

IEEE Haptics Symposium – Workshop on Affective Haptics – Proposal Abstract – Immersion Corp.

Immersion Corp.'s haptic feedback technology is now found in more than 300 million mobile devices worldwide (2011) and has experienced exponential growth in the past few years. Although this technology is primarily used for confirmation and notification scenarios, it has potential to enable affective experiences for end users. This talk will review Immersion's research into affective mobile haptic experiences from 2005 to present.

In 2005-2006, Immersion explored the idea of creating 'hapticons' to be used for emotional messaging on mobile feature phones. The framework relied on an SMS infrastructure and defined a fixed mapping between SMS symbols (i.e. ☺, <3, ☹) and statically triggered haptic effects. Several key challenges were identified with this simplistic approach: actuator performance limited expressive capabilities and it was very challenging to have the effects triggered appropriately. A smiley face emoticon might trigger a series of vibration pulses that are supposed to mimic the pattern of a person laughing (*bzzzzz-bzzz-bzzz-bzzz*), but this just doesn't *feel* like laughter.

Immersion next explored the idea of 'hapticons': enable the sender of the message to explicitly author the tactile sensation that will be experienced by the recipient on receipt of the message. This project, called 'Craft your Tap' created a communication framework to allow a message sender to tap a sequence of pulses which are delivered to the recipient and used to construct a notification. This enables idiosyncratic tactile messaging and removes the constraint of a fixed effect mapping. Though more personal and playful than a hapticon, Craft Your Tap rendered on a standard phone motor is restricted to primarily rhythmic expression which restricts the emotional content significantly.

The next prototype, called "Touch Trails," focused on two new components to the experience: real-time multi-user interaction, and well-synchronized multisensory feedback. The "Touch Trails" app uses two touchscreen mobile phones to create a 'shared space' between two remote users. Each user's finger creates a luminous particle trail that is displayed on both devices simultaneously. When the trails intersect, a haptic sensation is felt by both users. Although the multisensory feedback was relatively simple (a light trail and a subtle haptic *whirr*), the fact that the modes were well synchronized created a sense of mutual presence and greatly enhanced the emotional connection between users. Although the application is abstract, users were observed to engage in emergent play.

Building on the touch trails app, the 'Frostbox' app enables two users to view a shared photo. The photo can be marked up by blowing on the phone to 'frost' the image, which then allows each user to trace out primitive drawings. Both users feel a haptic texture when either user is drawing. This app was well received by users, especially by couples who could immediately use it for emergent, affective interactions. Laughter and improvisation was a common reaction. The haptic feedback was described by one user like this: "It feels like he's drawing on my hand."

Immersion research is currently developing a variety of new haptic display technologies and applications. We will discuss those that are public and describe our future vision of affective haptic devices and applications with attention to the commercial realities of bringing these ideas to market.