# 'Becoming Leeches: episode 1 – Having Dinner'

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## Short Artwork description:

*Becoming Leeches: episode 1 – Having Dinner'* is an introductory version of the *'Leech Project'* series which explore the augmented senses of live leeches through a machine computer vision system. This system facilitates collaborations with a human performer in an experimental virtual reality (VR) performance. Human participants and virtual leeches have a symbiotic relationship and help each other to survive within the post-apocalypse scenario of the VR game. The human participant, wearing a VR headset, has a dinner party with live leeches in the real world. At the same time on the dining table, the human game player journeys to leech-islands and can find virtual leeches in the virtual world. The virtual leeches are avatars of other human participants, whose actual feeding of the live leeches on the dining table trigger the avatars' behaviors and reactions to help the game player's survivability in the VR game via interactions in computer vision system. The artist of the project plays a chef, serving catering dishes for the participants' feeding of live leeches. *'Becoming Leeches'* creates enjoyable interactive activities and entertainment that engage the interrelationship between human and non-human animal, promote public awareness about understandings of interspecies relationships, and convert unfamiliarity with what are seen as "disgusting" animals (leeches) into artistic beauty, within the art game and visual performance.

### Brief description of what the performance is showing

One chef (me) and two waiters will serve food to leeches in small fish tanks on a dining table (or pedestal), where the main participant (audience), as the game player, will have dinner with the leeches and play the VR game. Other audiences can pick up leech-food on the chef's catering dishes and waiters carrying trays of raw meat appetizers and blood wine to feed leeches. When the game is over and the next player starts the game, one waiter guides the player and assists the new player wearing the VR headset. Simultaneously, another waiter carries plates to other participants and helps out feeding leeches. This gaming and dining performances are in a repetition while the chef continually serves food during the entire performance, for approximately two hours.



## The roles of visual performers in the gaming and dining performance

1. Chef – He serves catering dishes, where tiny pieces of raw meat, organs, and blood source are set and decorated with other natural materials, such as small stones, woods, plants, sand, water.... His food service as the chef performance takes place at side of the dining table. As the main manager, he checks out all performing environment and materials during the performance.



2. Waiter 1 – He mainly helps the game player sit down, wear the headset and controllers. Furthermore he manages the VR and computer vision system, and guides other participants' moving range in the performance place as well.

3. Waiter 2 – He mainly carries plates and manages the dining table with cleaning and supplying food. He also guides other participants to feed live leeches. Sometimes, he will carry a tray of raw meat appetizers and blood wine to the crowd in the gallery to promote the participations.

### The roles of participants (the audience) in the gaming and dining performance

1. The main participant, game player – She/he takes a seat at the center of the dining table (or stands on the center of the gaming area) while the live leeches in fish tanks are installed around of the player. The player plays the VR game, while the audience feeds the live leeches. The player some time needs to move his/her VR wearing head toward other participants to target the virtual rainbow leech because the virtual rainbow leeches are the avatars of the human participants, which offer points and power up to win the game.

2. Other participants – They mainly feed the live leeches in the fish tanks on the table. They can pick up a piece of raw meat and blood wine, which are served by the chef and waiters. The feeding participants are frequently changeable and guided by the waiters during the player's game playing.



## Installation of equipment and tools



#### 1. Three monitors:



2. Oculus Rift – It works for showing and controlling the VR game

3. ZED camera – It is a 3D depth camera, which is mounted on the VR headset to see the feeding people and other audiences in the real world in the live video.



4. Four web cameras – One camera is installed on the top of each fish tank (total four cameras of four fish tanks). These cameras capture the motions of live leeches for the computer vision system.



5. A professional game computer (PC) – It manages the Unity Game engine and computer vision system. Programing 'C#' mainly controls the Unity Game engine for the VR game contents and environments. Programing 'OpenCV' mainly controls the computer vision system for detecting and analyzing the body tracking of human and live leeches.

#### The plot of VR animation and game scenario

#### 1. Intro animation (30 - 45 seconds)

#### Scene #1 - Flying leeches encounter the garbage vortex:

Many flocks of flying leeches evacuate from the polluted earth to escape the impending nuclear storm. The leading leech looks down at the post-apocalyptic landscape, while flying in the sky in the view of first person perspective. One of groups in the flocks of flying leeches accidentally encounters the huge vortex of industrial waste in the air. The leeches have lost the migrant path and the sense of direction in the strong wind. Moreover, they are swept, falling, and driven into the incinerator island with numerous industrial and toxic wastes by the garbage vortex (which overlaps or fades out to scene #2).



#### Scene #2 – Flying into the inner world of the incinerator island:

In the first person perspective view, the leading leech can see the gigantic incinerator in the sky and the volcano-scape during the falling from the sky (the entrance of the island) to the ground.





