

# Researchers develop 'feel effect' vocabulary to tell stories with sense of touch

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Sound effects and visual effects have long been standard tools for entertaining audiences, but even as storytellers increasingly turn to haptic feedback to engage the sense of touch in games, theme park rides and movies, they have lacked a common vocabulary to describe or access these "feel effects." Researchers at Disney Research Pittsburgh are beginning to fill that gap.

In a study to be presented at the ACM Symposium on Applied Perception, Aug. 8-9, in Vancouver, Canada, Disney researchers worked with human participants and a Carnegie Mellon University psychologist to establish a library of 40 feel effects matched to descriptions that designers without a deep background in haptic effects can readily understand.

"Currently there are no guidelines to design haptic experience, so we formulated a procedure that associates haptic patterns to events in the story the same way as we describe these events with words and phrases," said Ali Israr, senior research engineer at Disney Research Pittsburgh.

The feel effects explored in the study range from common phenomenon, such as heavy rain or light rain, to more specific experiences, such as squeezing into a cockpit or feeling a hamster run across your back. And the library of effects are categorized and described in such a way as to help designers develop new sensations as needed.

Haptic feedback comes in a variety of forms, but this study concerned

only vibrotactile effects and specifically those created by an array of vibrators embedded into a chair back, such as in gaming chairs, theater seats and ride vehicles, or in apparel such as game vests.

The researchers began by designing preliminary feel effects for descriptions in everyday language. Participants read the description, experienced the associated haptics, and then were asked to rate how well each effect matched the description.

Using a simple interface with sliders they were also given the chance to show how the effect might be changed to better fit the description. The initial feeling of "light rain," for example, might be changed by sliding the value for "how many drops" to the lower end of the scale. The final effects and their descriptions were then tested on a second group of participants to see if there was agreement between different subjects. They also were tested to determine how well the descriptions matched to synonyms – heavy rain vs. a downpour.

Israr said there was general agreement between the groups, though some feel effects gave the subjects more trouble than others. "Squeezing into a cockpit" and "squeezing into a cave" were low scoring effects and some people had a hard time differentiating between an elbow poke and a joystick poke. In some cases, he said, that may be because people have less real-life experience with the effect; in some cases, it may reflect a technical shortcoming in the effect.

The effects were organized into families – rain, multi-legged locomotion, striking, brushing, pulse and motor sounds. People were asked to identify the extreme ranges for each family – a heavy vs. light rain, a calm heartbeat vs. a racing heartbeat. "This enables a designer to pick a desired feel effect and then have some tools to control them, to tune them to a given situation," Israr said.

Many more feel effects need to be added to the library and many more issues remain to be addressed, such as how different array configurations alter a feel effect and how vibrotactile sensations can be coordinated with other feel effect modalities, he added.

**More information:** In addition to Israr, the research team included Jill Lehman, Siyan Zhao and Kaitlyn Schwalje of Disney Research Pittsburgh and Roberta Klatzky, Carnegie Mellon professor of psychology. More information is available on the project web site at [www.disneyresearch.com/project/feel-effects/](http://www.disneyresearch.com/project/feel-effects/)

Provided by Disney Research

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