

Serious Game Development – Voice Recognition Soccer Game to Prevent Drowsy Driving

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Abstract

Recently, games has grown into not only as a function of simple entertainment but also as an industry that everyone enjoys the play culture as a certain form of leisure regardless of sex and age. The game industry has been developing globally, driven by the growth of the mobile game market and the digital download game market. Serious games were initially used for military purposes, but nowadays, they are diversifying and expanding the genre of the game industry, mainly with purposeful games such as education, training, and treatment. With the spread of serious games, the negative perception of games has been resolved and they contributed to the development of a sound game culture, so the interest of the game industry is on the rise. The purpose of this study is to create a game that is a type of serious games which can be enjoyed by the whole family. Especially, we want to develop a soccer game to prevent drowsy driving, which is suitable for the mobile environment and easy to play for all ages.

Key words: Serious Game, Game Development, Soccer Game

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I. Introduction

Globally, games are now not the simple entertainment but an industry that has become a play culture as a form of leisure for everyone without discretion of sex and age. The global game industry has been continuing to grow, driven by the growth of the mobile game market and the digital download game market[1]. The fields that lead the growth of the game industry are the mobile game market and online-based digital download game market which are expected to grow for years to come, but the growth of the social game market is expected to be smaller than this. The mobile game market, which is leading the growth of the game market, is rapidly growing as the spread of smartphones and the tablet PCs such as iPad has increased significantly around the world. Also, the age of the game user is gradually getting higher and the proportion of female game users has also increased significantly. The social gaming market is also expected to grow significantly over the next three to five years. Even though Facebook is the biggest market of social games currently, it is expected that games that are served out of Facebook will become mainstream in the future. As the social game market grows, social game elements are applied to various fields such as console games, the social game field is also expanding the game area to deal with the games of various genres from the existing casual game-oriented[2].

The Serious Game was originally used for military purposes, however the interest in the game industry is heightening because serious games can contribute to the diversification of the game industry and the expansion of the fields, which are aimed mainly at education and training nowadays, as well as resolving the negative recognition against games and the cultivating a sound game culture. The term "Serious Game" came from the book 『Serious Game』 written by social scientist Cluck Abt in 1977. In this book, Abt defined a serious game as a game whose main purpose is education, not play and pleasure. With the launch of the Serious Game Initiative in 2002, the conference has been activated to discuss serious games and the term 'serious game' was actually used. And with the advent of various serious games, the use of the game has been growing socially. To sum up the discussion so far, we present the characteristics of the serious game as follows.

- It is based on the elements of the game.
- It is created for a certain purpose.
- Users can have the opportunity to experience the game through simulation.

The purpose of this study is to develop an app game to prevent drowsy driving for serious game development. Especially, the game should be easily operated for all ages. In chapter 2, the studies related to serious games are introduced, and in chapter 3, it covers the overall planning, production design and game content of the soccer game that aims to prevent drowsy driving. Chapter 4 explains the actual production method, and the conclusion and future research directions will be discussed in chapter 5.

II. Related Studies

The Content possibly defined as a serious game can be roughly divided into three categories. First, it is a game aimed at the serious game from the production stage. Second, it is the type of games that game elements are applied to the existing simulation program. We can present 'Screen Golf' as a representative example, which was developed for the posture correction and training of golf players initially, but it has been used in the game after being combined with the functions of the game. Finally, it is the type of commercial games that are used to perform special purposes. There are many examples of these. In the United States, there is a case of using the Japanese rhythm action game "DDR (Dance Dance Revolution)" for students' diets. In addition, in the case of Falcon, which was developed with commercial flight simulations, it is being used as an official training program by the Air Force[3].

Table 1. Main Purpose of Serious Game

Training	Training on specific features
Education	Educate specific content
Promotion	Information delivery and promotion
Treatment	Treatment through content usage
Experience	Experience of certain courses and special environment

Today, serious games[4,5] are developed and utilized according to the purpose in various fields. They can be classified roughly into five categories according to their fields and purposes. The biggest field is the education in which the game is referred as a functional game, designed to give users educational or learning effects based on the fun of the game. It is also called 'Edutainment' or 'Edugame' which is a compound word of education and entertainment. The games in the business area are aimed at training various activities and knowledge related to business activities. Especially in the financial sector, simulated stock investment games are widely utilized. Recently, companies are introducing serious games for employee training, IBM's <Innovate> and <A Culture for Success> developed by Brand game can be mentioned as examples. Serious games developed in the public sector are often created by government agencies or international organizations such as the United Nations (UN) for the purpose of informing the general public of policies or international issues.