#### 2. Playing game

#### Scene #3 - At the starting point

When the game player clicks the button to start the game after wearing the VR headset and grabbing the controller, the intro animation is automatically playing (from Scene#1 to Scene#2). After watching the intro animation, some notice images quickly slide to explain information about playing rules:

a. Image 1 – the functions of buttons and directions of joystick

b. Image 2 – the rule of getting points and self-energizing power from the rainbow leeches. For example, "Find blinking rainbow color leeches and then target to them to get points. Each leech offers 10 points. If you reach to 100 points, the player will be able to fly to escape the incinerator island (Win!)".



#### Scene #4 - Flying and Jumping on ground

The player goes all around to find the rainbow leeches for getting points and increasing power to fly up. When the player finds a rainbow leech (the avatar of the audience in the feeding process), the player can control the target with buttons to point on them, and score points and energy (Two monitors among the three monitors show the virtual / real world activities at the same time). During the player's hunting, the background footage shows the lava-lake, lava flow, explosions of lava bobbles, volcano-mountains and valleys, flying other leeches, the part of incinerator machine, falling industrial waste...



#### Scene #5 - Interface design and animation

a. The interface shows the power bar, numbers of points, target, and condition of energy levels...b. When the player gets points and energy, the power bar and numbers are increasing.c. When the player obtains 100 points, all of the icons of the interface can be bright golden colored, which means that the play can fly to get out the island. Then, there is a message, for example, "Congratulations! You are able to fly and move out of the incinerator island".



#### 3. Ending scene and game over (20 - 30 seconds)

#### Scene #6 - Flying to the sky of the incinerator world

After the congratulation message, in the animation, the player ascends to the sky in the view of first person perspective that overlaps the next scene #7





#### Scene #7 - Flying toward utopia

After the player (leading leech) gets out the island and other following leeches also can escape from the island, the player is flying with other leeches in the view of first person perspective. They catch up with other group of flying leeches, which have showed in the intro animation. All of the leeches are flying up toward the green island (utopia) in the sky. The leading leech looks down on other different islands, such as the organ-island, human head-island, blood-fall-island... There are texts, "Game Over", and ending credits.



### **Technical Processes of Operation, Communication, and Interaction**

1. Unlike most VR apps, which are set up to watch a VR animation format, the VR part in my leech project involves **real-time interactions 'between the VR player and the feeding audience'**, and **'between the VR player and the live leeches'** from the live performance and installation.

2. For these real-time interactions, there are video cameras in the installation (fish tanks) and on the VR headset (Player). The cameras are operated by the **computer vision system** that cooperates with the **Unity** game engine software.

3. For the real-time interaction between the VR player and the feeding audience, the 3D depth camera **ZED** (attached on the top of the Oculus headset), detects **the body tracking/detection and distance of feeding audiences** in the computer vision system. <u>https://www.stereolabs.com/zed/</u>

4. For the real-time interaction between the VR player and the live leeches, **live video cameras** (on the top of the fish tanks) detect **the body tracking of live leeches** in the computer vision system.

5. The **computer vision system** uses a programming interface, **OpenCV** (Open Source Computer Vision Library). OpenCV involves multiple languages, such as Python, Java, and C++.

6. The **Unity** game engine is the hosting interface for coordinating the real-time communications and interactions between the three sections of **running 3D animation**, **operating the VR system (Oculus)**, and **utilizing data from the computer vision system**. For these real-time operations, Unity uses the language **C#**.

7. **OpenCV (with Python and C++)** controls the computer vision system for detecting **the motions of actual characters (humans and live leeches)** 

8. **Unity (with C#)** communicates with the computer vision system (OpenCV) and the VR system (Oculus) to run interactive game animation with generating **virtual leeches**.

9. In the process mentioned in #3 above, when the computer vision system with the **ZED** camera sends **the data of human body tracking** to Unity, Unity generates flying **virtual rainbow leeches** in the VR game footage as the real-time reaction. Therefore, the virtual rainbow leeches are **avatars of the feeding humans** from the performance.

- The virtual rainbow leeches are glittering rainbow colors

10. As the same process mentioned in #4 above, when the computer vision system with other live **video cameras** (webcams) sends **the data of leech body tracking** to Unity, Unity generates flying **virtual normal leeches** in the VR game footage as another real-time reaction. Therefore, the virtual normal leeches are **avatars of the live leeches** in the fish tanks.

- The virtual normal leeches are yellow (gold) colors

11. The virtual leeches as mentioned in #9 and #10 **don't mimic** the body movements and gestures of the actual human and live leeches. However, Unity utilizes the data of body tracking to **trigger** the programmed virtual leeches' **appearance and flying animation** in the VR game footage. In other words, the data of body detection/tracking of live characters triggers programmed contents that create the animation of virtual characters in the game engine system.

12. Unlike the virtual rainbow leeches, the virtual normal leeches (yellow color) follow the VR game player's moving positions in the game. This motion tracking looks like a **pet-relationship sense** between 'the human player and the virtual leeches (the avatar of live leeches)'. For instance, the VR player can see the following virtual yellow leeches when the player goes all around to find the rainbow leeches on the Incinerator-island.

