
Experiencing Human-to-Human Touch in Digital Games

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Abstract

Digital games have been equipped with novel control styles which promotes natural interaction. However, Human-to-Human Social Touch (HHST) has not been investigated as a gaming apparatus thoroughly. We believe that HHST can be a valuable contribution since it can convey different messages with different patterns and would provide a rich collaborative experience with physical contact. To explore this area, we developed the Sensation which is a control apparatus detecting the different touch types between two players. To observe the gaming experience we implemented the game, *Shape Destroy*, and conducted a user study with 30 participants to understand its effects on player experience. Results showed that HHST, provided by the Sensation, added to game experience boosting social, ludic and emotional aspects.

Author Keywords

Social touch; human-to-human interaction; gaming; controller; control apparatus; pervasive games; physical games; SFCS; Touché; game design; game research; embodied interaction; exertion games; exergames.

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ACM Classification Keywords

H.5.2 Evaluation/methodology - Input devices and strategies - Interaction styles

Introduction

Embodied interaction methods which do not require specific controllers have provided more natural ways to interact with games. However, the effects of human-to-human social touch (HHST) to digital games are not investigated thoroughly.

We believe that HHST is capable of providing novel experiences in collaborative game play of co-located players. Firstly, HHST can convey different messages and different patterns may mean common meanings for users. [4] Therefore, it can be considered as a sophisticated controller. Secondly, it can provide a more immersive experience by becoming invisible to players as a controller. Tertiary, different touch patterns are likely to provide space for novel mechanics which combines digital and physical properties of the game.

To investigate the usage of HHST in gaming we developed the Sensation which can detect different touch patterns between players and the game Shape Destroy specifically designed for HHST. The Sensation and the Game were played in the simulated version of DubTouch environment comprised of double-sided displays allowing players to play the game in a face-to-face position. We also conducted a user study in order to understand its effects on immersion level of players.

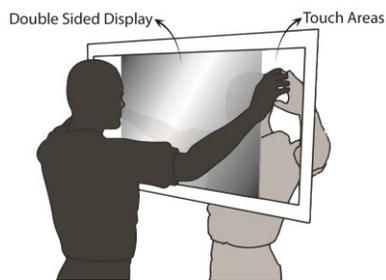


Figure 1: Conceptual DubTouch Environment [1]

Background and Related Work

Any touch interaction between two people is regarded as social touch. This can be referred almost every kind of contact with other people in our daily life. Patterns like hugging, bumping fists and shaking hands are forms of social touch and they have different meanings by having different characteristics [6]. Moreover, touch patterns could refer to various meanings and actions, which flourish the bond and communication between players [1]. Therefore, HHST may be used as a controller which can trigger different actions and the same time facilitate social interaction with physical contact.

Several studies on games have focused on the body contact of players. *Musical Embrace* [5] facilitates a hug between two players by making them hug a pillow together. Another study, *intangle* [3], examines the social boundaries while two people touch in each other in a playful context. These studies, however, do not focus on different and discrete touch patterns. Moreover, their concern is social interpretations and design inspirations resulting from human-to-human interaction, while our focus is on player experience presented by the game and the interactive environment.

DubTouch Environment

In our previous study, DubTouch [1] (Figure 1), we investigated the usage of social touch in digital games on a conceptual level. DubTouch is an interactive environment comprised of two-sided display for playing two-player games in a face-to-face position by letting players touch each other. In this study we analyzed HHST patterns which can be used in games. These patterns categorized under Direct Manipulation,

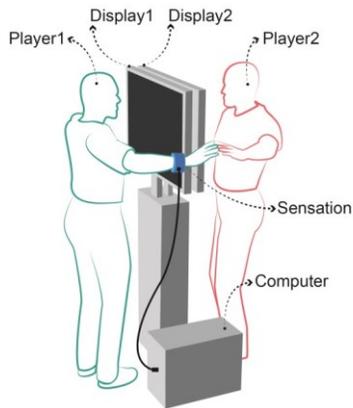


Figure 2: Simulation of DubTouch Environment with the Sensation Controller

Two Hand, Hand Posture, Two Users, Physical Impact, and 3D Space. This study is based on the preliminary results of DubTouch environment. Moreover, the game *Shape Destroy* is a modified version of a game designed by the experts in our previous study [1].

Sensation Controller

We developed Sensation for detecting different kinds of touch patterns between players. It uses Swept Frequency Capacitive Sensing method introduced by Sato, Poupyrev, and Harrison [7]. The prototype which we used during the user study was connected to a power supply and to a PC over the USB cable. Figure 1 illustrates the initial setup we used during the study. Imitating two-sided display concept, two screens are positioned backward to each other. While playing, each player is able to his/her own screen. Their hands touch each other next to the screen.

