

A Configuration Method of Visual Media by Using Characters of Audiences for Embodied Sport Cheering

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Abstract. In sports bars, where people watch live sports on TV, it is not possible to experience the atmosphere of the stadium. In this study, we focus on the importance of embodiment in sport cheering, and we develop a prototype of an embodied cheering support system. A stadium-like atmosphere can be created by arraying crowds of audience characters in a virtual stadium, and users can perceive a sense of unity and excitement by cheering with embodied motions and interacting with the audience characters.

Keywords: Embodied media, embodied interaction, sports cheering.

1 Introduction

In a stadium, spectators can participate in cheering for their team and owing to their presence in large numbers, they can perceive excitement and unity with other supporters of the same team. On the other hand, in sports bars, where people watch sports on TV, it is not possible to experience the atmosphere of the stadium, even though many people may be present in the sports bar. This difference may be attributed to the lack of two factors—sense of presence at the stadium and sense of unity among the spectators and players.

In this study, we focus on the importance of embodiment [1] in sport cheering. Hence, we support embodied sport cheering by configuring visual media as audience by using CG characters and conventional big screens [2] that can provide a sense of reality. Specifically, we focused on actions from the system to the users [3] [4] and on interactions between the system and the users [5] [6]. Then, we developed a prototype of the embodied cheering support system. Here, we create a sense of presence by arraying crowds of audience characters in a virtual stadium, and we create a sense of unity and excitement with embodied motions via actions and interactions between the audience characters and the users.

2 Concept

In this study, we propose a cheering system that provides embodied motions and actions for cheering on the basis of interactions between the system and the users (Fig. 1). There is a large, wide screen in the room, and the system simulates the

stadium using a sports broadcast image and audience characters, thereby creating the sense of presence. The audience characters in the screen excite the users in accordance with the broadcast image, and they generate cheering motions and actions together with the users. In addition, there is a cheering administrator for system control. The administrator controls the system so that anybody can enjoy embodied cheering for the team projected on the screen.

Thus, exciting embodied sport cheering can be realized by watching TV with cheering characters.

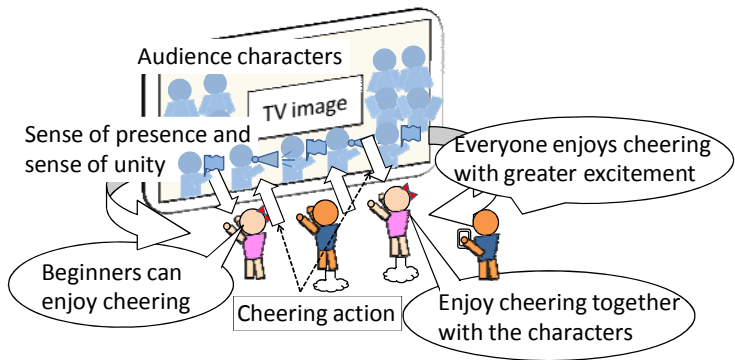


Fig. 1. Concept of the system

3 Embodied Cheering System

3.1 Configuration of the System

Fig. 2 shows the system configuration. A virtual stadium is projected using a large screen (width = 5.8 m, height = 1.8 m), two projectors (EPSON, EB-1735W), a visual computing system (NVIDIA, Quadro Plex 200 D2), and a PC (HP, Z400 Workstation). A soccer game was projected with a BD recorder at the center of the visual stadium by using another projector. We used a speaker for audio output. The iPod Touches, marketed by Apple Inc., was used by the administrator and for inputting users' actions.

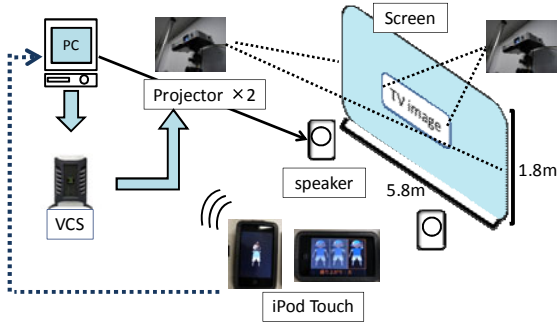


Fig. 2. System configuration

3.2 Configuration of the Virtual Stadium

In order to realize a sense of reality, there are audience seats and characters projected onto the virtual stadium on the large screen. We televised the game at the center of the virtual stadium. Cheerleaders in the audience seats were seated in the front and center rows. The cheerleaders have various cheering tools. There are numerous audience characters in the other seats. Because the television image is incorporated in the virtual stadium, all the users can experience the characters’ cheering by simply watching the TV screen (Fig. 3).

