speed, reduced errors, and even less wear and tear on devices.. Adjusting the volume of an MP3 player, for example, is faster and easier if the user need not look at the device. Instead, a haptic alternative could let them use a software-emulated virtual control “knob” that varies its resistance in proportion to volume and provides definitive confirmation through an intuitive tactile response.

Virtual and variable touchscreen buttons or dials can now be used with the same certainty and ease as physical keyboards and knobs. At a noisy basketball game where audible cues are hard to hear, haptic feedback can tell the user that their digital camera is out of focus or confirm without a doubt when a picture was successfully taken. In personal navigation systems, haptic interfaces reduce glance time by unmistakably validating that a person’s inputs have been accepted. Drivers can rely on a haptic interface and keep their eyes on the road for improved safety. Haptic interfaces can even help overcome the problem of eye strain due to glare or prolonged use of miniature screens.

Touch: Automotive Controls

For the automotive industry, closing the loop between action and reaction takes on a very important meaning. Immersion helps meet the challenge auto manufacturers and suppliers face in delivering interiors that are at once simple, intuitive, elegant, and safe while accommodating an increasingly sophisticated array of controls. As navigation displays, digital media, communications, and other consumer electronics add to the mix of standard automotive controls, the ability for drivers to feel responses to their actions, and know definitively that their input was received, becomes not only an issue of convenience but one of safety.

With haptic-powered controls ranging from touch surfaces for displaying multiple functions to rugged touch displays and advanced devices that let drivers control a wide range of functions from a single convenient location, auto makers can deliver simple yet powerful clutter-free interiors that meet their high standards for style, safety, and sophistication.

Touch: Industrial and Commercial Equipment

Industrial devices like process control systems, casino gaming machines, cash registers, ATMs, and kiosks offer one-way input buttons and controls that hamper accuracy, efficiency, and overall user experience. For example, modern farming GPS units installed in agricultural machinery allow farmers to manage “zones” to address field variability. Yet, interacting with one-way GPS touchscreen interfaces while operating loud agricultural machinery can be cumbersome if not difficult. Haptic touch controls that provide feedback and confirmation allow people to know immediately whether their input was accepted.

Current office machines such as printers, desktop and IP phones, and copiers do not offer an intuitive, easy user experience due to the inherent shortcomings of traditional touchpad control systems. People normally have to hunt and peck for the right button, with no confirmation beyond a disruptive annoying “beep.” Haptic feedback, however, leads to fewer errors, less redialing, and even less wear and tear from the frustrated user’s increasingly violent jabbing. A variety of tactile “effects” can be delivered to guide a user through programming steps that may include higher level features available on multifunction printers and other types of office equipment. Quite simply, Immersion offers a vastly improved, more accessible and intuitive user experience for the simple or advanced features of office automation equipment.

Latency or lag time between a control screen input and its response can cause users to wonder if the device is working, and in factory and medical settings, this confusion often comes at the cost of safety. With many workers touching medical diagnostic machine “knobs” in a given day, infection and disease can

easily spread. Haptic touchscreens in medical equipment offer professionals the tactile ease of a traditional control pad, improved patient safety due to the immediacy of tactile response, and the added dimensions of modular efficiency with sealed, easily cleaned surfaces.

Immersion brings a full fidelity haptic experience into these controls to complete the user's loop of reflex and instinct, linking action to reaction for greater enjoyment, accuracy, efficiency, and safety. The result is less clutter, faster learning, and greater awareness. .

Haptic experience is the future of digital technology

By layering the primal yet vital sense of touch into our digital lives, Immersion is ushering in a new era. The Age of Information is passing and the Age of Experience is here. Immersion is building an experiential world that will open new ways of communicating, learning, exploring, sharing, understanding, and enjoying in the world we inhabit. Such expansion of the digital universe can present financial opportunities for investors. Our partners are at the leading edge of the revolution as we work together to build compelling multimodal immersive environments for their customers. Employees will enjoy the ride of a lifetime, contributing to the vast social and economic changes to come. People will finally be able to touch the ultimate digital experience as first citizens of technology's new "Age of Experience," integrating haptic communication into their everyday lives in work, play, relationships, and entertainment. Immersion is the touchstone of the Experiential Age.

About Immersion

Immersion Corp. improves the user experience by harnessing human touch for a more compelling experience of our digital world.

With touch becoming as vital to everyday devices as sight and sound, life is more enjoyable, efficient, and safe. People engage in more fulfilling digital experiences. Technology providers, integrators, manufacturers, and distributors enjoy a stronger market presence, an unmistakable competitive advantage, and a greater revenue opportunity by creating more intuitive devices and user experiences.

As more and more portable or interactive devices integrate a haptic dimension, makers of consumer, industrial, and medical technologies turn to Immersion as the touchstone of the Experiential Age.