13. In those technical interfaces, integrating the actual and virtual environments, when the VR player looks around the space of performing and installation place, the player cannot see the actual feeding humans, but the player can see the flying rainbow leeches in the virtual world. Therefore, Unity and the computer vision system transform the actual feeding humans into virtual rainbow leeches in the VR game footage. In other words, **the humans become virtual leeches** in the context of art game and performance.

14. As the same process, when the VR player looks around the space of performing and installation place, the player cannot see the live leeches, but the player can see the flying yellow leeches in the virtual world. Therefore, Unity and the computer vision system transform the live leeches into virtual normal yellow leeches in the VR game footage. In other words, **the live leeches become virtual leeches** in the context of art game and installation.

15. Although the VR player cannot see the actual characters, audience can watch three monitors that show what are going on in the real and virtual worlds.

- Monitor 1 shows the virtual game images, which mirrors the player's VR headset Oculus' views

- **Monitor 2** shows the body tracking of **feeding people** from **ZED camera views**. The camera is mounted on the player's VR headset

- **Monitor 3** shows the body tracking of **live leeches** from the **other cameras' views**. The cameras are installed on the top of fish tanks

## Roles of Characters in the VR game and Performance

16. **The audiences' feeding participation** not only offers **nourishment** and energy **to** actual **live leeches**, but also offers **self-energizing power to the VR game player**, who is one of virtual leeches in the game. In other words, the virtual rainbow leeches as the avatars of feeding people help the VR game player's **survivability**, such as earning score points and power up, to win the game.

17. In **the plot of game**, the VR game player is one leech in a flock of flying leeches while they are on a migrant path toward a green island (utopia) from the polluted earth to escape the impending nuclear storm. Unfortunately, the flock of leeches accidently encounters the huge vortex of industrial waste in the air. From this accident, they are swept, falling and driven into the Incinerator-island, where the gigantic incinerator grinds and burns industrial and toxic wastes that are incessantly produced by the human impact as a environmental catastrophe and dystopia of living creatures.

To escape from the Incinerator-island, the VR game player as a leading leech has to find the rainbow leeches (the avatars of feeding humans) that offer score points for healing and energizing power. The fully powered and scored points enable the VR player to ascend and fly up to the sky. Then, the VR player and following other leeches (the avatars of live leeches) will be able to escape the dystopic island and return to the migration path toward a green island.

18. **The main performer, the chef**, is a booster and guides people into enjoyable activities and art entertainment to engage the notion of interspecies relationships in the art game, and convert unfamiliarity of disgusting non-human animals into artistic beauty in the visual performance with the catering service.

19. The virtual normal yellow leeches are the avatars of live leeches. From the support of feeding people, **the live leeches** create visual content, mingling with the human player and follow the player's journey in the VR game.

While the VR player and audience are watching the journey to the islands, the player is stuck in the incinerator island by the industrial storm vortex. So, at this moment, the audience and live leeches need to collaborate to generate the virtual avatars to rescue the VR player in the game narrative. After the VR player successfully gets out of the incinerator island, the player and other leeches can fly to other islands and migrate to their utopia

### Artistic Metaphors and Implications in the VR game and Performance

20. The virtual normal yellow leeches' motion tracking, which is **a function of following** the VR player's journey in the game:

- The player **can lead** the virtual leeches to escape the Incinerator-island

- **Friendship and pet-relationship sense** between the VR player and virtual leeches (avatars of live leeches) in the game

- Interrelationship in the game context from the avatars of the human and animal

21. Feeding people are significant for both the human player and live leeches:

- Nourishment to the live leeches

- Energy, power, and score points to the virtual leeches in the game

- Art collaboration between audiences and live leeches. Feeding activities create the visual elements, such as appearances of virtual rainbow leeches and virtual normal yellow leeches

22. Entertainment and catering service for animal:

- The art performance invites people and provides meats to allow people to make an

interrelationship through feeding and playing with live and virtual leeches.

- An enjoyable art party and friendship with non-human animals

23. **Mutual benefits** from the **art collaboration** for the survivability:

- **To survive and win the game**, the VR player needs score points and energy from the rainbow leeches, the avatars of feeding people.

- For this surviving process from feeding activity, the VR player needs the live leeches' role

- Within the game process, the live leeches can be continually fed.

- So, the human player and live leeches earn mutual benefits and have a **symbiotic relationship** within the game process.

## **Considering Points for 'Hybridity'**

#### 24. Interspecies relationships:

- The VR player is a human in the real world, but the player is one of virtual leeches as the leader of leeches in the virtual world.

- The VR player drives the virtual normal yellow leeches in the player's journey in the Incineratorisland scene.

- The virtual normal yellow leeches are the avatars of the live leeches. These virtual avatars follow the VR player.

- The human player and the live leeches get together as the game avatars and have a relationship in the game.