These games are evaluated to be very effective when compared with existing publicity methods. Typical games include the <Peace Maker> to promote the Palestinian issue and the <Food Force> to deliver the food aid activities of the United Nations Food Program(WFP). Serious games in the medical and health fields are classified into various categories according to their purpose. Especially, the games for the purpose of experience aim to give a direct exercise effect to the user by using one's body directly while playing the game. A typical example is the <RNB Runner>, a game machine combined with a treadmill manufactured in Korea. Nintendo's <Wii Sports> and <Wii Fit> also fall into this category as well.

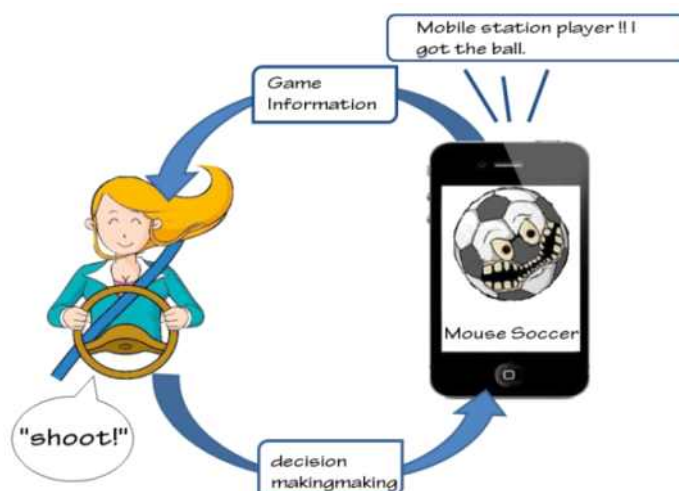
Serious games aimed at military training is to develop for the military training required for mission performance. As the cases of examples, there is the <BCTP> (Battle Command Training Program) game that has been used domestically since the 1970s and a 'War Game' that provides simulated combat situations just like the <Creation 21> developed recently. Also, this category includes <Pung-ig Model> developed for artillery training in Korea and the <Falcon> used in flight training, which reproduces actual training situations through simulations. From the late 1990s, educational games have been developed by educational companies in Korea, but they failed to enter the markets due to the lack of a profit model and the serious games ended up not getting much social attention. Meanwhile, in 2004, the term "functional game" became known as the functional game contest project conducted

by the Korea Culture and Content Agency. Since then, with the functional game competition continued and the release of various examples of functional games around the world, social interest has increased gradually.

After the effectiveness of instruction utilizing commercial MMORPG at school announced in 2005, the possibility that commercial games can be used for a specific purpose was suggested, which has led in various fields such as education industry, contents industry, e-learning content industry, and game industry to participate since 2006. In 2008, the 'Functional Game Forum' was established, led by the Ministry of Culture and Tourism with experts from various fields of society, and the full-fledged policies and plans for the development of the functional game industry have been made. Based on these movements, the actual movement to create a functional game market was taken place in 2009. The supports for the development of infrastructure technology and contents development were carried out and several companies made concrete business for profit-making with functional games. In addition, the Ministry of Culture, Sports and Tourism designated and operated the G-Learning Research School, which introduced educational methods using games to three schools in Seoul and Gyeonggi Province, with the cooperation of the Ministry of Education and Human Resources Development[6]. Currently, various companies are developing functional game contents through a consortium, and businesses are actively promoting functional games through functional game camps and exhibitions. In addition, the G-learning research school project has expanded and five new schools have been designated in Daegu and Gangneung in addition to the metropolitan area, and functional games are being utilized nationwide. With the spread of new devices called smart phones, new types of functional game content types and distribution channels have emerged as well.

III. Content Development Planning and Design

The game name to be developed is Soccer Game and the genre of the game is sports action game. The game platform is a smart phone. The critical idea for playing the game is to use a hearing, not a vision. The theme of the game is a game reminiscent of a sergeant in the army who is playing soccer with his soldiers by speaking but not moving. The overall flow of the game is shown in Figure 1.



[Fig. 1] Game Flow Chart

The concept of game play is language, listening to game information, and playing the game with voice recognition. If you play the game using the language, drowsy driving is prevented and you can play the game with tension and excitement by listening to the sports broadcast. The soccer game which is planned and developed in this study enables pleasant driving by preventing drowsiness, provoking interest through games, and stimulating the body through speaking. In addition, it can also improve the quality of life of blind people because blind people can play games. The structure of the game screen is shown in Figure 2.

