

Ninja Ride – Supporting movement through a rhythm oriented Exergame

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Abstract

In this paper we present the music and rhythm oriented Exergame “Ninja Ride” in which the player has to assume the role of a bicycling, newspaper delivering ninja. The game aims to increase training motivation of children by integrating training aspects with motion gaming and music synchronicity in both gameplay and movement. Bicycling movements on an ergometer and arm gestures in the real world are detected with the “Blobo Ball” peripheral. User-generated content, based on self supplied music, can be integrated to increase replayability and to allow using preferred music in training.

1 Introduction

With the game “Ninja Ride” we developed a serious game for children combining the motivational aspects of a digital game with the physical task of bicycling and arm movements as well as the acquisition of tactfulness. The primary purpose of serious games is not only to entertain, but to teach knowledge or training skills. Through the integration of educational and training aspects into a gaming environment the intrinsic motivation to use the system is increased (Prensky 2003). Furthermore, music can be used as a second motivational aspect to enjoy movement (Karageorghis et al. 2009). This is important because today many children are physically inactive and have sedentary lifestyles, which can result in health problems later (Daley 2009). Because their preoccupations are mostly screen-based activities like videogame playing or computer use, a good solution is the combination of these games with motion tasks. This is known as Exergaming (Daley 2009). Although playing active games is not as effective as doing real sports, studies have shown that the energy expenditure and the heart rate of children during these games are higher than during sedentary gaming and that Exergaming can have positive effects on children’s physical activity levels (Daley 2009; Ni Mhurchu et al. 2008).

2 Related Work

Today, consoles like Nintendo's Wii, XBoX's Kinect or Sony's Playstation Move are responsible for the increasing popularity of active video games that should move people away from their sedentary lifestyles. With success: Lanningham-Foster et al. (2009) showed that energy expenditure while playing Exergames is increased in comparison to television watching or playing sedentary video games as well as Haddock et al. (2009) point out the positive influence on energy expenditure of overweight children through the use of a stationary bike to control a video game. Konami's music related Exergame Dance Dance Revolution gave birth to a second genre of games, related to music. Examples are Parappa the Rapper on Sony's Playstation or the later released Vib-Ribbon, created by the same team, that shares some mechanics with our game as it combines action-based platforming with the need to time the inputs synchronously to music.

Researchers found out that music is important in people's everyday lives (Rentfrow & Gosling 2003) and that it can have positive effects on arousal regulation (Nilsson et al. 2005), motivation (Karageorghis & Terry 1997) and mood levels (Gfeller 1988). Besides, Karageorghis & Terry (1997) showed that the tempo of music can affect movement as well as that the type of music leads to a synchronization of people's movements to the music. Furthermore, through music the perceived exertion rates during exercises are reduced because the attention is diverted to the music (Boutcher & Trenske 1990). The integration of music into Exergames is promising, because the music has a positive effect on people's activity level. Wininger et al. (2003) identified music as most important factor influencing enjoyment of exercise. Also Yim & Graham (2007) state that "music increases exercise enjoyment by increasing positive mood states and reducing feelings of physical discomfort, anger, fatigue, and depression" (p. 169).

3 Ninja Ride – The Game

"Ninja Ride" is an abstracted Exergame catered to children between the ages of seven and eleven. To allow the combination of physical training with the game's mechanics, a peripheral called "Blobo Ball" is used. This new kind of game controller has the form and size of a golf ball and provides acceleration and pressure data through a wireless Bluetooth connection. One of those balls gets attached to a pedal of an ergometer. The acceleration data of that ball is used to calculate the pedaling frequency of the player. A second ball in the hand of the player allows the input of game actions. Both acceleration and pressure data are used to detect gestures like swinging and squeezing.

During the game, the child assumes the role of a paper delivering ninja who has to carry out newspapers. In order to reach this goal, the avatar rides by bicycle through a fictive three-dimensional city and must encounter the post boxes at the roadside by making a fast arm movement to the side with the Blobo Ball. For each post box that is hit, the player earns one point by default. On the street different obstacles complicate the task. The child has to over-

come these obstacles by jumping (the player has to move his arm up) or crouching (the Blobo Ball has to be pressed), otherwise points might be lost. Obstacles are placed at positions that require the correlated actions to be synchronous to a piece of music played in the background. Additionally, in order to get more points, the player has to keep pedaling in the rhythm of the music. Depending on how long the child is pedaling synchronously with the music, the number of points earned for an encountered post box increases (up to five points). This multiplier is represented by a sun that gets the more sunrays the better the child keeps the rhythm. At the end of a level, the achieved points are saved in a highscore.

In the game the children have a freedom of scope because of the possibility to integrate their own favorite music into the game. Boutcher & Trenske (1990) found out that music chosen by the player can have positive effects. When they load a song into the game, they concurrently constitute a new level that is first empty. By playing the level the first time, the child creates a new level by jumping, crouching and throwing newspapers how often he or she wants. At any place an action was made, a fitting object will appear when playing the level again. This can for example be used for the constitution of a very difficult level for the friends of the child.

In addition, a cooperative two-player mode exists for “Ninja Ride”. In this mode two children play the level one after another. The first player tries to get as much points as he can save but there is also the possibility to perform actions at places where no post boxes or obstacles are. In the second round the next player plays a modified game. At each place where player one performed an action before, the corresponding game object exists now. In this way they can reach more points as they normally could.

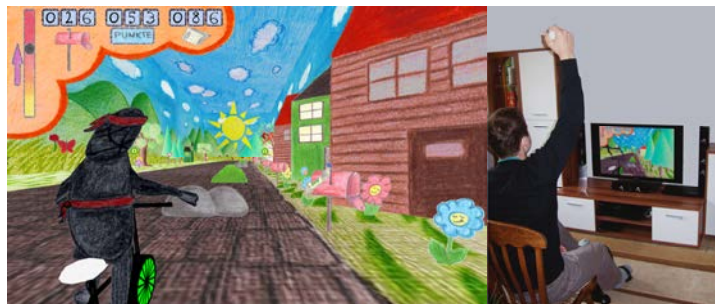


Figure 1: left: game drawn by hand in comic-style; right: player during the game using Blobo Balls and ergometer

4 Conclusion and Future Work

“Ninja Ride” is a physical health game that should train motion skills and through the permanent bicycling also physical fitness and condition. An important aspect is also the procurement of a sense of rhythm. Karageorghis et al. (2009) showed that motivation and endurance can be increased by listening to preferred music, especially if the music is in sync with the conditional training task. Therefore, we aim to provide the possibility to integrate the players preferred music as player created content and automatically adjust the pedaling

frequency to the current track. Because of the different arm movements in combination with the pedaling action and the simultaneous focus on music and obstacles in the level, concentrativeness, capacity of reaction and concentration skills are trained. Besides, in the two-player mode the children learn to cooperate together in order to obtain more points. In order to check the positive impacts on children's physical activity and health, a set of the game and peripherals was supplied to the paediatric clinic of University Hospital Essen, where motivational aspects will be evaluated in post-chemotherapy rehabilitation training.

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