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Remote Cheering System with voice in Live Streaming

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ABSTRACT

This research examines how to make it satisfactory live performance where we can feel a sense of unity and presence even if we are alone at home in live streaming. Live streaming has the disadvantages of "it is no different from music programs or DVDs" and "it lacks a sense of unity and presence, and it is boring". The cheering using voice of the audience plays an important role in the excitement of live performance. We assume that even in the situations where the audience cannot share the same venue, listening to the voices other audiences and cheering together them will result in highly satisfying live streaming. In this system, we acquire the voice information of each audience with the build-in microphone of the personal computer and collect the voices of the audience with the WEB call program. We created a program with TouchDesigner that changes the graphics in real time according to the loudness of the collected audience's voice and built a system to display it in combination with livestreaming video. The sense of unity and presence of the live streaming is enhanced by visualizing the voice of the audience and projecting it on the screen. This research aims to create an environment where we can enjoy ourselves even if we are alone at home.

Keywords: Kansei engineering, Live streaming system, Visual programming

INTRODUCTION

In recent years, live streaming has become the mainstream (Piatex Co., Ltd, 2020), (Fujii, 2021). Because the music concert has canceled or postponed by the influence of the new coronavirus infection. The new coronavirus infection is causing a lot of damage to the music and entertainment industry (Pia Co., Ltd, 2020). However, the intention to use flat-rate music distribution service and livestreaming is increasing with the advancement of entertainment online (Recording Association of Japan, 2020). We can easily watch live streaming because it can reduce travel costs and time. Furthermore, live streaming tries various measures not to let audiences get bored such as comment function, social tipping and virtual live production (Zhenhui et al, 2017), (Mitsubishi UFJ Research and Consulting Co., Ltd, 2018). Even when that the number of infected people is decreasing, hybrid live performances that perform both concert and live streaming are being held. Fans who cannot go to the venue or who did not win a ticket to the concert are able to purchase a ticket for live streaming and participate in the concert wherever they like. However, the fans

who participate in the live streaming are more likely to feel alienated than the fans who go to the venue. While entertainment has rapidly become online, live streaming is difficult to feel a sense of unity and presence (Teramoto et al,2010), (Horie, 1989). Therefore, it has not created the same or higher excitement as concert. SKIYAKI Co., Ltd conducted an awareness survey of 2,822 music live fans comparing concert and live streaming (SKIYAKI Co., Ltd, 2020). In terms of overall satisfaction, the questionnaire exceeded 75% of the response that real concert is better. In addition, more than 90% of the respondents answered that real concert is better in terms of sense of unity and presence of the live performance. In other words, very few people evaluate live streaming. Live streaming has less information that the audience can get from the screen, and there is no sharing of hot emotions between the audiences that naturally occur in real concert. Consequently, it has become a problem in the music and entertainment industry. The purpose of this research is to support a live experience where audiences can feel the excitement even if they are alone at home, and to increase the value of the live streaming.

CURRENT SITUATION SURVEY OF AUDIENCE DURING CONCERT AND LIVE STREAMING

Survey of Audience Behavior at Concert

We observed and analyzed behavior and the excitement transition of the audience during the concert. Furthermore, we conducted a questionnaire on the cheering using the voice of the audience during live streaming. First, we watched concert video of idols, singers and rock bands. Then we observed and analyzed behavior of the audience. As a result, we analyzed that there are three types of cheering for the audience: those using voice, those using hands, and those using the entire body.

Next, we analyzed the behavior of the audience in the song sung during the concert, based on Freytag's Pyramid. Freytag's Pyramid is the theory that music and theater starts with a rising action and ends with a calming action after reaching the climax (Cole, 2020). We measured the audience's excitement from 0 to 5. Specifically, we defined 0 for the audience to be quiet and relaxed and 5 for the audience to move their entire body while making a loud voice. Figure 1 is a graph of the behavior of the audience during the song. As a result of the analysis, the audience often cheers using voice toward the chorus, which is an important part of the song, before the chorus such as melody B. The cheering using voice creates the most exciting climax scene. It is an important role that determines the excitement of the live streaming. There is a strong connection between the excitement of live performance and voice.

