

WIND WHEELS: USING MICROPHONE AS AN ALTERNATIVE INPUT METHOD FOR MOBILE GAMES CONTROL INTERFACE

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Abstract. Current mobile phones are equipped with input functions such as microphone, camera and touch screen. However, we observe that these features are not fully utilised as an input method for mobile gaming other than the mobile keypads for text entry purposes. As a result, we created *Wind Wheels*, an experimental prototype for game demonstration using the mobile device's microphone as an alternative input for mobile gaming. Thus, this paper explores the design of *Wind Wheels* using the device microphone as an input method as a game interface.

1. Introduction

In a recent report by Gartner. Inc (Petty, 2007), the growth of mobile game industry was projected to increase from USD \$2.9 billion to USD \$9.6 billion in 2011. Thus, the development on mobile gaming is going to be the next imperative factor in generating advancement for the gaming and telecommunication business. In the early days, the development of mobile gaming was restricted by the limited software specifications. However, recent advancement of mobile technologies with higher definition of colour screens, bandwidth and functionality give rooms for playing more complex mobile game (Kirriemuir, 2003).

Most of the mobile gamer today mainly uses keypads as a main input method for games control interface. It involves an act of doing, and influencing the controller that imbricates the gamer with the game (Galloway, 2004). Game interface is the entity for the players to interact with the game in which Clanton (1998) suggests that it determined the functionality and the satisfactory of gamers. On the other hand, Shelley (2001) highlighted for a poorly constructed game, an alternative game control interface was an essential element for a game that kept and engaged a player from the game play. Hence, we were interested to explore an alternative game control and

incorporate it into the mobile gaming to give players a different and new user experience. This paper illustrates the design aspects of *Wind Wheels*, a mobile game with the use of a microphone as an input method, which was targeted for children aged 8-13 years old.

2. Literature Review

2.1. ALTERNATIVE GAME CONTROL

There are a few general functions in the current mobile phones namely microphone, camera and touch screen. We highlight using the microphone as one of the alternative functions in mobile phones gaming and how it could be incorporated as the alternative interface controller.

2.1.1. Built-In Microphone

Every phone is designed to communicate and therefore it is a must to have a built-in microphone where users can speak and talk to people. Apparently it serves no other usage than communication. We can explore an alternative of leveraging the functionality of a microphone for gaming purpose. A microphone receives the changeable wave's pressure in the air and alters them to electric signals. The design of microphone has included different technology but the one thing that has in common is the diaphragm, where it gathers the sound waves and generates motion which applied to construct the signal (Layton, Brain, Tyson, 2007).

2.1.2. Polar Patterns

Shambro (2007) mentioned there are a few types of polar patterns available for a microphone. They are omni-directional and a microphone's directionality or polar pattern which indicates how sensitive it is for sound to arrive at different angles about its central axis. During the design phase, we incorporated the different polar patterns of microphone into the consideration of designing the *Wind Wheels* prototype.

2.2. VOCAL INTERACTIONS

There are two types of vocal interactions, e.g. non verbal interaction and speech interaction. In the past, voice based or verbal based interaction is the main input of interaction. Recent studies showed that non verbal input is

gaining recognition from developers and researchers in leisure, arts and assistive technology (Sporka, Harada, Kurniawan, 2007).

2.2.1. Non-Verbal Interaction

There are a few categories of non-verbal interaction, which are pitch, volume and timbre (Sporka et. al., 2007). Players could perform shout, hums, blows, hiss or even whistle as a way to control the gaming interface (Sporka, Kurniawan, Mahmud, Slavik, 2006). Thus, we reckoned the potential of using more than one way of verbal interaction for the players while using the microphone as an alternate input for mobile game.

2.2.2. Speech Interaction

Speech interaction is where a person talks, speaks in words or verbal form to interact with the applications for recognition. The description of vocal signal is based on different features, such as timbre or volume (Blimes, Li, Malkin, Kilanski, Kirchoff, 2005). The method is highly desirable for people with motor impairments and disability to replace mouse and keyboards in playing games (Igarashi and Hughes, 2001; Noyes and Frankish, 1992). By using speech people with disability are able to play the games by using alternative ways for enjoyment.

2.2. MARKET GAME STUDIES

Currently, there are not many game developers who incorporate alternative input as their gaming control interface. However, games that are available in the market are *Lament Island* by SimLife and *Surf the Tube* by Zed.

2.3.1 Lament Island

Lament Island is a mobile game created by SimLife, a mobile game developer company in China. This game was voted on IMGA Awards as one of the top 10 games created in 2006 (IMGA Awards, 2006). This game fully utilized most of the mobile phone function and competency (Simlife Inc., 2006). For example, it used microphone as an alternative input method for the players to huff and record Morse code to crack puzzles (Aldridge, 2007). Players were able to scream to get rid of the monsters in the game. *Lament Island* basically opens a new game play experience for mobile gaming industry.

2.3.2 ZED Surf the Tube

Zed produces a mobile game where it involves using microphone as an alternative input method for the gaming interface. The games works when player blow into their handsets microphone to lift the waves (Zed TM, 2005). It is a game where it combined with realistic wave and surfer graphics which live out the ultimate surfing game. Players can blow, shout, and make some noise to increase the volumes of waves. However, *Lament Island* and *Surf the Tube* mainly target the youngsters with complex game play, which may not appropriate for younger children. Thus, we are particularly interested in designing a game using an alternative input method for the children aged 8-13 years old.

