POZE: Collaborative Experience For Music Festival Attendees Using a Kinect Sensor

Abstract
This paper presents POZE, an interactive, collaborative system for social interaction in a music festival setting. POZE uses a Kinect sensor to detect the body movement of the participants. Individuals need to collaborate using their virtual skeletons to eliminate the targets projected on a large screen. Results of a 10-participant user study show that POZE lowers the social barriers by engaging individuals in cooperation, breaks the ice between individuals and enhances the social interaction after the experiences.

Author Keywords
Social interaction; collaboration; music festivals; emotional contagion; entertainment.

ACM Classification Keywords
H.5.2. Information interfaces and presentation (e.g., HCI): User Interfaces;

Introduction

Nowadays, there is a continuing growth of music festivals as avenues for musical performance, and for regional economic development [3]. With the advancement of technology, the entertainment events

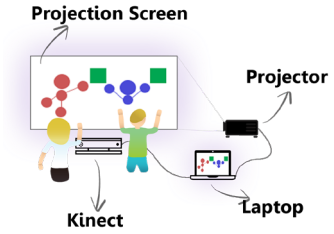

Figure 1: The system structure of POZE.

have become grander and more impressive. Technology plays a very important role in the enhancement of the decors and also the side activities aimed at the festival attendees. Side activities are a very important part of a music festival, both from the economical point of view (brand promotion) as well as from a social point of view; the managers of a festival do not wish for the audience to become disinterested in between concerts and leave. Previous research suggests that the entertainment quality of a festival has the strongest impact on visitors' overall experience, their satisfaction and intentions to return [2].

Most of the times, the usual side activities are constituted by group activities such as group pictures in a special setting or common spaces where attendees can enjoy their time (e.g., ball pits, cart rides). However, cooperative, digitally engaging experiences are not a common practice among festival side activities.

Since the emergence of the Kinect sensor, it has given plenty of opportunities for research and design. There is numerous work done on the behavioral patterns in cooperative Kinect experiences [5,7,9] and the method of creating such experiences [8]. Moreover, researchers have also looked into how to improve the state of the art of technologies using Kinect which enhance the design of certain entertainment events [1,4,6,10]. However, these two fields have not been merged yet, and POZE explores this design opportunity - achieving more physical activity and social interaction amongst festival attendees through a cooperative digital experience using Kinect.

Regarding the social interaction, it has been shown that emotions are inherited by the members of a group through a social phenomenon called emotional contagion [11]. Different research has shown that it is more likely for members of a group to share these group-based emotions if they identify on a certain level with the group (e.g., through a common goal) [12]. Concerning the emotional state of the participants, studies have shown that by adopting postures associated with excitement (open, raised arms, jumping), the subject will feel the excitement through postural feedback [11].

In this paper, we present POZE, an experience placed inside a festival setting which the audience can enjoy while taking breaks from the busyness of the crowd and socially interact with other festival attendees. POZE uses a Kinect to detect the bodies of the participants and creates virtual skeletons on the projection screen. By collaborating, the participants will have to cover a set of targets on the screen simultaneously (Figure 1). By achieving this goal, the participants can go through a musical timeline. At the end of the experience, they receive pictures of themselves in different poses they made. These pictures facilitate the conversation after the experience which improves the social interaction.

In its current state, the test was structured for validating whether the prototype would engage social interaction and enhance communication. The results of a 10-participant user study showed that POZE was perceived as fun, interactive and engaging and that the participants felt more positive, more energetic and closer to each other after the experience. The participants also stated that POZE would fit in a festival or a party setting. From this, the conclusions are drawn

Figure 2: Two participants during the user test (rear view).

Figure 3: Two participants during the user test (front view).

that POZE is successful in bonding people, in a fun and interactive way, and in stimulating communication between the players.

Design and Implementation

The design of POZE has started with a clear purpose in mind: bringing people together by syncing, and raising their positive emotional state in the context of a music festival. Therefore, while designing POZE, two important aspects have been considered: the engaging nature of the experience and the cooperation that is needed to complete the challenge. For the focus of the project, a late 90's – early 00's music festival has been chosen. With the help of a Kinect sensor, a group of at least two people had their body movement detected and projected on a screen as digital skeletons (Figure 2). A certain number (e.g., 9) of targets are placed on the virtual projection. By collaborating, the participants need to cover all the targets on the projection with their digital skeletons simultaneously, which will make them go through a timeline with music. Communication and cooperation are required to reach the common goal. After the experience, participants receive pictures of themselves in different poses. The feedback system is represented by the changing songs (every three times a set of targets has been eliminated) with visual and sound effects.