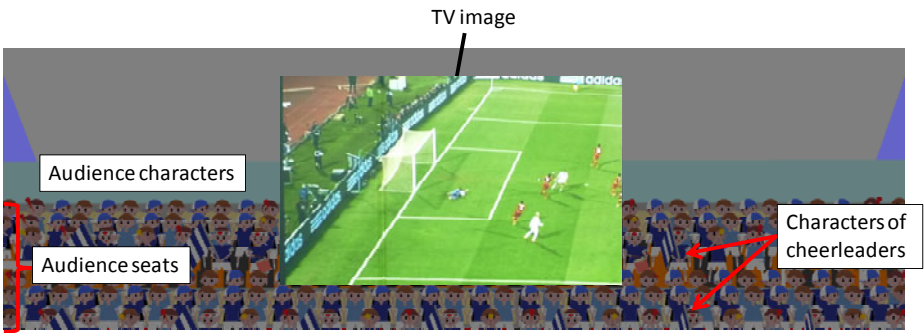


Fig. 3. Configuration of the virtual stadium

3.3 Control of a Character’s Action

In this system, we create a sense of presence through actions from the characters in the system to the users, and we create a sense of unity through the interaction between the system and users. Tables 1 and 2 list the characters’ actions that create a sense of reality and sense of unity. We explain these actions in more detail later.

Table 1. Sense of presence created by the system

Media	Character	Low	Medium	High
Cheerleaders character	Flag	Slow speed	Average speed	Fast speed
	Vuvuzela			
	Megaphone			
	Drum			

Table 2. Sense of unity through interaction between the system and the users

Media	Character	Low	Medium	High
Audience character	Male	Small jump	Medium jump + Hold up fists	Large jump + Rise arm higher
	Female	Small jump	Medium jump + Hold up fists	Large jump + Waving flag
Vuvuzela	—	Constant volume		

4 Direction of Sense of Reality by the System

4.1 Cheering Action of a Cheer Group

In the virtual stadium, there are many cheering characters waving flags, playing vuvuzelas or drums, and holding megaphones. These characters help to create a sense of presence by simulating the characteristic atmosphere of a stadium through their motions and cheering actions (Fig. 4).



Fig. 4. Cheerleader characters

4.2 Control of Cheerleaders by Volume

The motion of a cheerleader character is controlled by the situation of the game. For this purpose, we use the volume of the sports broadcast and the installation site of the system. For example, when the game becomes exciting and the volume of the crowd

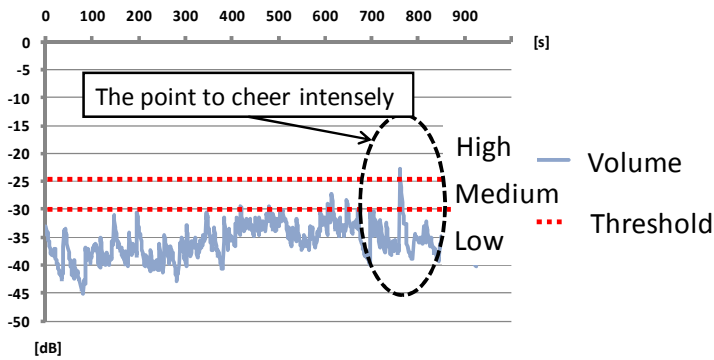


Fig. 5. Control of cheerleaders by using volume

increases, we generate large and rapid motions. Two thresholds control the three levels of motions. Fig. 5 shows an example of the volume and a threshold of the system.

5 Direction of Sense of Unity by Interaction

5.1 Embodied Actions of the Audience Characters

We use the interaction between the users and the audience characters for creating a sense of unity with cheering. Specifically, the motion of the characters depends on the cheering situation, and it is controlled by the system administrator. For example, when the users become excited, the administrator can change the motion of the characters, as shown in Fig 6. To change the motion of the characters, we prepared a level control. Specifically, when the level is low, the characters perform a small jump. The characters smile, raise their arms, and perform big jumps at the middle level. When the level is high, the characters show more joyful expressions than they do at the middle level. Then, the male characters hold up their fists, and the female characters wave a small flag; both male and female characters jump very high.