Survey of Audience Behavior at Live Streaming

We conducted a questionnaire survey for 67 male and female in their teens and twenties who had watched live streaming about cheering using voice during the live streaming. First, we investigated whether they enjoyed watching the live streaming. Then, 60 subjects answered "No". In addition, we

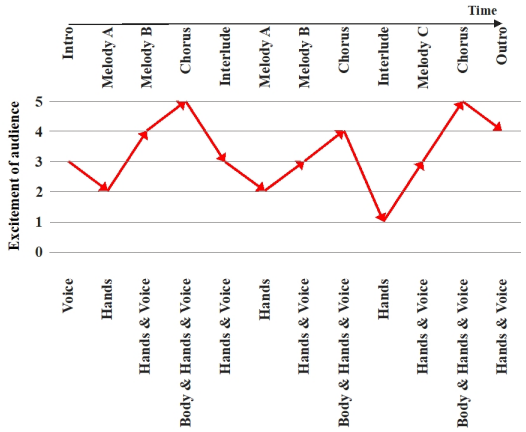

Figure 1: Behavior of audience in song sung concert.

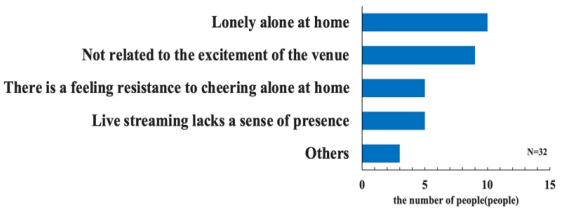

Figure 2: Reasons for not cheering with voice during live streaming.

investigated the situation in which the 60 subjects would watch the live streaming and how to cheer them on. 41 of 60 subjects watch the live streaming alone, 13 subjects watch it with their family, and 10 subjects watch it with their friends. 32 of 41 subjects who watch it alone answered that they would not cheer using voice. Then, Figure 2 summarizes the reasons why the 32 subjects do not cheer using voice. Many of them said, "Lonely alone at home" and "Not related to the excitement of the venue". From the results of this questionnaire, we believe that the live streaming is less exciting than the concert because it is not possible to share emotions with other audiences on the spot and there is no sense of unity or presence. We need a system that could share the voice with others and visualize them so that we can easily see the excitement of the live performances. Based on the above, in this research, we will create a cheering system using voice in live streaming.

CREATING A PROTOTYPE SYSTEM

System Concept

We decided on two system concepts: a design that shows the changes in the excitement of the live streaming immediately, and a design that does not interfere with its video.

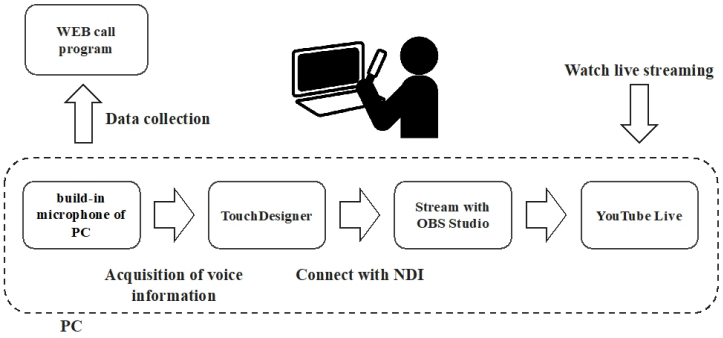

Figure 3: System configuration diagram.

System Configuration

We built a remote cheering system that audience use a computer and a smartphone. Figure 3 shows the configuration of this system. In this system, we acquire the voice information of each audience with the build-in microphone of the personal computer and collect the voices of the audience with the WEB call program. We used LINE Phone for the WEB call program. We created a program with TouchDesigner that changes the graphics in real time according to the loudness of the collected audience's voice and built a system to display it in combination with livestreaming video. We also need to deliver video screen created in TouchDesigner. Therefore, we use TouchDesigner's NDI Out TOP to stream video captures in OBS Studio. We used YouTube as our live distribution site to allow audiences to watch the live streaming.

