

FeelCraft: Crafting Tactile Experiences for Media using a Feel Effect Library

Siyan Zhao, Oliver Schneider
Disney Research Pittsburgh
4720 Forbes Avenue, Pittsburgh
{siyan.zhao, oliver.schneider}
@disneyresearch.com

Roberta Klatzky
Carnegie Mellon University
5000 Forbes Avenue, Pittsburgh
klatzky@cmu.edu

Jill Lehman, Ali Israr
Disney Research Pittsburgh
4720 Forbes Avenue, Pittsburgh
{jill.lehman, israr}
@disneyresearch.com

ABSTRACT

FeelCraft is a media plugin that monitors events and states in the media and associates them with expressive tactile content using a library of *feel effects* (FEs). A *feel effect* (FE) is a user-defined haptic pattern that, by virtue of its connection to a meaningful event, generates dynamic and expressive effects on the user's body. We compiled a library of more than fifty FEs associated with common events in games, movies, storybooks, etc., and used them in a sandbox-type gaming platform. The FeelCraft plugin allows a game designer to quickly generate haptic effects, associate them to events in the game, play them back for testing, save them and/or broadcast them to other users to feel the same haptic experience. Our demonstration shows an interactive procedure for authoring haptic media content using the FE library, playing it back during interactions in the game, and broadcasting it to a group of guests.

Author Keywords

Feel effect; haptic vocabulary; haptic gaming experience; haptic authoring tool.

ACM Classification Keywords

H.5.2. Information interfaces and presentation: User Interfaces—Haptic I/O

INTRODUCTION

In recent years, haptic feedback has been frequently utilized to enhance user experience in movies, shows, games, rides, virtual simulations, and social and educational media [1-4, 6]. Despite a long history of use in communication, haptic feedback is a relatively new addition to the toolbox of special effects. Unlike sound or visual effects, haptic designers cannot simply access libraries of effects that map cleanly to media content, and they lack even guiding principles for creating such effects. Recently, Israr and

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the Owner/Author.

Copyright is held by the owner/author(s).

UIST '14, Oct 05-08 2014, Honolulu, HI, USA
ACM 978-1-4503-3068-8/14/10.
<http://dx.doi.org/10.1145/2658779.2659109>

colleagues [5] compiled a library of FEs that extended the richness of an interaction by engaging the haptic senses in the same way that libraries of sound and visual effects are used to engage the auditory and visual senses.

FEEL EFFECT LIBRARY

A key feature of an FE is that it correlates the semantic interpretation of an event (as judged by human users) with the parametric composition of the sensation in terms of physical variables, such as intensity, duration, temporal onsets, etc. In carefully designed perceptual studies, Israr et al. [5] showed that:

- semantically similar FEs lie in close proximity in haptic parameter space,
- semantic reasoning for relating events can be applied to the haptic space to derive new FEs.

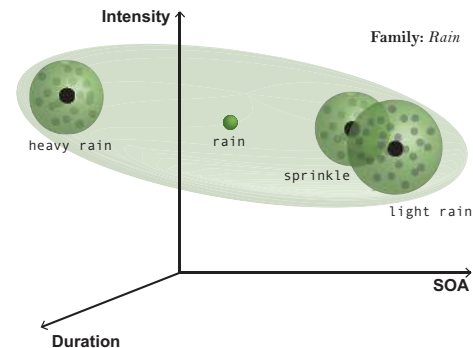


Figure 1. Feel Effects spanning a parametric sub-space

For example, FEs associated with **heavy rain** and **light rain** are located at the extreme ends of the “Rain” family in the haptic parametric space (see Figure 1). We compiled a library of FEs associated with the six families of events shown in Figure 2. Each family has a predefined parametric structure and the FEs in a family vary with respect to one, two or three parameters [6].

FEELCRAFT ARCHITECTURE

The FeelCraft plugin channels media events to dynamic tactile sensations on a haptic device. Figure 3 shows the architecture of authoring and playback haptic media. In a typical **playmode**, *media* (1) triggers action monitored in *media plugin* (2). The *Event2Haptic* (3) associates events to

