

TouchCast: An On-line Platform for Creation and Sharing of Tactile Content Based on Tactile Copy & Paste

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Abstract

We propose *TouchCast*, which is an on-line platform for the creating and sharing of tactile content based on *Tactile Copy & Paste*. *User-Generated Tactile Content* refers to tactile content that is created, shared and appreciated by general Internet users. *TouchCast* enables users to create tactile content by applying tactile textures to existing on-line content (e.g., illustrations) and to share the created content over the network. Applied textures are scanned from real objects as audio signals, and we call this technique *Tactile Copy & Paste*. In this study, we implement the system as a Web browser add-on to create *User Generated Tactile Content*.

Keywords: User-Generated Content; Tactile interaction; Tactile transmission; Web-based interaction.

ACM Classification: H.5.2 [User Interface]: Haptic I/O, H.5.3 [Group and Organization Interfaces]: Web-based interaction

General terms: Design, Human Factors

Introduction

Many tactile devices have been proposed to date. However, it is difficult to create and to render tactile textures, and therefore, we have only a small amount of tactile content. In order to disseminate and enhance tactile experience, it is necessary to increase the amount of tactile content and have general users experience it.

On the other hand, in the case of visual and auditory content, a large amount of User-Generated Content (UGC) exists [1]. In particular, Japanese amateur creators have developed a unique culture of UGC derived from the Otaku culture. NicoNico Douga (<http://www.nicovideo.jp/>) and Pixiv (<http://www.pixiv.net/>) are on-line sharing sites for self-made movies, illustrations, and novels (Figure 2). These Web sites have more than 15 million users and are very interactive; amateur creators create, share, appreciate, and remix their own or others' content. By this cycle, a large variety of content is created and shared. The introduction of this cycle to tactile content is expected to be effective in increasing the amount of tactile content. Therefore, in this study, we implement a platform for the creation and sharing of *User-Generated Tactile Content (UGTC)* that is created, shared, and appreciated by general Internet users (Figure 1).

ACM 978-1-4503-1582-1/12/10. When designing our platform, it is important to ensure that the transmission and rendering of realistic tactile textures involve easy techniques. In the study presented in [2], a finger-shaped sensor received a stimulus when stroking objects, and the scanned data were transmitted for being displayed in real time. In another research, force and acceleration values were recorded to reproduce realistic haptic sensations [3]. These attempts were successful in transmitting realistic tactile textures, but they required complex calculations and devices that only a professional can use, and therefore, they are unsuitable for non-professional users. For the creation and sharing of *UGTC*, we devise easy methods to render and transmit a variety of tactile textures.

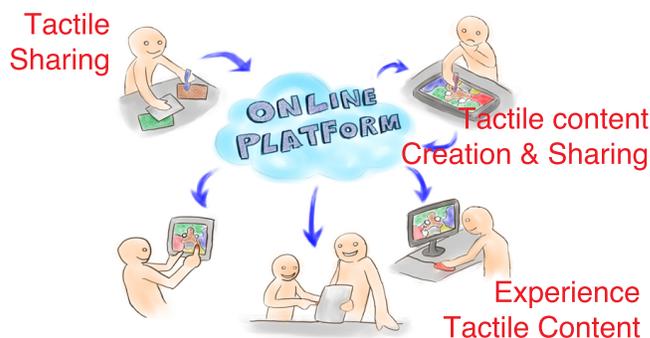


Figure 1. Conceptual sketch of UGTC

Proposed method

Tactile Copy & Paste

To simplify tactile rendering, the TECHTILE toolkit [4] uses audio signals for tactile stimulations and provides sounds recorded by a microphone from a voice coil (Figure 3). Audio signals can be easily handled on the Internet because many protocols and file formats have been proposed. In our previous study, Haptic Duplicator [5], which uses the method of the TECHTILE Toolkit, was proposed for performing *Tactile Copy & Paste* (Figure 4). The method involves copying tactile textures from surface textures of real objects by stroking a microphone and pasting it on 3D content. In this study, copied textures are applied to illustrations, and we aim to create illustrations with various types of tactile feedback.

Platform for Creation and Sharing of Tactile Content

To help general users create tactile content, we design the platform to include a tactile editor. Referring to existing visual editors e.g., PhotoShop (Adobe Inc.), we design the interface such that it is capable of applying tactile textures

to illustrations, similar to the task of painting different colors. Considering that it is difficult to create tactile textures at present because we do not have general models for tactile generation, we collect scanned textures and provide tactile material for the creation of tactile content. The more users scan and share tactile textures and create content, the larger is the tactile database. Moreover, the created content can be shared and experienced from anywhere in the world with a simple and inexpensive tactile device.



Figure 2. Japanese illustration sharing site Pixiv



Figure 3. Recording tactile texture by using a microphone

Implementation

TouchCast is implemented as a browser add-on. The add-on is optimized for the Japanese illustration sharing site Pixiv because this site has many illustrations and is suitable for verifying our system’s effectiveness. The platform is aimed at supporting the creation and sharing of *UGTC* and has two modes: creation and experience modes. In the creation mode, users choose an illustration to which they want to apply a tactile texture and they also select areas to which the texture is to be applied; this is similar to the use of the pen tool in PhotoShop (Figure 5). Textures are applied by the technique of *Tactile Copy & Paste*. The textures are stored in our tactile database, and users can use them for content creation.

In the experience mode, users experience tactile content with a tactile device. When they touch areas to which tactile textures have been applied, the system plays back vibration sounds from the voice coil (Figure 6). Further, the play-back speed changes according to the users’ movement [3][4]. If the speed of the cursor increases, the play-back speed also increases. In the real world, a similar phenomenon occurs: if we touch real objects that are stationary, we cannot feel vibrotactile sensations. This method is based on the real world, and therefore, we can provide a variety of realistic tactile textures. We also provide a pen-shaped tactile device that is optimized for *TouchCast*. The device consists of a voice coil, an audio amplifier, an electro-conductive rubber, and a microphone. The device is based on the method discussed in [4] and can record and provide various tactile textures (Figure 7).

By using these techniques, users can apply tactile textures to illustrations in a manner similar to the task of painting.

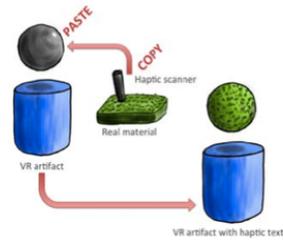


Figure 4. Tactile copy & paste



Figure 5. Overview of creation mode



Figure 6. Using the pen-shaped tactile device



Figure 7. Prototype of the pen-shaped tactile device

Conclusion

In this paper, we presented *TouchCast*, which is an on-line platform for the creation and sharing of *UGTC*, based on *Tactile Copy & Paste*. In this system, users can create tactile content and appreciate the various shared content easily on the Internet. Tactile textures can be copied from real objects and handled as easy-to-handle audio signals on the Internet. In a user survey, some users said that it is important to search for specific tactile textures. To facilitate such a search, it is necessary to develop a simple search engine for tactile textures. In *UIST 2012*, we will provide a sequence of tactile content that has been created and experienced and show the essence of tactile designs. Further, in order to develop a search engine, we intend recording tactile textures and user-associated keywords.

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