You Better Eat to Survive! Exploring Edible Interactions in a Virtual Reality Game

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Figure 1: We explore eating as an intriguing interaction technique for VR games.

Abstract

"You Better Eat to Survive!" is a two-player virtual reality game that involves eating real food to survive and ultimately escape from a virtual island. Eating is sensed through capturing chewing sounds via a low-cost microphone solution. Unlike most VR games that stimulate mostly our visual and auditory senses, "You Better Eat to Survive!" makes a novel contribution by integrating the gustatory sense not just as an additional game input, but as an integral element to the game experience: we use the fact that with head-mounted displays, players cannot see what they are eating and have to entrust a second player outside the VR experience to provide them with sufficient food and feeding him/her. With "You Better Eat to Survive!", we aim to demonstrate that eating can be an intriguing interaction technique to enrich virtual reality experiences while offering complementary benefits of social interactions around food.

Author Keywords

Virtual reality; eating; food; human-food interaction; multi-sensory; games.

ACM Classification Keywords

H.5.1 [Multimedia Information Systems]: Artificial, augmented, and virtual realities

a.

b.

Figure 2: The images above show one of the interactions the player has to do in the game. He/she has to light the campfire with a lighter obtained before.

Introduction

In recent years, virtual reality (VR) based games are becoming popular with big companies like Google, Facebook and Oculus putting efforts in building platforms and hardware to support the development of such games. In VR games, software technology is used to build replicas of the real world through simulations and such experiences are visualized using head-mounted devices like Google cardboard or Oculus Rift [3]. So far, a majority of the research on VR is happening around visual and auditory interfaces, whereas the potential of other senses (e.g. smell, touch and taste) are rarely explored in virtual reality environments even though studies suggests that the consideration of such senses would benefit virtual experiences [7].

In this work, we investigate eating food as an input to control actions in VR games. We are interested in exploring edible interactions in virtual reality because food offers a rich multi-sensory social experience [5]. We note that current VR games often rely on creating high sensory immersion and the possibility to make the player forget that they are inside a digital environment by using head-mounted displays (HMD) [4]. To this end, in our game players are not able to see what they are eating. But rather than treating this as a limitation of using an HMD, we utilize it as an intriguing part of the gameplay.

Related work

Exploring multisensory ways of interacting in a digital game is not new. For example, Tennent et. al developed a gas mask that utilized the player's breathing as a game mechanic for computer games [8]. In their first person shooter game players could move the crosshair through breathing. The authors found that breathing "is a viable, interesting and fun control method for gaming" [8]. This game showed that games can benefit from allowing an additional bodily

Figure 3: The real world player feeds food the VR player who does not know what he/she is eating. The hands visible in the image belong to the real world player in the background.

action to be sensed in order to control gameplay. Brown et al. introduced a game in which the player is trapped in a coffin and at the same time putting him/her in a real coffin to enable an "unusual, yet engaging player experience" [2]. An associated study supports that bodily restriction (such as not seeing the food in our work) can be used to intensify the game experience. Eating has also been used to create novel game experiences. In their study, Murer et al. integrate taste as a playful interaction technique by using a lollipop as a haptic input device that changes flavors when it is played with [6]. However, to the best of our knowledge, eating has not yet been explored as an interaction technique in virtual reality games.

a.

b.
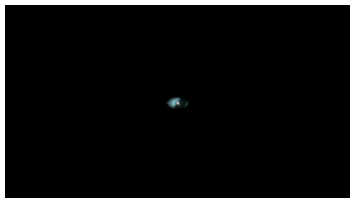
c.

Figure 4: Images a) - c) demonstrate losing vision in the game from full sight to almost no sight which is a smooth transition in the game.

"You Better Eat to Survive!"

"You Better Eat to Survive!" is a two-player virtual reality game. In this game, the first player wears an HMD and enacts the role of a person stranded on an island. The game objective for the player is to get rescued by finding a way off the island by using different objects (example shown in Figure 2) to ultimately find a flare gun that can be used to call for help. During the exploration on the island, the player must also keep himself/herself healthy and alive by eating real food on a regular basis. If the player does not eat food, then due to hunger, he/she may lose his/her consciousness (illustrated through the progressive decrease of vision in the game as shown in Figure 4).

While "virtual eating" is also a common action in many existing games to regain health, the interaction or consumption is often limited to simple button presses to grab and eat food. In "You Better Eat to Survive!" real food must be consumed to prevent loss of sight in the VR world. Eating is sensed during these blackout phases when the player's vision decreases due to hunger. When eating, the player is given visual (virtual crumbs falling down) and auditory (chewing noises) cues. If the player does not eat after losing sight for 20 seconds the game is over.

The job of the second player (not wearing a HMD) is to feed food to the VR player, who, because of the HMD, cannot see the food (as shown in Figure 3). This creates an intriguing game setting of two players playing the same game but one in the virtual and one in the real world. This setting is enforced by requiring the players to play as one "shared body across both worlds" that combines the abilities of the two players: the VR player cannot see the real world or the food but sees the virtual world, while the real world player cannot see the virtual world but sees the food and can interact with it. To beat the game the players have to combine

their abilities: While the VR player tries to discover a way to get help in the game the real world player is in charge of feeding his/her companion to prevent him/her from losing vision in the game. Physically the players resemble one body because the real world player embraces the VR player from behind and uses his/her own hands as it would be the VR player's hands to feed him/her while the VR player is not allowed to use his/her hands (see Figure 3). Due to this both players face the challenge to collaborate and move together to be able to explore the virtual world and get food in the real world. In case they just follow their own task they will prevent the other player to succeed in his/her task. To this end, the game becomes a rich fun social experience that promotes teamwork.

Implementation

We utilise chewing, an important action during consumption of most food items as an edible interaction in the game. We attach a microphone (which now comes free with most smartphones) to the player's cheek with sticky tape to capture if and how fast the player is chewing. While there are other approaches such as using glasses with integrated skull vibration sensors [10] or earpad sensors measuring air-conducted vibrations [1] to sense chewing, we aimed to create a low-cost and easy-to-implement system to detect chewing. While the device Amft et al. [1] developed might be more accurate, our method does not require a dedicated device and hence our game is easily deployed and played with any smartphones that comes with a headset.

Future work

Although "You Better Eat to Survive!" does not make any specific eating recommendations, in the future we envision our game could also be used to improve player's food literacy (which describes the tools needed for a healthy relationship with food [9]). This could, for example, be realized

Figure 5: The game required four things to play: Head-mounted display case, smartphone to insert into the HMD case, headset with microphone and - of course - food.

by rewarding players for choosing healthy food or by monitoring chewing processes to see if a player is chewing each food properly.

Conclusion

"You Better Eat to Survive!" is a two-player multisensory VR game that offers an underexplored way of interaction - eating - by requiring eating real food to survive and escape from a virtual island. The game does not require special devices besides the VR head-mounted display and the microphone that comes with most smartphones used with HMDs. With "You Better Eat to Survive!", we aim to demonstrate that eating can be an intriguing interaction technique to enrich virtual reality experiences while offering complementary benefits of social interactions around food.

Acknowledgements

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