RESEARCH METHOD

This research aimed to investigate the usefulness of this system and the validity of the concept of using voice. We experimented twice with the prototype system that we created. The content of the two evaluation experiments is to watch live performance video using this system for 30 minutes. Furthermore, we asked the subjects to complete some questionnaires after experiment. In the questionnaires, we investigate the satisfaction obtained when using this system, the change in the sense of unity and presence of the live performance, the change in the shout during the live streaming.

The contents of the questionnaire are as follows:

1) Do you feel satisfied this system more than the conventional live streaming?
2) Do you feel satisfied this system more than the conventional concert?
3) Do you feel that this system has a sense of unity in the live performance compared to the conventional live streaming?
4) Do you feel that this system has a sense of presence in the live performance compared to the conventional live streaming?
5) Did you cheer louder when using this system than when you watched the live streaming before?
6) Did you feel like cheering more with voice when using this system?

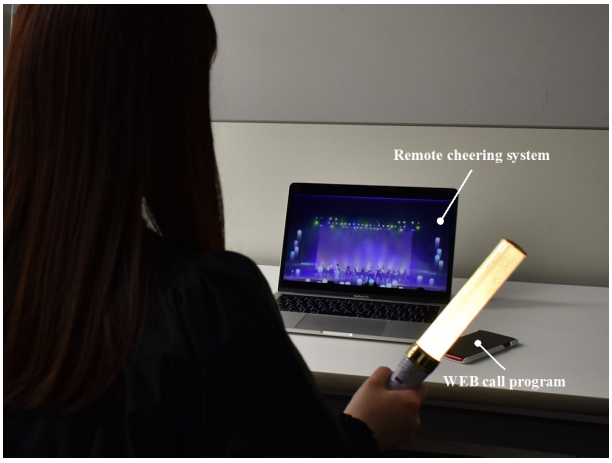

Figure 4: Using remote cheering system.

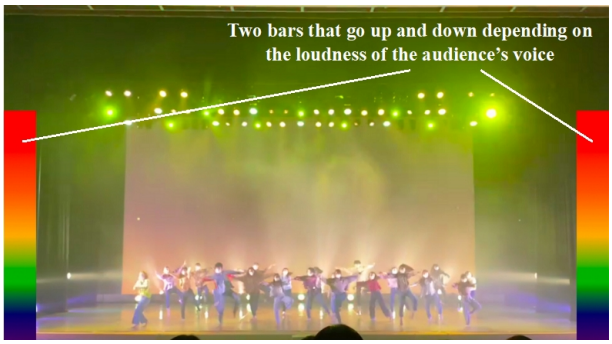

Figure 5: Interface design used in the primary evaluation experiment.

RESEARCH CONTENT AND RESULTS

Research Content

We experimented twice and asked the subjects to complete 6 questionnaires after using this system. After that, we asked the subjects in detail what they liked about system and what they were dissatisfied with. Figure 4 is a photograph of the actual experiment.

First, we experimented with 6 male and female subjects in their twenties who had watched live streaming. This time, we displayed sound level maters graphic on the sides of the screen so as not to interfere with the live streaming video and designed it to show how loud the audience's voice is. Figure 5 shows the interface design used in the primary evaluation experiment.

The second time, we experimented with 26 male and female subjects in their twenties who had watched live steaming in groups of 4 to 5 people. After the primary evaluation experiment, we improved the design so that the graphics of particle like fireworks appearing from the sides and center of the screen. Figure 6 shows the interface design used in the secondary evaluation experiment.

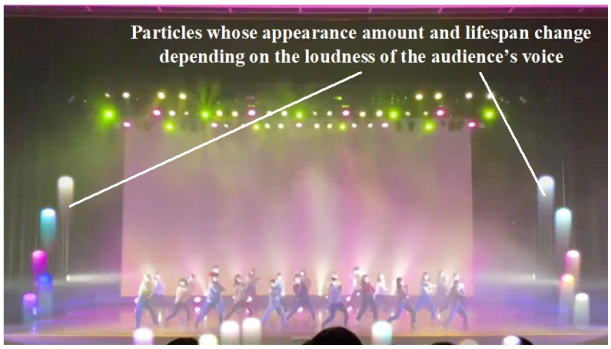

Figure 6: Interface design used in the secondary evaluation experiment.