- There is no visual appearance of the VR player's own body as a leech. However, playing game with the first person perspective implies that the player is one of leeches. For example, the flying leech point of view (POV) in the flying scene, the camera angle of POV is in the pattern of up-and-down motion, which is the same motion to the swimming motion of leeches under water, unlike the motion of sidewinding snakes and eels.

#### 25. Becoming virtual leeches:

- The feeding audiences are transformed into the virtual rainbow leeches in the game

- In the technical process, the human body tracking allows the audiences to become virtual leeches

- Live leeches become virtual normal yellow leeches

- Integrating with different species through the technical interfaces

- The human player become a leech in the game context

# More info about the project: Dr. Jennifer Parker-Starbuck's email interview with Doo-Sung Yoo:

Dr. Jennifer Parker-Starbuck Head of Department of Drama, Theatre, and Dance, and Professor of Theatre and Performance Studies Royal Holloway, University of London, UK Co Editor of *Theatre Journal* Author of *Cyborg Theatre: Corporeal/Technological Intersections in Multimedia Performance* 

**1.** *I* wondered if you have any writing about what you are doing with them, especially in relation to the dinner/chef performance. So the premise is that you are feeding the leeches? -- Yes. In the performance, I am, as a chef, cutting meat to allow the audience to feed meat to live leeches. The chef performance with involving the audience's feeding participations is a sort of catering service for animals. This physical feeding performance illustrates the normal relationship of 'human to nonhuman animal' – the '*Becoming Leech'* performance illustrates multiple metaphors of relationships and interactions between human, non-human animal, and machine, such as 'human-to-nonhuman animal (in ways of physical and virtual interaction)', 'human-to-machine (for creating virtual avatars)', 'nonhuman animal-to-machine (for creating virtual avatars)', and 'nonhuman animal-to-human (for following motions to human's virtual avatar)'.



#### 2. And then what happened to them?

-- Here is the summary of characters' roles that create the narratives of performance and VR game. The chef – Food provider, moderator between the human participants (the VR game player and feeding people) and the nonhuman animal (live leeches) in the performance, and the director of the performance

Waiters – Food deliverers and helpers for the performance and game set up





VR Game player (a human performer who becomes a virtual leading leech) – The first-person perspective (Point-of-view shot) is a view from the leader of the flock of virtual leeches, which are



stuck in the post-apocalypse environment of manmade incinerator island in the game scenario. In the VR game, the player needs to find rainbow leeches (the virtual avatars of feeding people) to score points and power up to fly to escape the incinerator island. One camera is mounted on the VR headset, which helps out the computer vision system to transform the feeding people to virtual leeches and enables the VR player to find the feeding people in the real world, the performing place. The game player has two

perspectives to see two worlds: one for seeing the virtual world with the VR headset; and another for finding feeding people in the real world with the extra camera on the VR headset.

The leading leech, the virtual avatar of a human playing the VR game, has to win the game to rescue other virtual leeches (the virtual avatars of live leeches) to return to their journey on the migrant path, where virtual leeches were flying up toward the green island (utopia) in the first scene at the beginning of game animation.

Feeding people (human participants who become virtual rainbow leeches) – The computer vision system detects body tracking of feeding people, who become virtual leech characters blinking rainbow colors in the VR game. The virtual rainbow leeches (the feeding people) offer self-energizing power to the virtual leader leech (VR game player).



Feeding people are significant for both the human game player and live leeches. Actually, as the performance and game narrative, feeding people offer food to live leeches in the fish tanks and simultaneously provide surviving energy to the human game player (the virtual leader leech) as well.



These audience participations in the performance and relationships between human and animal in the VR game narrative continually implement my art goals, developing interspecies interactions, which I have mentioned in the interview with you in *Antennae Journal*. I would like to remind you about some sentences (See your question and my answer on page 56 – 57). http://www.antennae.org.uk/home-template-2/4593743325

To answer these questions myself I would say that my animal parts symbolize animality, but also serve as cultural symbols as objectified and technologized animals. Involving those contexts in my art forms, I have articulated that we might use technology to reassess animals as ontological equals in our living world rather than subsumable (and consumable) entities. However, frankly, promoting public awareness of understanding of those conceptual agendas is not easy. So, my goal is to attract more public attention to these issues in my research. I believe that more participations and interactive activities for audiences could help remind them to think more about our potential issues with animals and environmental damages. Artists could suggest new ways of thinking, better and more ecological forms, prototypes, and interfaces with implementing technology that eventually enables people to reinterpret animality. Through those materializing technological interfaces, audiences would be aware that technology is not solely for expanding our realm and our territorial aggrandizement, but to mediate co-existence and symbiosis between animals and humans for mutual interdependence. So, general audiences could become more humble in their attitudes towards the use of technology towards animals, and embrace animality.



