

Synesthesia Suit

Yukari Konishi¹, Nobuhisa Hanamitsu¹, Benjamin Outram¹
Kouta Minamizawa¹, Ayahiko Sato², Tetsuya Mizuguchi^{1,3}

¹Keio University Graduate School of Media Design,

²Rhizomatiks Co. Ltd. ³enhance games, inc.

4-1-1 Hiyoshi Kohoku-ku Yokohama-city Kanagawa, Japan 223-8526

{y.konishi, hanamitsu, ben, kouta}@kmd.keio.ac.jp, ayahiko@rhizomatiks.com, t@mzgc.net

Author Keywords

Haptic Design; Haptic Suit; Virtual Reality; TECHTILE;

ACM Classification Keywords

H.5.2. User Interfaces: Haptic I/O

INTRODUCTION

Synesthesia Suit provides immersive experiences for whole body by using haptic sensation. The system includes a suit, a haptic controller and designed tactile waves. Instead of vibration feedback which are used such as conventional game controller or smart phone, we designed haptic effects as well as designing sound effects. We developed this for the game “Rez Infinite” that will be released for PlayStationVR.

RELATED RESEARCH

There are some researches using multi-channel tactile feedback for a gaming environment. Surround Haptics[1] proposed moving tactile strokes using multiple separate vibrators for a gaming chair, and they also proposed Mango[3], which was a editor for multi-channel tactile feedback system. In these researches, they focused on designing the spacial dynamics of the vibration patterns, however, in this paper we aimed to design haptic effects based on TECHTILE[2] method so as to create the embodied immersive experience for the user.

PROPOSED SYSTEM

Synesthesia Suit: As shown in figure 1, Synesthesia Suit has 24ch tactile actuators and it was designed to be easy-to-wear and variable for various size of the body. The actuators are put on positions; *shoulder, arm, back of the hand, hip, thigh, knee, shin, instep, stomach and back.*

Synesthesia Engine: We developed the control software as shown in Fig 2. It controls 24ch tactile signals and render tactile signals to any positions in real time by using the library of designed haptic effects.

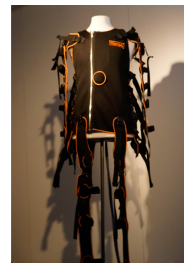


Figure 1. Suit Overview

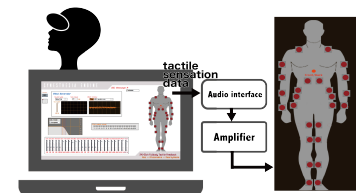


Figure 2. Synesthesia Engine and hardware connection

HAPTIC CONTENT DESIGN

Our concept in haptic design was to make the users feel as if they dived in the world of Rez. Using PlayStationVR Head-Mounted-Display, the user can experience visually immersed world of the game. In addition to that we designed the whole body haptic experience to be united with the avatar in the game. Through a lot of discussions, we drew out the imaginative haptic feeling of the game from the game creator, and then converted into each vibrotactile signal on various part of the body. Not only the synesthetic haptic textures caused by the background music, we also designed the haptics for the interaction like shooting, hitting, and warping.

ACKNOWLEDGMENTS

This research was funded by JST-ACCEL Embodied Media project. Technically supported by Mr. 2bit ISHII(buffer Renaiss) and Rhizomatiks team. The costume was designed by Mr. Toshihiko Sakurai(SQUNABICONA).

REFERENCES

1. Israr, A., Kim, S.-C., Stec, J., and Poupyrev, I. Surround haptics: Tactile feedback for immersive gaming experiences. In *Proc. CHI '12 Extended Abstracts on Human Factors in Computing Systems*, ACM (2012), 1087–1090.
2. Minamizawa, K., Kakehi, Y., Nakatani, M., Mihara, S., and Tachi, S. Techtile toolkit: A prototyping tool for designing haptic media. In *Proc. SIGGRAPH 2012 Emerging Technologies*, ACM (2012), 22:1.
3. Oliver, S. S., Israr, A., and Karon, E. M. Tactile animation by direct manipulation of grid displays. In *Proc. ACM Symposium on User Interface Software and Technology (ACM UIST) 2015*, ACM (2015).

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(s).

UIST'16 Adjunct October 16-19, 2016, Tokyo, Japan

© 2016 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-4531-6/16/10.

DOI: <http://dx.doi.org/10.1145/2984751.2985739>