In its current state, the system is implemented using a Kinect 2 sensor, a PC which runs the program and, for better immersion and engagement, a projection screen and a projector. The Kinect detects the limbs and the joints of the participants, and the program translates them into digital skeletons. The program draws digital targets in 2D on the screen and uses collision detection to identify whether a target is covered by any of the players' joints. Once all the targets are reached, the system deletes the current targets and redraws them at new, random positions (with a minimum distance kept between the targets).

Evaluation

The evaluation was structured for testing the level of engagement, entertainment and social interaction of the proposed system in a practical setting. For this first iteration, a user test was conducted at a concert hall in a music venue, where an immersive party atmosphere was created by using the light, smoke and sound system. The participants were divided into 5 groups of 2. With the help of a high-quality beamer, POZE was projected on a screen placed on the stage.

The participants were asked to step in front of the Kinect sensor and try to figure out the dynamics themselves. They were allowed to take part in the experience for as long as they wanted (Figure 3). To stimulate social interaction, there were not many instructions given on purpose; instead, hints were provided when needed during the experiences to get the participants on the right track. To observe the mood change, participants had to rate their emotional arousal, positivity, and excitement in a 5-point Likert scale questionnaire before and after the experience. After that, they were interviewed with open questions.

Results

Ten participants (5 males, 5 females) aged from 20 to 27 (M=22.3; SD=2.41) were recruited for the study. The participants reported more excited after the experiment (Before: M=3.05; SD=1.13; After: M=4.4; SD=0.86), their arousal was higher (Before: M=2.35; SD=0.55; After: M=3.55; SD=1.54), and the

participants felt more positive (Before: M=3.6; SD=1.22; After: M=4.5; SD=0.55). These results show that POZE had a positive effect on the participants' emotional state.

The results of the open question interview show that the participants enjoyed the experience and all of them agreed it would be a good fit for a festival setting. *"This would make for a nice side activity to take a break from the crowd and the music"* (P1, P10), *"You can just chill and have fun, it works in that setting."* (P7). Regarding cooperation and social interactions, the participants stated that they felt a lot closer to each other after the experience, collaborated well and felt more excited than before the experience. The participants mentioned that *"This is a more comfortable way to connect with a stranger"* (P2), *"If you want to have strangers bond, then having a picture together is something to start with!"* (P9), *"Sometimes we had to switch to reach all the targets together"* (P3, P6). One participant mentioned *"I also think it is contagious. If you see people playing and you figure it out, you also want to play"* (P8). User feedback indicates that POZE would be a successful physical, fun, interactive activity for people to work together, communicate with strangers and create great memories.

Discussion

POZE, in its current state, has some limitations. First and foremost, the technical performance is not up to the expected standards. An advanced body tracker should be used to allow the participation of bigger groups; a better computational performance and graphical quality need to be achieved. Next, it should be easier to switch between different contexts, such as a playground or team building activities, social events. To further motivate people in long-term participation, gamification such as a scoring and ranking system should be implemented to create incentives as stimuli for more competitive participants. More audio-visual feedback could also be implemented to create a higher level of embodiment. Last but not the least, an alternative version could provide assistance and guidance for the players to make the experience easier when the participants are stuck or the poses require more physical effort.

Conclusion and Future Work

The uses of Kinect sensor have opened many opportunities for both design and research for creating an experience that is both emotionally and physically engaging for a group of audiences. We have presented POZE[1], an interactive, collaborative experience which stimulates social interaction between attendees in a music festival setting. The results of the user test are evident that POZE provides a highly enjoyable experience well placed in its context, which helps people break social barriers and elevate their moods.

Future work can consider adopting the concept of POZE to many other circumstances such as keeping children in hospitals or the elderly in retirement homes physically and socially active. It could also constitute a side activity for any entertaining event such as parties, cultural festivals or social gatherings, or introduce a scoring system for teams to compete with each other.

[1] Supplemental demo video: http://tinyurl.com/yd2xhv7h.

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