Live leeches – A web camera is installed on the top of each fish tank. The cameras capture underwater live leeches in the multiple fish tanks. When the live leeches move to pieces of meat that are fed by the audience, the computer vision system detects the motion of live leeches and analyzes if the live leeches touch and eat the meats. These data trigger the Unity Game engine to create virtual game characters, normal virtual leeches, which follow the game player's (the leader of the flock of leeches) journey of the game. It is one of artistic metaphors for interspecies interactions that the live leeches' physical motions create visual narratives, mingling with the human player's avatar in the virtual world.



**3.** *Is there more you could say about the ideas to make the people become virtual leeches?* -- Yes. The VR game player controls the leader of virtual leeches as the POV view. The feeding people become virtual leeches with blinking rainbow colors that enable the player's virtual leech to power up energy and get points to fly to escape the manmade incinerator island. Additionally, the live leeches also become virtual leeches that follow the leading leech to escape the dystopia. In the VR game narrative, both human and live leeches become the virtual leeches, which means that humans (the player and feeding people) and nonhuman animal (live leeches) need to collaborate in the performance to survive together in the virtual world.



#### 4. Do they then eat as well?

-- The live leeches eat well and like the pieces of meat, which provides a good catalyst for active live leeches. This visual spectacle from the live leeches' eating actions creates more curiosities that promote people to participate in the feeding activities.

In the context of the chef performance with leeches, the metaphor of 'food (meat)' is mediation for interrelationship between human and nonhuman animal. Meanwhile, in the context of the VR game with becoming virtual leeches, the metaphor of 'feeding' and 'eating' are promotable activities for interspecies interactions.



Like we share food and treat a nice dinner to lovely family and friends, *Becoming Leeches: episode 1 – Having Dinner*' bring food to the performance and energy to the VR game contexts to promote awareness of nonhuman creatures as interdependent companions. 'Becoming leeches' and 'having dinner' with leeches are attitude of accepting and embracing animals as our companions. For this focus and art goal, I also continually develop and implement the leech project series. I also have mentioned in the interview with you in *Antennae Journal*. I would like to remind you about some sentences as well (See your question and my answer on page 50). http://www.antennae.org.uk/home-template-2/4593743325

Accepting animals, embracing animals, becoming animals (and becoming cyborgs) is based on the premise that we are willing to change our persevering anthropocentric certitude. I imagine that we can have a less anthropocentric attitude toward our world if we are integrated with different species through technological interfaces. The notion of interspecies might enable us to realign our minds and everyday efforts to support interdependence in our coexistence.



These **concepts of 'becoming leeches'** in the art game and performance continually implement my art goals, developing the notions of interspecies, which I have mentioned in the interview with you in *Antennae*. I would like to remind you about some sentences, which would good references of understanding my art concept and intention.

I believe that the notion of interspecies can shift the paradigm in our understanding of animals away from anthropocentrism. (Page 50)

The scientific trends of interspecies research, such as human-animal hybrid embryos, and the notion of transhumanism are good trials to deconstruct the binary logic and merge the dual identities into hybrids. However, anthropocentrism is still alive in the destructed boundaries where our industries only benefit human welfare. For the mutual benefit of both species then, we should think about what ideal forms of interspecies relations might be, and how interspecies communication could be used to understand other species' signals. (Page 50)

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I believe that more participations and interactive activities for audiences could help remind them to think more about our potential issues with animals and environmental damages. Artists could suggest new ways of thinking, better and more ecological forms, prototypes, and interfaces with implementing technology that eventually enables people to reinterpret animality. Through those materializing technological interfaces, audiences would be aware that technology is not solely for expanding our realm and our territorial aggrandizement, but to mediate co-existence and symbiosis between animals and humans for mutual interdependence. (Page 57)

We are always redesigning animality for human benefit. But we need paradigm shifts towards mutual benefits, symbiotic relationships, and interspecies existence. (Page 57) Defining animality and humanity is still an ongoing process. A way of thinking about animality is how we think about ourselves. So, art could show more interconnected forms through interactivity with tools from science and technology. In the Anthropocene, we as posthumans need to learn about and involve animality to solve our environmental issues. As artists, our responsibility is to educate audiences about animality – and that is part of the process of 'redesigning' animality. (Page 57)

The VR illustrates an ideal fantasy, where the human avatars co-exist as equals with the nonhuman animals' avatars as interdependent companions. (Page 58)

# 5. In going through your technical notes (many thanks for these) what I understand is that there are live cameras in the installation space that track the movements of the audience, players, and live leeches?

- Yes, the live webcams and 3D camera (Zed) capture the body tracking of the audience and live leeches' movements, but not tracking of the players.

# 6. So, what is captured from the Zed camera (on top of the VR player) is movement from the audience who are eating (point 9 on your list) which is translated to the rainbow leeches/avatars?

- Yes, exactly. The Zed camera captures the audience's motions created when they engage in feeding the leeches that can be computerized database in the computer vision system and sends the visual data to the Unity game engine to generate the virtual rainbow leeches, which are the avatars of the feeding humans.