3. Justification of Study

We conducted a survey to study the general interest of using alternative input methods for game play among the children. The respondents consisted of 68 primary school children and teenagers (35 males, 33 females) aged between 8-13 years old.

The survey showed that the children and young teenagers preferred playing games were 83.82 % (N=57) while 8.82 % (N=6) expressed dislike in game. When asked the factors that influence the liking on game, the result showed that the highest preference was game graphics, 26.47 % (N=18) and followed by the type of input method as 23.53 % (N=16) in a game play. The respondents were also asked whether there would be any difference in enhancing their gaming experience if they were to use an alternative input method. About 52.94 % (N=36) believed that using alternative input device would make a difference while only 14.70 % (N=10) of the respondents stated it did not make any difference.

The survey result revealed that the children and young teenagers would make a different user experience by using an alternative input method in their game play. Given the fact that mobile games market is growing exponentially these days, there are still limited choices of utilizing alternative game control interface, especially for mobile games. Due to space constraints, some gamers expressed less satisfaction of moving their thumbs and fingers on the numerical keypads, which limit the joy and engagement with the game play. We believed by combining and using one of the mobile phone features, in particular microphone would bring a total different mobile user experience for the gamers. Thus, this also opens up another possibility and an avenue to consider using an alternative input method for mobile game industry. As a result, we created an experimental mobile game, namely *Wind Wheels*, by

utilizing the microphone on the mobile phone as an alternative input method for the targeted users.

4. Design and Development of Wind Wheels

4.1. INTRODUCTION OF WIND WHEELS

We designed a mobile game prototype, *Wind Wheels* by using the microphone as alternative input method for the mobile phone. The combined car racing and environmental friendly mission was developed using Adobe Flash®. There were 3 levels of the game play, e.g. *easy*, *intermediate* and *advance*. The player was required to interact with the game by blowing through the microphone in order for the car to move ahead. Scores would be tabulated at the end of the game to distinguish the different scores and the final winner. Each player was given 3 chances to continue the game. Each chance will be discounted provided they fail to challenge the obstacles.

The aim of *Wind Wheels* is to offer something different from the conventional input method like keypad, keyboard, mouse and joystick. Instead, *Wind Wheels* allows the player to blow through the microphone to interact with the game play.

4.2. DESIGN CONCEPT OF WIND WHEELS

The game concept is based in the theme of “Save the earth with our friendly environment”. The mission of the game is for the *Wind Wheels*’ residents with the mission of saving the city from pollution. There are two characters, a protagonist and an antagonist. Professor Oxy, the protagonist, who guides the players to achieve the mission while Mr. Evil Chloro, the antagonist sets traps and roadblocks along the way to hinder the environmentalist heroes (the players) from achieving the goal.

The players are required to combat the villains in order to gain higher scores and the race to the end point. Otherwise, the *Wind Wheels* city will be “polluted” and occupied by the villains. The overall background design of the game is related to environmental issues e.g. carbon dioxide, wasted gasoline, littering and so forth. The whole design concept aims to create awareness of protecting environment for young people.

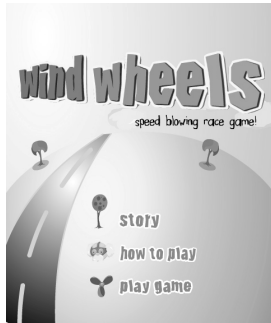


Figure 1. Wind Wheels Introduction Page.

4.3. TARGET PLAYERS

This mobile game is targeted for children and young teenagers aged 8-13 years old. With the consideration of user preference, we designed the game in 2D cartoon illustrated with funky and joyous colour theme.

4.4. COLOUR THEME

Since the theme of *Wind Wheels* is related with environment, we designed the overall look and feel in greenish colour. The menus, highlighted areas and background images are displayed in green (see Figure 2).

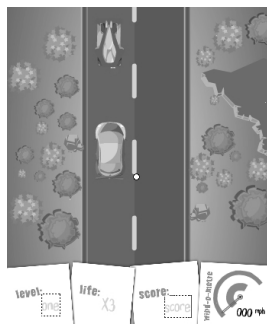


Figure 2. The interface of Wind Wheels on the mobile phone.

5. Conclusion

Mobile phones have grown to be an indispensable tool for us in our daily lives. With the evolution of technology, mobile phones have evolved from a tool for communication purposes to a device incorporating entertainment and information elements. As such, mobile games are growing prospects for the gaming industry. With the consideration of giving different input methods for mobile games, *Wind Wheels* was designed to use the microphone as an alternative input. We noticed with recent advancements, mobile device microphones have started to gain popularity as a medium for mobile interaction among gamers. It opens up a totally different user experience by providing verbal and non speech gestures for gamers. This manner of interaction also encourages higher levels of user participation and interests, thus enhancing game play and user confidence. In the future, we will explore and consider incorporating accelerometers for mobile game play. We will also report the user evaluation from the target group using *Wind Wheels* in the future submissions.

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