
Flight 37

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Abstract

This paper proposes the idea of combining HCI device “Mindwave” with modern video games. The key distinction between commercially-successful video games is their availability and marketing to end-users. A certain degree of quality is necessary in order to be accepted on retail shelves or popular digital distribution platforms. Flight 37 attempts to closely resemble a commercially-successful game that utilizes the Mindwave.

Keywords

Innovative interface, Virtual Reality, Game, Simulation

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Design, Human Factors, Experimentation.

Introduction

The Mindwave must be a proven consumer product by popular markets in order to achieve worldwide acclaim. The most popular market is the games industry, and it is definitely possible to produce a fun and high-quality interactive game with the Mindwave. Flight 37 is a concept that aspires to kick-start a new genre of

Mindwave-compatible video games, to increase consumer awareness of its capabilities.

Related Work

There is a general lack of games that utilize dynamic aesthetics that react to involuntary player inputs. Most of the games available on the Neurosky store utilize the Mindwave as an additional player input device that affects gameplay.

For example, the game Mindout¹ mirrors the classic game Breakout wherein a player must destroy a wall of bricks by volleying a ball towards it. The Mindwave in Mindout records the player's concentration levels and responds by changing the ball's size accordingly. Although inventive, this game is challenged by the sparse Mindwave market. Unlike Mindout, Flight 37 utilizes the Mindwave for changing the aesthetics during gameplay, and not affecting gameplay itself.

We have further assessed that there are no modern commercial video games that feature manipulation of the mind.

Current Mindwave-Compatible Games

There are a few entertaining and serious games available exclusively on the Mindwave store [2]. The majority of these games are overpriced and would not appeal to a mass-market audience. The games produced and released on the store seem quite simple and compare in quality to a free web-based flash game. NeuroSky products are sold exclusively on their online store, which limits marketing possibilities.

Motivation

The Mindwave is an affordable Electroencephalographic (EEG) device that can interpret frequencies generated by the human brain. EEG devices record electrical information from the human scalp. If mass-marketed, this device could become more affordable and would motivate numerous game developers to produce games for it.

The key advantage we see in the Mindwave is enhancing a game's aesthetics. For instance, it would be possible for the game's visuals to change depending on the levels of concentration and brainwaves generated by the gamer. For instance, in a horror game, the Mindwave would detect when the player is not focused. It then would trigger a random scary event that would guarantee to catch the player off-guard. There are many untapped novel gaming experiences that could feature brain manipulation.

Although excellent video games using adaptive aesthetics exist, they only respond to a player's direct input. In the following examples, we will describe how preexisting games could utilize the Mindwave for indirect player inputs.

Penumbra: Overture

Penumbra is a horror-themed game wherein a core game mechanic is to impose a sense of fear into the player. With the Mindwave, Penumbra can impose a sense of fear by adding ambient sounds such as doors creaking and mice scurrying. This way, the player concentrates on the ambient sounds and spontaneous screeches could occur when the player reaches an ideal level of concentration.



Figure 1. The Neurosky Mindwave headset.

¹ <http://www.mindoutgame.com/>

Portal 2

Portal 2 is a first-person puzzle-platform game in which the player may utilize portals to change gameplay dynamics. The aesthetics of Portal could be enhanced by the Mindwave such as when the player loses focus: GLADOS (who acts as a narrator) could start to say things such as "You're losing your focus on the goal; is this too hard for you? Aww, I'm sorry." Adding this to the game will make the experience feel more realistic and would trigger an emotional response from the player. Furthermore, visual aesthetics can be changed as well. Again, when the player loses concentration, tiles in the level could start falling off the wall, to reflect the lack of focus.

Braid

Braid is a side-scrolling puzzle platform game. It has a beautiful aesthetic that changes whenever the player manipulates time. The Mindwave would be able to provide terrain effects such as rain or snow depending on the player's level of concentration.

Development Plan

Our team interfaced the Mindwave with our C++ game engine to enhance a typical gaming experience. The proposed game utilizes an XBOX 360 game controller for all game inputs while the player can indirectly change the game's aesthetics via the Mindwave.

As per the examples above, Flight 37 will utilize the

Development Steps

1. Analyze the capturing abilities of the Mindwave
2. Assess the different ways to create a compelling game while strongly considering the potential fo the Mindwave

3. Once effective methods of implementing the Mindwave have been discovered, start designing the game with these interactions in mind
4. Thoroughly test each interaction as the game progresses through production to ensure game mechanics work well with the Mindwave

Flight 37 - Our Approach to the Mindwave

Flight 37 is a scrolling shooter game similar to *Raptor: Call of the Shadows*. Flight 37 is programmed in C++ on the Gadget2D engine made by Brent Cowan [3]. The game mechanics are simple: stay alive while shooting and killing off waves of enemies that are trying to destroy you.

Our core goal is to implement the Mindwave to indirectly manipulate the game's aesthetics. In Flight 37, when the player's level of concentration changes during game play, the game's background, scenery, and music will all change depending on the levels of concentration. Some changes can fade in and out of the scenery, or change abruptly. The music will also change by intensity or melody. Using the Mindwave to change these aspects of the game creates a more compelling experience for the player.

Flight 37's future potentiality lies in our cooperation with Neurosky and several distribution channels. For instance, if it were possible to interface the Mindwave with the PlayStation 3 via Bluetooth, then we may be able to distribute the game on the PlayStation network and allow players to utilize the Mindwave for an enhance experience.



Figure 2. Screenshot from *Raptor: Call of the Shadows*.



Low levels of concentration translate to less aesthetics in the game.



Higher levels of concentration lead to more vibrant aesthetics.

Acknowledgements

This student project was developed under supervision of Professor Lennart Nacke in the course INF4350, Human-Computer Interaction in Games, at UOIT.

Gameplay Video

<http://youtu.be/-e0v3Kbz5V0>

Sources

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