# 7. You say these leeches don't mimic the body movements or gestures, but how does it translate to appearance and flying animation exactly? Just that it creates them and makes them fly? - There are two main different types of leech animations.

1. 'Predefined' animation - The flying normal leeches (various colors) that you have seen in the sample VR app were modeled by the 3D modeling software (Cinema4D) and animated in Unity, in which I adjusted animating effects on the '3D models' of leeches and designed the tracks of flying leeches. This predefined animation of virtual leeches can be shown in all footage, excepting the Incinerator-island scene.



Predefined animation of virtual leeches

2. 'Procedural animation - However, the yellow and rainbow leeches (2D models) are modeled and animated by the programing code. It is a simulation that the computer (by coding) automatically generates appearances and animations. The programmer writes the code to make the pattern of the virtual leeches' body types and up-and-down motions, design their flying tracks, and create their characteristics (roles in the game). This procedural animation of virtual leeches can be shown in the footage of the Incinerator-island scene only. Also, this procedural animation of virtual leeches, and the feeding humans (the predefined animation of virtual leeches is not interactive in my project).





Procedural animation of virtual leeches - Rainbow leeches

The Zed camera can capture the depth of field, which can be used to detect distances between the player and the feeding people. The computer vision system is set up the capturing area, in which the live leeches in the fish tanks are installed. So, the computer vision system can distinguish the feeding people among the audience with the process of detecting distance in the depth of field. When people step into the capturing area (the ZED zone), the computer vision system scans the targets (feeding humans), and then confirms if they stay in the set up positions and if their motions last more than the minimum time duration.

The computer system doesn't immediately generate the virtual leeches. The computer vision system continually scans the body tracking of the feeding people, such as the movements of their heads and limbs in the time duration. Then, the computer system confirms that the targets are humans.



The computer vision system scans the targets and confirms that the targets are humans and leeches

Meanwhile, the Unity game engine communicates with the computer vision system in real-time. When the vision system confirms that the targets are humans, Unity generates the rainbow leeches that appear in the footage and show their characteristics through the programming code. As the same process, the computer vision system also scans and confirms other targets that are moving live leeches. Unity also generates the yellow leeches that appear in the same footage and shows the yellow leeches' characteristics through another programming code.



The player plays with virtual avatars of feeding humans and live leeches



A rainbow leech emits a glowing light at the beginning of generation and animation

The computer system generates less than 50 yellow leeches total in the footage from the motions of the live leeches due to the limitation of the computer's operating capacity to create a high-resolution and good frame speed. However, the rainbow leeches can be generated a few, one per person, which is just for the game playing design.

Although the virtual leeches don't mimic the gestures and motions of humans and live leeches, the computer system has to scan and utilize the minor gestures and motions of body tracking to confirm that the targets are humans and live leeches to generate the programmed procedural animation of virtual leeches.

#### 8. Otherwise can you tell that this data is connected?

- So, I can tell that the data (visual tracking) is connected to the virtual leeches' animations because the data of the body tracking, using the minor gestures of heads and limbs, is utilized in the computer system to confirm the targets and trigger the appearance and the procedural animation of virtual avatars.





The feeding audience and live leeches become virtual leeches, which can fly to follow and swarm around the player's position in the VR footage.

# 9. Then for points 4 and 10: the live leeches are filmed and these are the gold leeches in the experience?

Again, their movement just triggers their appearance (so when I do it, do I see the gold and rainbow or will they not appear at all since I am not doing it live (I seems to remember rainbow leeches, but I was just trying to be in the moment, and will go back for detailed notes).

- Yes, the yellow (gold) leeches are the avatars of the live leeches in the VR footage. The third monitor shows the capturing status of the live leeches' movements.

- Yes, when someone and a live leech are moving in the detection areas, you can see the appearance of rainbow and yellow leeches and their characteristics in the live version.

**10**. In point 12 you say the yellow (are these also the gold) leeches follow the person in the headset? So they are the virtual live leeches. So how are they connected movement wise to the person in the headset? (seems very fascinating, if complicated from the outside!) I like the connectedness between the live leeches to the animated ones to the person in the headset. - Yes, the yellow leeches follow the person in the headset.

- As I mentioned about 'Procedural animation' above answer #5, the programming code directs the virtual leeches' appearances and animation of characteristics: the yellow leeches can fly to follow and swarm around the player's positions at back, mid, and front grounds, and within view angles of the headset (track targeting to the player positions and the headset angles and motions); and the rainbow leeches can fly around the player and disappear in the footage after a few seconds.

- The programming code enables the yellow leeches to fly toward to the target position, which is the player moving positions, and keep the distances between the virtual leeches and the player in the VR footage. The programming code sets that the virtual yellow leeches must keep the distance during the following and swarming motions, closed to the player, but not too much closed, in the eye level shots of the headset motions. So, the player can see the following yellow leeches around his/her body in the VR footage on the Incinerator-island.