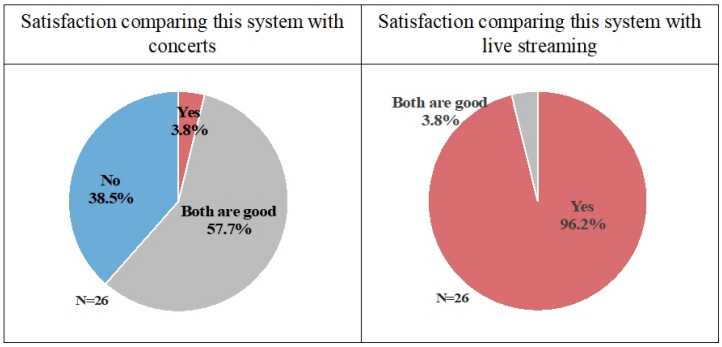

Figure 7: Satisfaction obtained when using this system.

Results

In the primary evaluation experiment, all subjects highly evaluated the usefulness of this system. In contrast, they commented, "I feel like I'm making a voice by myself" and "The graphics are monotonous and boring."

In response to subject's opinions, we make improvements the two problems in the primary evaluation experiment. Specifically, we improved the point that "I feel like I'm making a voice by myself." to graphic design that makes it look like each audience make a voice. And we improved the point that "The graphics are monotonous and boring." to a design that the graphics appear not only from both sides of the screen but also from the center with a certain amount of excitement.

As a result, more than 90% of the subjects answered that there is a sense of unity and presence in the live performance by comparing this system with the conventional live streaming. In addition, more than 90% of the subjects answered that they are more likely to cheer with a louder voice than the conventional live streaming, and all subjects responded that they were motivated to speak aloud more. And 96% of the subjects answered that they were satisfied with the live streaming when using this system compared to the conventional live streaming. Compared to the concert, many subjects answered that both concert and live streaming were good, and about 60% of the subjects answered positively. Figure 7 shows the satisfaction obtained when using this system.

CONSIDERATION

In this research, the attention of the audience's voice is appropriate. Voice and live performance are closely related. We also believe that this system is useful not only for live streaming, but also for watching sports, watching movies and distributing games.

This research has two issues. The first is a functional problem. This system requires graphics that change in real time according to the concept and the world view of the live performance. Live performance is the world view expresses by the concept and set list that artists imagine. Therefore, when the live streaming has quiet scenes or video, we design inconspicuous graphics so that the audience can concentrate on what they are watching. On the other hand, we design flashy graphics to match when the artist has a flashy production with flames and fireworks. The immersion in the live streaming is enhanced by changing the graphics depending on the scene. And the value of live streaming will increase. The second is a technical problem. Namely, the graphics appearing in the center interfere with the subtitles when live streaming broadcast video with subtitles. In this system, particle graphics appear from the center of the screen when the volume of the audience's voice exceeds a certain level. However, we need to fine-tune the appearance of the particle graphics by setting the graphic's appearance time and range of external forces in detail in order not to interfere with the video with subtitles.

CONCLUSION

In this research, we constructed a remote cheering system using the audience's voice for the purpose of making live streaming more satisfying than conventional it. We showed how important the voice is through the analysis of the behavior of the audience during the concert and the questionnaire survey on the cheering of the audience during the live streaming. This system visualizes the voice of the audience and changes the graphic in real time. As a result, the audience's shouts increased and the live satisfaction was enhanced. Therefore, we concluded that this system is effective for cheering on live streaming. Through this research, audibly and visual shared the audience's shouts in real time leads to a fulfilling live experience. Furthermore, it is room for the development and needs to be improve d to make the live streaming more satisfying. From this experiment, the cheering system using voice improve the concert experience at home.

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