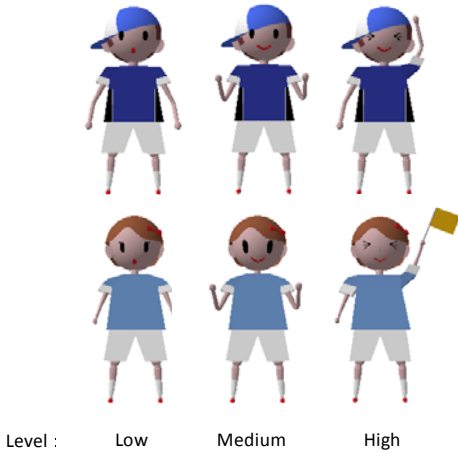


Fig. 6. Jump motions of the characters

5.2 Interaction via Jump

We have measured the acceleration of the users' jump movements to generate the jumping actions of the audience characters. These cheering actions can be shown to many users around the system. The acceleration of the users' movements is measured so that the characters can jump at the same time as the users, providing a level of interaction between the system and the users. Fig. 7 shows an example of acceleration data, as measured by an iPod Touch. We set the threshold for the jump control at the dotted line, and when the acceleration exceeds this value, the audience characters jump (for approximately 0.25~0.4 s).

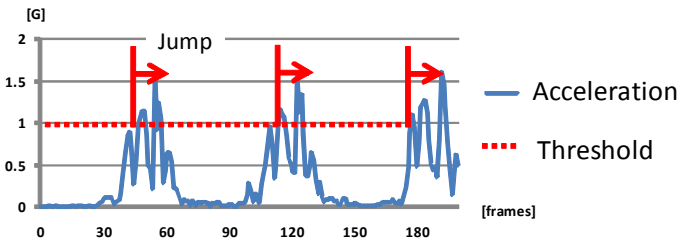


Fig. 7. Jump control by using acceleration

5.3 Interaction via Sound Effects

Users can create vuvuzela sounds by using the iPod Touch (Fig. 8). The sounds indicate excitement and intensify the sense of unity. In addition, the volume of the vuvuzelas intensifies the cheerleaders' actions so that the sense of presence can be enhanced.

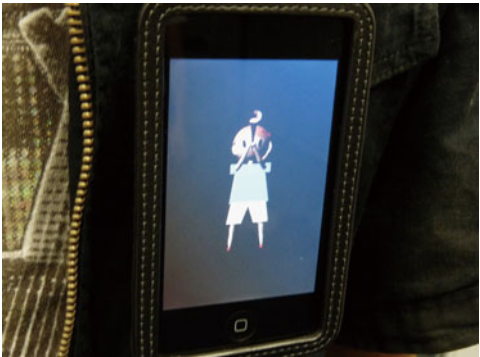


Fig. 8. Screen shot of the iPod Touch

5.4 System Control by an Administrator

We have configured the administrator's iPod Touch so that he or she can control the level of the audience characters' cheering actions (low, middle, or high). Because the

administrator controls the level, users can experience realistic cheering during the game. Furthermore, beginners are able to experience realistic cheering by referring to the characters' actions (Fig. 9).



Fig. 9. Screen shot of iPod Touch for the administrator

6 Using the System

Fig. 10 shows an example of the system usage. Numerous cheerleaders, a virtual stadium, and the televised game are projected on the screen. The users are enjoying the game, and they are experiencing a sense of presence and unity by supporting a team via embodied cheering.

Users have commented that they could enjoy cheering together with the characters because the characters jump and hold their fists according to the users. Some users mentioned that the experience was more enjoyable than the usual television broadcast. Furthermore, some users believe that the system should be provided with more functions to promote cheering. Thus, we confirmed the effectiveness of the system.



Fig. 10. Example of the system

7 Conclusion

In this paper, we proposed a configuration of visual media that promotes sport cheering via physical interactions with many virtual characters, and we developed a prototype system. In addition, we confirmed the effectiveness of the system.

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