At the beginning of the player's exploration on the Incinerator-island, the player can see a number of yellow leeches, but later on, the numbers of yellow leeches can be generated increasingly due to the collection of data from the live leeches' motions with the stimulations of feeding humans.
The motions of live leeches can continually trigger the appearances and animations of their virtual avatars, but the numbers of yellow leeches are less than the maximum number (such as <50) in the coding.</li>

#### 11. Are the people in the game aware of what the rainbow and gold leeches represent?

- Yes. As I explained in the additional summary and the description on my website, the installed monitors, 3 in total, show the detecting situations with the actual characters in the real world and animation of the avatars in the virtual world at the same time.

During the game play, the player can't see the actual humans and live leeches because this project is only VR interface, not AR (Augmented Reality) and MR (Mixed Reality, or called XR). The player can see the virtual avatars only. However, the second monitor (the ZED view) shows the actual people and the third monitor shows the live leeches. Simultaneously, the first monitor (the Oculus headset view) shows the virtual avatars that the player looks toward and plays with them.
So, the audience can watch the game and understand the situation, the game process, and roles of characters, which guide the audience to participate in the feeding activities to offer the visual contents and their role in the game context.

# 12. I felt at the start that I was one of the leeches, or riding one of them along the way (as you say in point 17). Very effective physically!

- As the title, *Becoming leeches*, the player has an experience as being a leech and mingles with other virtual leeches in the VR interface, which is for the goal of experience with feeling interspecies.

# 13. In the game itself (points 20 onward) does the user use the hand sets to lead the others off the island?

- Actually, the scene of Incinerator-island doesn't involve the footage that yellow leeches continually follow when the player ascends to the sky and get out the chimney of Incinerator-island. But, the footage shows ascending shot and the last shot of the Incinerator-island scene illustrates the player view that looks ahead to the hole inside of the chimney during the escape.

However, as showing following virtual leeches in all other scenes and shots, the last scene (outro flying scene) shows that the player is flying with other fellow leeches again and return to the migration, which implies that the player's leading role finally succeed to help all leeches get out of the Incinerator-island and overcome their difficulties to survive.

#### 14. How do you get points?

- As I explained in the description on my website, the player can control a target with the controller to point on the rainbow leeches. Although the rainbow leeches quickly fly and last a few seconds, the player can get multiple score points by correctly pointing at them.

- Because there is one rainbow leech per human in the generating process, the player needs to keep looking around to find other rainbow leeches.

- The rainbow leeches can be generated a few times and quickly move out the footage. That's the reason why many people can participate in the feeding activities to offer more possibilities of getting score points to the player. So this collaboration of the audience and the live leeches is necessary for the game process and play on it.



The player is pointing on a rainbow leech to get score points.

# **15.** *Point 24. How do you understand the relationship between the human player and live leeches as game avatars?*

When I launched this leech project series, I had researched both leeches and parasites because there are many similarities biologically and characteristically between them. Looking at the bioactive substances in their productions, the interesting point from the parasites' survival strategies is that the parasites control their hosts' behaviours to enhance their transmission and move to other hosts. The leeches also have a clever strategy that their saliva contains an anaesthetic and anticoagulant to enhance their bite and suck blood in secret and continuity on their hosts.
Conceptually, as I mentioned #23 in the additional summary, I applied conceptual ideas to my project that the live leeches would control humans as their hosts for the survivability with the continuance of feeding in the game context. The player also needs the audiences to support the live leeches for his or her survivability with getting points from the rainbow leeches in the game context. So, as I said on #23, there are mutual benefits in the symbiotic relationship between the human player and the live leeches within the game process.

- Technically, as I mentioned #20 in the additional summary, the player can lead the virtual avatars of the live leeches and mingle together in the VR interface. In the game context, the avatars of live leeches are companions for the player's journey. The player needs the live leeches because the live leeches attract the audience to the feeding participations that help the player get score points from the audience avatars. So, the live leeches mediate between the player and the audience in terms of playing game.

# 16. Is the intention to work together to get to the utopia? How do they work together in the game?

- Yes. My conceptual intention is that the human and nonhumans create utopic metaphors with their collaborative and mutual relationships within the art forms.

- In the animal utopia, the leeches might exist as ontological equivalents with humans without the bias that leeches are disgusting animals and incarnations of greed, avarice, bloodsucker, aggression, and parasite in human cultures.

- Becoming leeches and collaboration of humans and leeches in the game engages people to understand the notion of interspecies, share mutually beneficial relationships, and help them open up a possibility for positive change beyond our bias toward leeches that represent nonhuman animals. This collaborative relationship between humans and leeches conceptually create resemblance of utopia within the VR and the artistic spaces.

- As I mentioned in my previous answer #13 above, all participants in the game and performance work together to create the art interface as the resemblance utopia, in which the collaborations consist of activities on this note: the human player become one of virtual leech and leads the virtual avatars of live leeches to get to the utopia; the live leeches attract other humans to support the player and themselves for the survivability; the chef provide food to encourage the audience to feed the live leeches and guide the art collaboration.