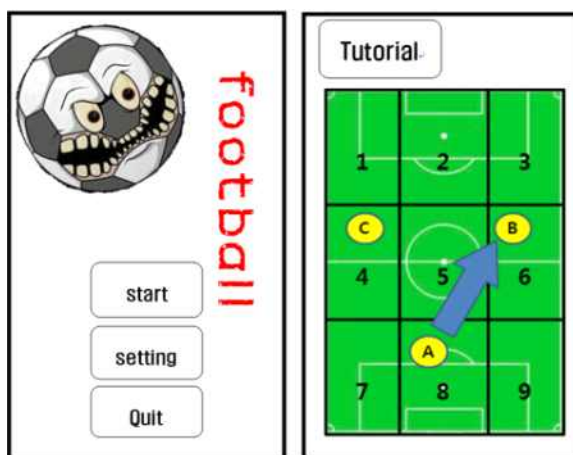


[Fig. 2] The structure of the game

First, the stadium is divided into 3 x 3 to allocate the position of the players and the ball, and each zone is numbered. It informs the location of the players and the ball with the zone number. It conveys information about the game through game broadcasting. Describe the position and status of our team and opponents. Depending on the distance, the pitch of the sound differs which plays a supporting role in game broadcasting. It informs the users of the player's foot sound and the ball's. The game situation you want to know is retrieved using the command word, and it explains the game situation through game broadcasting. The game to be developed in this study is a voice recognition game. Users can play the game using command words, such as shoot, pass, personal skill, setup, and it can distinguish between command word and user's voice. Game sound replaces visual information with auditory. Main broadcasts the game situation with the game broadcasting tone. It tells us the location of our team, the opposing team, and the ball. Auxiliary sounds are surrounding sounds generated by the ball and the players. The pitch of the sound is different depending on the distance. The sound effects consist of the whistle of the referee, the ball-related ones, and the spectator-related sound effect, such as the sound of a whistle, kicking, walking and running. It also has a special effect sound that produces a dramatic effect, raising up the tension by inserting heart sounds. The target users of this game are the male drivers in their 20s to 30s who own cars. These target users feature that more than 90 percent of them use smart phones, have an experience of active service, and like soccer and games.

IV. Game Production

Now is the stage to develop a planned serious game which is of an application of a soccer game to prevent drowsy driving. The initial screen of the game and the tutorial screen where explanation begins are shown in Figure 3.



[Fig. 3] Game Initial Screen

Major contents of the game are as follows. The key technology used in this game is voice recognition. The reason for the low voice recognition rate is that the waveform of sound differs from person to person and also because it changes according to the condition of the neck. In this study, voice recognition rate is increased by reducing the number of subjects in comparison. For example, there is 'left' and 'right' in the voice database. The user says "left". The computer compares only 'left' and 'right' to recognize the voice. All game players' 'left' voices do not turn into a 'right' voice. Create a command to apply this technique in the game. Increase recognition rate by establishing a command recognition step. For example, command shots are divided into roving shots, strong shots, and volley shots. In addition, only compare the first level of the pass and search for the lower rank of that level if the user says so. At this time, the voice recognition rate can be increased by dividing the recognition step. When the game starts, the initial game screen should appear and the game should run normally. The system is at the start of the game and the sound comes out that goes "The match will begin with the ball of 'X' department". You hear the referee's whistle sound and the game begins with "the match between 'X' department and 'Y' department has started". In the event of the pass command, the user sends a 'pass' command and the condition is that the user must have a ball. The action system gives a close-range command when passing to the nearest player. When you pass to the furthest player, you should make a long distance command. Call the player's name when you

pass to a specified player. Say "I passed X soldiers to X soldiers." Ball possession occurs when a soldier catches a ball and the possession of the ball has changed. A voice comes out that says "'x' soldier's ball is caught [at x]". An event that moves to another area is when a soldier has moved to another area, and the condition is that the user must have a ball. At this time, the sound "[x] area" comes out. The moving command event issues a 'move' command that says "the player runs towards X Soldier [X]". The shoot command event is issued by the user with the command "X Soldier shoots from X~". The goal event will make a "Goal" sound when you score the goal. Besides, the game is produced with various sounds that include the explanation of the situation or the footstep sound.

V. Conclusion

Fourth industrial revolution technology is used in many fields throughout the society. When high-tech is used in our daily life, people naturally spend more time and money on entertainment, travel, and leisure. Games are growing fastest in the entertainment industry, and smart phone-based game users are on the rise. Especially if you use a smart phone while driving or drowsy driving, the risk of accidents is very high. In this study, we developed a game application to prevent driving while drowsy for the sake of developing a serious game. The game is played smoothly with sound only by using voice recognition technology. It is also possible to safely drive without being bored and allows blind people to enjoy playing games.

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