

Examining the usage of Feedback Vibration in Nintendo DS Handheld Game Console

Mohammad Shirali-Shahreza
Computer Science Department
Sharif University of Technology
Tehran, IRAN
shirali@cs.sharif.edu

Sajad Shirali-Shahreza
Computer Engineering Department
Sharif University of Technology
Tehran, IRAN
shirali@ce.sharif.edu

Abstract — Feedback vibration is a standard feature in almost every home video game console controller to vibrate in selected circumstances, such as when the user's character kick the ball or hit the opponent, to immerse the player in the game. In the handheld game consoles this feature causes the handheld game consoles to vibrate. But the handheld game consoles are different than home video game consoles. In this paper we examine the suitability of using feedback vibration in the handheld game consoles. We evaluated feedback vibration popularity among the users. We used Nintendo DS handheld game consoles for this evaluation.

Keywords — Feedback Vibration, Handheld Game Consoles, Nintendo DS, Rumble Pak.

1. Introduction

Nowadays game consoles are welcomed by both youngsters and adults. Therefore the game and game consoles developers are trying to attract more users by improving their consoles and adding new features to their consoles such as improving the game consoles graphics, designing more comfortable game controllers, adding Internet feature to their consoles, and so on. One of these features which is become a standard feature in almost every home video game console is feedback vibration.

Feedback vibration is a technology that enables video game console controller to vibrate in different circumstance such as when the user's character falls into a hole or his car hit to another car or a wall. Feedback vibration is designed to immerse the player in the game and cause him to enjoy more.

The current home video game consoles controllers including Nintendo Wii game console controller (Figure 1), Sony PS3 DualShock gamepad and Microsoft Xbox360 controller have feedback vibration technology.

In addition to the home video game consoles, in recent years the game console companies add the feedback vibration feature to their handheld game consoles. As far as we know, only Nintendo Company adds this feature to its handheld game consoles.

Handheld game consoles are portable and small video game consoles which are very lighter than home video game consoles. Handheld game consoles have built-in controls, screen and speakers. There are also more differences between

handheld game consoles and home video game consoles. Therefore feedback vibration maybe not suitable for using on the handheld game consoles.

In the next section, we will survey the related works that use the vibration in devices to provide further information to the user and the users studies which measure how effective these interfaces are.

In this paper, we examine the suitability of using feedback vibration in the handheld game consoles. We evaluated feedback vibration popularity among the users. We used Nintendo DS handheld game console for this evaluation. More details of this evaluation process and the results are explained in the third section. In the final section the conclusion will be made.

2. Related Works

Vibration is currently used in cell phones as a haptic interface. For example, it is used to inform incoming calls to the phone owner in silent mode. One of the problems is how to control the vibration motor to create the desired vibration effects. There are a number of studies and experiments on this topic such as [1]. The work done in [1] is similar to our work since it tries to collect the users perception for the different vibration levels generated. More details about the theoretical bases and related works are provided in [2] and [3]. The authors of this work also designed a visual tool to create different vibration patterns for use in haptic interfaces [4].



Figure 1. Wii game controller (Wiimote)

A special vibration feedback device for mobile games is developed in [5]. This system has a specially built vibration facility that can provide information about the velocity and acceleration of the car in a racing game.

Another usage of vibration in cell phones is the proposed system in [6]. This system is developed to provide information about the status of the ball – such as its location and whether it is moving or not – to the phone owner via vibration instead of a display. The preliminary results of this system are described in [7].

In addition to cell phones, vibration is used in other devices to provide special feedbacks. It is used to better simulate the environment for the user. For example the vibration is one of the feedbacks the user received in the GAME^{Cycle} [8] exercise system. This system is using computer games and has a special device to encourage disabled people to do certain exercises.

Another study on the use of vibration to provide information to users is the work reported in [9]. In that work, a special device is created which is implemented in the shoe and used to provide the information to the user through his foot. The authors test different types of patterns to find the patterns which users can perceived more accurately.

In addition to vibration perceived by hand in devices such as cell phones, the vibration can be perceived by other parts of human body such as shoulders and heads. In the work done in [10], the authors developed a special device to test whether using other parts of body instead of hands is comfortable for users or not. Their result shows that the device is more effective when it is used in the shoulder. Another results of this approach is provided in [11].

In [12], a special purpose belt is designed for blind people to provide further information about the environment. For example, it is used in combination with an image processing software to inform the user about the location of the person who is talking.

3. Evaluation Process and Results

As we mentioned in the first section, using the feedback vibration technology in the home video game consoles is welcomed by the users. In addition, in section 2 we see that vibration is used in different devices to provide further information to the users.

But using it in the handheld game consoles maybe discomfort the users. In this section, first we explain our evaluation process and then we provide the results which are about the feedback vibration popularity among the users. Finally we analyze the results.