# 17. Also, at the start I really felt I was a leech because of the graphic with the leech in front and behind me—why not do this throughout?

- There are some visual conflictions and layout difficulties between the player's body and other fellow leeches, and other visual elements. So, only the first scene and the last scene show the player' body and add the fellow leeches in front and behind the player.

- There are also some concerns between the first person perspective with the up-and-down motions and other camera motions, which cause VR motion sickness symptoms, such as feeling dizzy and discomfort.

- So, after I tested the scenes many times and consider the visual design, I finally decided that only the intro flying scene and outro flying scene involve the player's body and fellow leeches, and the up-and-down motions.

#### 18. Is the VR being a mode to engage empathy for others?

As my understanding the question and assisting your additional sentence, I would describe a little more about the feeding audiences, who are also accountable to others within the collaborative relationships. Also, I would like to mention the other general audiences' reactions from my observation during the game and performance. Additionally, I would like to describe my intention for the audiences' palms where I set a flower, a piece of raw meat, and a live leech although we haven't discuss about this point last time. I hope that those would help you write more about 'empathy for others'.

Most audiences didn't understand what are going on in the real and virtual experiences when they entered in the room. However, they learned soon that they are actually in the game plot with having their role as the virtual rainbow leeches through watching the three monitors, showing them the game animation and detecting their feeding features at the same time. After the feeder audiences learned more about the process and their role in the game environment, they attempted to do more activities to contribute more nourishment support and visual spectacles in playing with the live leeches and generating the virtual leeches. They were interested in the role in supporting survival for others, the real and virtual counterparts.

The general audiences also learned about all components' interrelations, interactions and collaborative roles though watching the game animation and demonstration on the monitors, and observing the performance. These observation and learning experience promoted them to attract

and step into the feeding participation and playing the VR game. Actually, I have seen that many audiences explained each other the process of game and performance and shared tips for better earning score points from their feeding and playing VR experience after their participation. All people (and all live leeches) in the room became members of the human-nonhuman-team within the art game and performance.

As you have seen the photo documentation on my website, showing many pictures where many audiences enjoy to directly touch the live leech on their palms after their playing the game and feeding activities. As one of my performance with audiences, I have set a flower, a piece of raw meat, and a live leech on their wet palms. This additional entertainment with touching live leeches not only visually create a beautiful celebration and feeding environment on human body, but also emotionally give audiences the feeling of being in love with grooming and patting another living being's body. It looks like a comfortable feeding baby on mom's arms and a pet animal on owner's hands. It also looks like the celebration of childbirth with flowers and the first breast-feeding. We both human and non-human animal originated from water. Like amniotic fluid surrounding a fetus in a womb, the live leeches were nourished in water, and then finally they were delivered to the wet hands. Humans and leeches already have biological homogeneity, but we are estranged culturally and politically in the anthropocentric world.

I know that my intention would be too anthropomorphic approach to live leeches. Also, most audiences couldn't understand my concept and intention. So, I frankly had expected that most people wouldn't touch the creepy wet bloodsuckers in the collaboration of the chef and audience. However, amazingly, so many audiences asked me to touch live leeches and they were willing to feed them on their palms, and touch the creepy-cute small creatures and a small piece of bleeding raw meat as well after their feeding and playing participation. I believe that the enjoyable entertainment in the interspecies experience and technical hybridization in the art collaborations made this positive feedback. The experiences from the gesture of hospitality and becoming leeches moderate our bias toward unfamiliarity and engage empathy for non-human others, beyond merely the human body and the human-centric mindset. This positive change also makes the audiences aware of understanding interspecies and familiarity with hybridity to accept others or become others, and to be variable and transformable in blurred boundaries.



### Credits

#### **Director and Producer**

Doo-Sung Yoo

#### Creative Coding: Unity C#, C++, OpenCV

Micheal Geiger

#### 3D Modeling & Animation, Unity Game Engine, VR App Design

Peng Fei Lin Garrett Williams Doo-Sung Yoo

#### **Character Design**

Doo-Sung Yoo Peng Fei Lin

**Story, Screenplay, and Game Narrative** Doo-Sung Yoo

Sound Design & Editing

Doo-Sung Yoo Garrett Williams

#### **Visual Performance:**

Chef – Doo-Sung Yoo Waiter 1 – Greg Collins Waiter 2 – Mary Sundermeier Waiter 3 (for game set up and game attendant) – Garrett Williams Waiter 4 (for game set up) – Michael Geiger

#### Video / Photo Documentation

Keida Mascaro David Stephens

#### **Video Editing**

Doo-Sung Yoo

Exhibition and Performance at ROY G BIV Gallery, Columbus, Ohio Opening Reception: March 3<sup>rd</sup>, 2018 Exhibition: March 3<sup>rd</sup> – March 31<sup>st</sup>, 2018 Closing Reception: March 31<sup>st</sup>, 2018

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