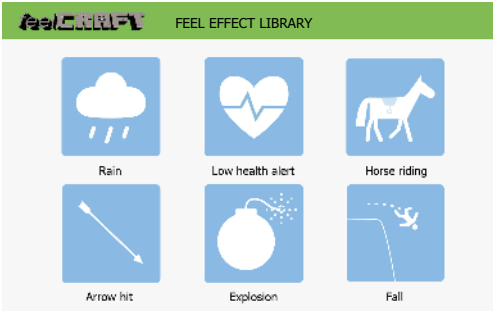


Figure 2. Families in the current Feel Effect library

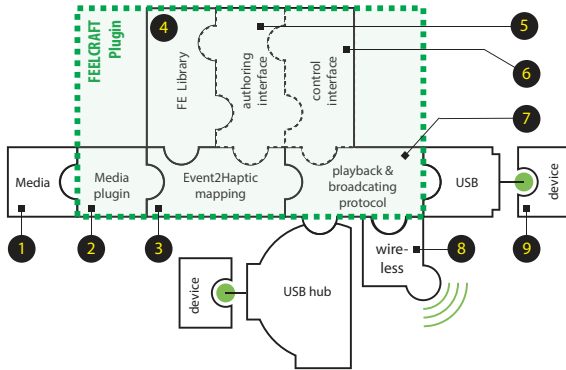


Figure 3. Haptic authoring and playback architecture

specific FE stored in the *FE library* (4). The associated FE is *played back* (7) using custom protocols that either send the FE to a specific *haptic device* (9) or *broadcast* (8) it. In **craftmode**, users create and save new FEs and tune, edit and playback existing FEs on the *authoring and playback interface* (5,6). Users can also assign FEs to media events by overwriting Event2Haptic mappings.

Figure 4 shows the Feel Design Editor (an authoring and playback interface) that allows users to create new haptic sensations or select and modify previously created sensations from the existing FE library and associate them to actions from the media.

DEMONSTRATION

The demo is interactive and engages up to six guests at one time. Figure 5 shows the demonstration layout. Guests sit on chairs with commercially available Marvel Avengers haptic pads (Vybe Haptic Gaming Pad, Comfort Research, USA). Guest A interacts with the authoring tool interface and generates new FEs or uses existing FEs from the library. Guest 1 sits by and interacts with guest A during media production process. Guest U plays the game with a hand controller and the multisensory experience is broadcasted to guests 2-4 sitting on gaming pads waiting for their turns. Host H explains the demonstration and interacts with guests.

Figure 5 also highlights interactions spaces for the demonstration. Two gaming pads are attached to a computer running the game, plugin and Feel Design Editor (space I), while the remaining gaming pads are connected to a wireless hub (space III), which receives the broadcasted

a



Figure 4. FeelCraft Design Editor. (1) FE Library, (2) presets, (3) authoring interface and (4) control interface

haptic media. One monitor screen shows the authoring tool and the other screen shows the game. The game is also projected on a wall for stand-by, passing-by and engaged guests G (space II).

Our plugin runs on a PC and monitors actions, states and events from a popular sandbox indie game “Minecraft” (<https://minecraft.net/>). It extracts six recurring events from the game and associates them with six FEs from the families in the FE library. Guests can play FEs, tune them, make new FEs, save them and broadcast them for other guests for this entertaining and exciting sensory experience.

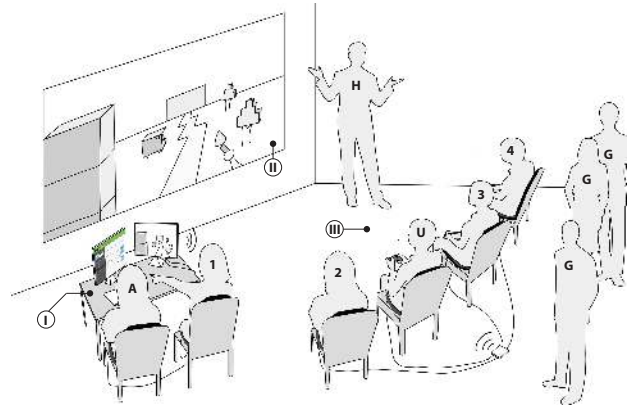


Figure 5. Installation at UIST

REFERENCES

1. D-BOX Technologies Inc., <http://www.d-box.com/>
2. Farley, H. & Steel, C. A quest for the Holy Grail: Tactile precision, natural movement and haptic feedback in 3D virtual spaces. In *Same places, different spaces. Proc. ASCILITE Auckland* (2009), 285-295.
3. Immersion Corporation. <http://www.immersion.com/>
4. Israr, A. *et al.* Surround Haptics: Sending Shivers Down Your Spine. *E-tech ACM SIGGRAPH* (2011).
5. Israr, A., Zhao, S., Schwalje, K., Klatzky, R., and Lehman, J. 2014. Feel Effects: Enriching Storytelling with Haptic Feedback. *ACM Trans. Appl. Percept.* 17 pages (in press).
6. Watl, M., Rainer, B., Timmerer, C., and Hellwagner, H. A toolset for the authoring, simulation, and rendering of sensory experiences. In *Proc. International Conference on Multimedia*. AMC Press (2012), 1469-1472.