Exertion in Interactive Entertainment

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ABSTRACT

Incorporating exertion and physical activity into interactive entertainment has received increased attention over recent years. These exertion games, or exergames, require separate input devices and are often specific to a particular game, however, consumers and experts attribute unique benefits to them: they are believed to positively contribute to general health, fitness and weight management, encourage social interaction between players and can promote a more physically active lifestyle, in particular when used by children and teenagers. However, there are still many open questions in this domain, for example we still do not know what makes an exertion interactive experience successful in any of these areas. We are proposing a special interest group on exertion in interactive entertainment to bring researchers and industry participants with an interest in this together to further understand the role of physical activity in gaming and promote the area as distinct topic. The special interest group will encourage future collaborative efforts and promote reflection on issues in this novel and exciting area.

Categories and Subject Descriptors

H5.2. Information Interfaces and presentation (e.g., HCI): User Interfaces.

General Terms

Human Factors, Design.

Keywords

Exertion, physical, activity, natural, interaction, pervasive, ubiquitous, sports, videogames, obesity.

1. INTRODUCTION

In recent years the use of physical activity to control games and interactive entertainment has increased tremendously. The majority of arcade games are not controlled with joysticks anymore, but with designated input devices operated by full body movements that try to elicit sweat from the players. The success of Dance Dance Revolution has started a trend in transcending these devices into the players' homes, where many physical input devices are now available to be used with console games. The advantages of these exertion games, or exergames, are becoming more obvious and researchers are beginning to understand the appeal these games have for players: they train general health, contribute to fitness and weight management, but are also considered to be more social than traditional games, and players use them to express themselves [1].

2. RELATED WORK

Lieberman [1] collected the numerous studies on the Dance Dance Revolution, an arcade and home console game that encourages people to follow dance moves that are represented by moving arrows on the screen. The players dance on a dedicated dancing pad which contains sensors that detect the dance moves to assign points when the steps were executed in sync with the music. Such dancing games can have health benefits for children and adults alike, Lieberman concludes. Nintendo's Wii console comes with a controller that contains accelerometers and infrared sensors to support full body interactions instead of limited index finger and thumb movements. In order to hit the virtual tennis ball, the player uses the new controller like a racquet, exerting him/herself through upper body interactions [2]. Sony's Playstation offers EyeToy Kinetic [3], a personal training workout game, which tracks a user's body movements using a webcam to provide a personalized workout program in the living room.

NetAthlon [4] is an interactive experience that allows riders of exercise bicycles to race against other remote riders, represented by three-dimensional avatars. The Virtual Fitness Center [5] uses a similar approach with exercise bicycles positioned in front of a video screen. The physical movements conducted on the exercise bicycle are used as input to modify the representation of 3D virtual environments from map information. Reversely, the map information affects the pedaling efforts. Shakra [6] supports physical activity awareness in a mobile setting, and the authors report on the beneficial aspect of competitive progress exchange as encouragement to exercise more. Lin et al. combined pedometer data with a tamagotchi-like experience of caring for a virtual fish: the more steps the user takes during the day, the healthier the fish appears [7]. Breakout for Two [8] supports players who are geographically distant through a competitive game of soccer. Table Tennis for Three is a distributed table tennis-like game for three players, played with regular bats and balls [9]. Push'N'Pull [10] is a networked exercise machine that focuses on a cooperative game to encourage rapport and a

workout at the same time. Airhockey over a Distance uses puck cannons to replicate physical pucks on the remote end of a distributed air hockey table [11].

Conceptually, research has been investigating the applicability of two different frameworks ([12] and [13]) especially the interaction with the Eyetoy gets attention [14]. Other work has emerged that is conceptualizing a more general theoretical framework around the topic, for example Dourish [15] developed foundations of embodied interactions. Also theories evolved around interacting through body movements, and special journal issues [10] have started to examine this topic recently.

3. BENEFITS OF EXERTION IN INTERACTIVE ENTERTAINMENT

Incorporating exertion into interactive entertainment applications usually requires additional effort: new hardware needs to be developed to support the body interactions the game supports. These hardware devices are specific to the game, and hence constitute a significant financial increase to the cost of the game to the consumer. Even with vision-based games, which detect when the player waves his/her arms in the air, a webcam needs to be purchased initially. However, the benefits of physical games seem to justify the additional hardware and development costs.

Exertion games are believed to contribute to a healthier lifestyle, and many buyers of Dance Dance Revolution bought the game to exercise more often [1]. (However, studies have also shown that after purchase, people use the game for entertainment purposes instead.) Players invite others around to stage competition events, the physical activity seem to be conducive to social settings, and players describe their interactions as "performance" [1]. Regular play with exergames can lead to increased fitness, and parents and teachers have acknowledged its potential to encourage children to exercise more, for example the state of Virginia in the US plans to install DDR in every public school to encourage the pupils to dance as a form of exercise [16].

4. FORMAT OF THE SPECIAL INTEREST GROUP (SIG)

We propose a half-day for the activities in the special interest group. The organizers will start with presenting their experiences and introduce the topic. The participants will present their work or interest in the area next. The remaining time will be used to discuss issues that emerged from the presentations and interactions. If any of the participants have built any prototypes, they are encouraged to demo them.

5. CONCLUSIONS

There has been an increasing interest in the combination of exertion and interactive entertainment, from a research as well as commercial perspective. Studies have confirmed the benefits of including full body interactions with interactive computing technology, in particular health benefits and managing weight issues are mentioned, but also the social aspect is notable. A special interest group on this topic will focus research interests on this topic and allow for a networking opportunity which can result in new collaborative projects and promotion of the field through further research on theoretical frameworks and lead to advanced prototypes to advance this exciting new field further.

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