An open-source framework for air guitar games

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Abstract

This paper presents an open-source framework for developing guitar-based games using gesture interaction. The goal of this work was to develop a robust platform capable of providing seamless real-time interaction, intuitive playability, and coherent sound output. Each part of the proposed architecture is detailed and a case study is performed to exemplify its easiness of use. Some tests are also performed in order to validate the proposed platform. The results showed to be successful: all tested subjects could reach the objective of playing a simple song during a small amount of time and the most important, they were satisfied with the experience.

Keywords: air guitar, music game interaction

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1 Introduction

Over the past few years, game industry has added peripheral tools to games enhancing gameplay experience. These peripherals have also increased levels of active engagement with games and widened the appeal of games to audiences who may never have played them before. Examples of such tools include the Eye Toy [Entertainment 2007], Dance Mats [Byrne 2004], the Wii motion controller [Nintendo 2006], shown in Figure 2, among others. One of the most successful examples is the evolution of game interaction with the advent of music games.

The concept of music games refers to video games in which the gameplay is meaningful and often almost entirely oriented toward the player’s interactions with a musical score or individual songs. In the last decade, they have conquered a significant space on game market, and in consequence, game industry is now focusing its efforts on musical instruments and simplified devices that favor user interaction.

Video game interaction represents a research area in constant evolution. It has started with game-specific, few functional controllers, to more sophisticated ones, including features such as motion sensors and adaptable design formats, as shown in Figure 3. Recently, Microsoft presented Project Natal [Microsoft 2009], a system containing depth-sensors, a camera, and a microphone (shown in Figure 4), which claims to be capable of replacing conventional controllers. Such technology would allow a person to use his/her own arms and legs to directly interact with the game.

This “controller-less” approach may be applied to games similar to Guitar Hero or Rock Band. The idea of playing an “air guitar” refers to imitate rock guitar gestures along music without the actual physical instrument. It is more showmanship than musical performance and does not require real musical skills. Instead of just acting along with the imaginary guitar, the user could control an actually playable “virtual” instrument, capable of emitting sounds according to his/her movements.

Concerning the project of an “Air Guitar game”, it is possible to emphasize some requirements in order to obtain a robust and usable application:

- Interaction has to occur in real time. Since the user is playing music, the time constraint is very strict and implies that the delays on visual and audio responses are minimum. This may be obtained by using simple image processing techniques, capable of executing on most computer configurations.

Figure 1: Left: example application being controlled with two yellow gloves. Right: scratch of a game using the platform.

Figure 2: Console peripherals, from left to right: PS3 Eye Toy, Dance Mat and Wii basic controllers.

Figure 3: Controller evolution example, from the Atari controller (left) to the sophisticated Wii Wheel and Wii Zapper ones (right).

Figure 4: Project Natal sensors.