In our current prototype, we shrank the previous prototype to a wearable wristband which has wireless capability. One of the players needs to wear the Sensation module on his/her wrist. Afterwards, Sensation should be calibrated by two players. The module can detect up to 6 touch patterns based on the area of touch patterns.

Game: Shape Destroy

We improved the game that is designed at the workshop of our previous research [1]. It is a two-player collaborative game. The aim is to destroy the different objects by collaboratively performing the required gestures. We used the touch patterns in Figure 3 drawing upon the previous study. The shapes which matches with the gestures are visible only one player at a time. Therefore, players should be in a collaborative

communication to be able to destroy the shapes with right patterns.

Effects on User Experience

We conducted a user study with 30 participants to investigate the effect of HHST on gaming experience. Participants played the *Shape Destroy* by both Sensation and gamepad. We observed an increase in shared, ludic and affective involvement level which are the dimensions of immersion experience according to Calleja [2]. Therefore, we believe that several aspects suggest that HHST can contribute to the gaming experience. These aspects are as follows:

Social Touch as a controller

HHST, provided by the Sensation, contributed the shared feelings of players. Shared involvement increased as it is easier to read the other player while in physical contact. Another aspect, different touch patterns involved in the game added to the collaborative gaming experience. Physical contact transformed into a playful activity enhanced with different kinds of discrete touch patterns. Different from the previous studies we were able to facilitate social touch as a control apparatus which moves skin to skin contact beyond social interaction and transform it into an entertaining activity.

Invisible Controls

Collaboratively playing the game was harder to adapt with a gamepad since players were not accustomed to use the controller (gamepad) as a game mechanic. When they get adapted though, it became mundane to check the other players' controller all the time. This problem was overcome with *the Sensation* by establishing the invisibility of controls. Social touch is

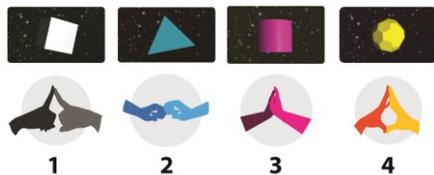
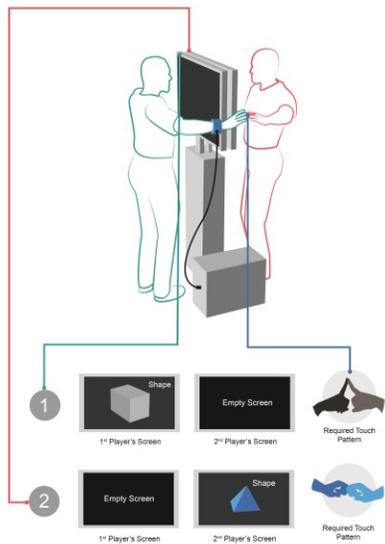


Figure 3: 1) 1-Finger 2) Bro-fist 3) Palm Touch 4) 4-Finger



one of the common communication types, so controlling the game is more natural and easier with Sensation. Participants were better at concentrating the goal of the game, therefore ludic involvement increased. Furthermore, we observed that apart from the digital game rules, forming the right touch patterns also became a gaming experience. Players enjoy the physical part of the game as much as the digital side.

We provided innovative game mechanics and interaction styles. The first thing was face-to-face position of players resulted from the use of double-sided displays. This added a mystery to the game. This mystery resulted from the interaction style could be easily solved by letting players explain the shapes in their own screen. However, by adding “no-talking” rule which is unusual for digital games, we achieved to that even in a simple game, HHST may lead to novel mechanics.

Shape Destroy was a game that can be consumed quickly which is suitable for introducing a novel interface like HHST. However, we believe that it is possible to achieve different game mechanics with *the Sensation* in different and more complex games. It can be further experimented with different game genres.

Conclusion

In this study, we introduced a contemporary controller, *the Sensation*, which enables HHST in DubTouch environment. We developed a controller and conducted a user experiment with 30 participants to inspect the results and observed significant increases in 1) shared 2) ludic and 3) affective involvement, therefore an increase in overall immersion.

Sensation provided a more natural way to interact with games and increased the enjoyment level of players significantly. We believe that addition of HHST in collaborative games is valuable since 1) facilitates social interaction, 2) casts light on novel ludic experiences and 3) create opportunities for new game mechanics

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Figure 4: Flowchart of the Game Shape Destroy
1) 1st player sees the shape and 2nd player does not

1) 2nd player sees the shape and 1st player does not