
Hotaru: The Lightning Bug Game

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Abstract

The *Hotaru* game is a collaborative play experience in which two players use costume elements as input devices. The experiential aim for the game is to give players a sense of connection and transformation.

Author Keywords

Games; Physical Games; Embodied Interaction; Movement Games; Social Wearables; Game Controllers; Costumes.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Gameplay (whether digital or non-digital) is known to put players into a safe space—a ‘magic circle’—that can allow for playful identity transformation and can encourage social connection [1],[2]. Our ongoing research project explores whether and how these effects can be augmented with the introduction of costumes that function as game controllers. Robust wearable technologies are increasingly available in daily life, making the vision of affordable and reliable costume-based controllers a near-term possibility.

We are especially interested in the potential value of costumes as game controllers in *social* play contexts. Historically, wearing costumes loosened social constraints and encouraged people to experiment more freely in social interaction [3]. Costumes are already a part of some parts of gamer culture in the form of cosplay [4]. It seems possible that costumes used to control gameplay could bring players more readily and dynamically into gameplay experiences together.

From a design perspective, wearable controllers offer the potential for new and more flexible forms of social play. For example [5] used smartphones worn on the wrists to enable players of a dance-battle game to move freely through space when competing. Costumes could further free players' hands and bodies for more imaginative and active interactions.

In addition to game design researchers, we believe this work could offer value to those in the CHI community interested in the full range of use cases for wearable technology. Social use cases for wearables typically focus on social networking (sociality from a distance— e.g. [6,7]) rather than augmentation of in-person social interaction.

Related Work

There have been recent work-in-progress and workshop papers considering costumes as game controllers [8,9], as well as a paper focused on creating conceptual models for props and costumes as game controllers [10]. Many researchers have articulated and demonstrated the value of co-located social physical play (e.g. [11, 12, 13, 14, 15]).

Game designers have been experimenting with using existing handheld technologies as game props (for example J.S. Joust, a game that uses of Sony Playstation Move controllers without the rest of the console [16]). Research teams have experimented with creating custom wearable hardware to augment pervasive games (e.g. [17]). In the latter case, the device was designed to help keep players immersed in the game's narrative (rather than using their own mobile phones or laptops as interaction devices, which could break the illusion of the game's world).

Game Design

Hotaru was designed by Kaho Abe, an accomplished independent game designer whose specialty is movement-based social games (see [18]). She was interested in combining costume and gesture, to create a physical enactment of the gameplay identities players take on when they engage in avatar-based play [19]. Abe was inspired by *Kamen Riders*, a Japanese television show with superheroes who have costumes with powers they unlock by making special gestures. The idea was to combine costumes and special collaborative gestures to unlock players' powers together, building camaraderie and connection through interdependence and shared mission. *Hotaru* means 'lightning bug' in Japanese. Abe conceived of *Hotaru* as a game in which the players seemed like fireflies battling together to keep smog at bay. She designed the costume elements to be simple and evocative of this theme. (see Figure 1).



Figure 1. An overview of components of *Hotaru*.

To play *Hotaru*, one player puts on a gauntlet, and the other puts on an energy collection 'tank'. Both costumes illuminate when 'energy' flows through them. The object of the game is to collect energy, then aim it at projected 'smog' to dissipate it. This requires the coordination of both players. The person with the tank moves their hands in an energy collecting gesture to 'fill' their tank. This is indicated by illuminating segments of the tank lighting up. This player cannot see the tank, so they need the other player to keep an eye on it and tell them when the tank is full. Then the players must hold hands for the energy to 'transfer' between them. The second player waits until their gauntlet fills with energy (indicated by all the spikes on the gauntlet illuminating). Then this player quickly raises their hand in the air to release the energy. This causes the gauntlet to emit a loud 'firing' noise. The end goal is to collaborate to release energy as many times as possible in a limited time window (please also see accompanying video).



Figure 2. Costumes had embedded Android-based mobile phones connected to Adafruit mini IOIO boards that drove the light displays.

The two costumes both have embedded Android-based mobile phones connected to Adafruit mini IOIO boards that drive the light displays (see figure 2). Bluetooth connects the Android phones to the IOIO boards. Open Sound Control is used over a dedicated wifi network. Both the main game program (operated on a nearby computer) and the Android apps were coded in Processing using Ketai, OSC and PIOIO libraries.

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