We provided a Nintendo DS Lite handheld game console, a Rumble Pak to enable the feedback vibration in the Nintendo DS Lite console, and the “Mario & Luigi: Partners in Time,” a Nintendo DS game which is compatible with the Rumble Pak (Figure 2).

Nintendo DS is a popular handheld game console. It was released in 2004. Nintendo DS is the most popular handheld game console. Some new Nintendo DS features are the incorporation of two screens; one of them is a touch screen, wireless connectivity, and a microphone port.



Figure 2. Our test pack including a Nintendo DS Lite, a Mario & Luigi: Partners in Time, Nintendo DS game, and a Rumble Pak

The Nintendo DS features a clamshell design, with two screens aligned vertically on either side of the hinge. This console also features online capabilities via the Nintendo Wi-Fi Connection and ad-hoc Wireless networking through Wi-Fi IEEE 802.11b [13].

Most users of this console are children and young people, so many educational games are developed for this handheld game console [14].

In January 2006, Nintendo revealed an updated version of the Nintendo DS which is named Nintendo DS Lite (Figure 3) with an updated, smaller form factor (42% smaller and 21% lighter than the original Nintendo DS), a cleaner design, and much brighter and higher-quality displays (with adjustable brightness) [13].

To enable the feedback vibration in the Nintendo DS Lite console we used a Rumble Pak. The Rumble Pak is a device from Nintendo Company that enables feedback vibration while playing video games. Only in the Nintendo 64, the Nintendo DS, and the Nintendo DS Lite there is needed to a Rumble Pak for enabling the feedback vibration. But in the other game consoles which have feedback vibration, this feature is inserted in the game console and is enabled as a default [15]. The Nintendo DS Rumble Pak is an Option Pak that is released in June 2006. Its shape is like a Game Boy Advance cartridge and is designed to be inserted in the Game Boy Advance game slot (Slot-2) of the Nintendo DS [15].



Figure 3. The Nintendo DS Lite

Various Nintendo DS games support the Rumble Pak such as: Metroid Prime Hunters, Sega Superstars Tennis, Mario & Luigi: Partners in Time, and Super Princess Peach.

We asked 16 persons to participate in our evaluation process. We categorized the participants in three age groups: Children and youngsters (6 persons aged 7-15), youths (6 persons aged 18-25), and adults (4 persons aged 38-47).

We asked the users to play the “Mario & Luigi: Partners in Time” Nintendo DS game on a vibration-feedback enabled Nintendo DS Lite handheld game console which a Rumble Pak was inserted in it.

After each user played the game for an hour, we asked him/her these questions: “Is the feedback vibration feature in the Nintendo DS handheld game console interested for you?” and “Do you enjoy the game more when you use this feature?”.

Five of the six users of children and youngsters group users enjoyed the game more when the feedback vibration feature was enabled in the Nintendo DS handheld game console. But only one user of the youth group from its six users was interested in using feedback vibration feature in the Nintendo DS handheld game console. Finally this feature was not interesting for any of all four users of the adult group.

The information shows that this feature is interested for the children and youngsters, but it is not interested for elder users. One of the reasons is that the feedback vibration feature in the Nintendo DS handheld game console is very soft and not as powerful as the feedback vibration feature in the home video game consoles controller. Also many of youths are experienced this feature in the previous years, so this feature is not interesting for them. Game consoles are not interesting for many adults users. Parents usually want to control the video games which their children are playing, but they do not attention on that is any video game consoles features interesting for the child or not.

4. Conclusion

In this paper, we examined the suitability of using feedback vibration in the handheld game consoles. We evaluated the popularity of the feedback vibration among a group of users. The results show that this feature is welcomed by children and youngsters, but the elder people are not interested in it. Then we analyzed the reasons of these results in this paper.

Many mobile phones are supporting vibration. On the other hand, many mobile phones ships with some preinstalled games. Also recently, some mobile phone manufacturers released various powerful mobile phones which are also capable of running advanced games. For example, Nokia recently released its N-Gage 2 technology which is supported by some of its mobile phones such as Nokia N81 (Figure 4), Nokia N82, and Nokia N95 [16].

The N-Gage platform was released to the public on April 3rd 2008 through the N-Gage official website. The N-Gage service is Nokia's mobile gaming platform that is available for several Nokia S60 3rd Edition smartphones. It is a follow-up to the N-Gage handheld game console. N-Gage is a part of Nokia's Ovi initiative [16].



Figure 4. Nokia N81, One of the N-Series models which supports N-Gage 2 platform

Adding the feedback vibration technology to the mobile phones can be suggested as a new feature of mobile phone games. But this suggestion should also be examined and analyzed before the implementation.

Handheld game consoles also have other features which are ported from home video game consoles such as Internet browsing. It is needed to examine and analyze the usage of these features on the handheld game consoles.

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