

A Case Study on Digital Interactive Training Content <Tamagotchi> and <Peridot>

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Abstract

Having pet is one of the activities people living in modern society do to relieve stress and find peace of mind. Currently, the object of companion animals has moved beyond being a real 'living entity' and has developed to a stage where the animal's upbringing process can be enjoyed in a virtual space by being programmed in digital content. This paper studies detailed elements such as character design, interaction, and realism of 'Tamagotchi (1996)', which can be said to be the beginning of digital training content, and 'Peridot (2023)', a recently introduced augmented reality-based training content. The point was that it was training content using portable electronic devices. However, while the environment in the electronic device in which Tamagotchi's character exists was a simple black and white screen, the environment in which Peridot's character operates has been changed to the real world projected on the screen based on augmented reality. Mutual communication with characters in Tamagotchi remained a response to pressing buttons, but in Peridot, it has advanced to the point where you can pet the characters by touching the smartphone screen. In addition, through object and step recognition, it was confirmed that the sense of reality had become more realistic, with toys thrown by users on the screen bouncing off real objects. We hope that this research material will serve as a useful reference for the development of digital training content to be developed in the near future.

Key words: *Pet, Tamagotchi, Tamagotchi, Augmented reality, Design, Content, Interaction*

1. Introduction

For people living in modern society, having pet is an act of relieving stress and gaining emotional comfort. Anyone who has time, money, and space can adopt real life creatures such as dogs, cats, fish, and birds as pets. However, the generation of negative emotions[1] through environmental conditions such as availability of living space, health-related problems such as allergies and respiratory diseases, financial problems due to various management expenses, and death due to animal injuries, diseases, and old age. There are many people who are not willing to adopt a pet due to these reasons.

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As digital fostering content is developed, people will be able to gain the joy of adopting and caring for pets in a digital environment. Starting with 'Tamagotchi (1996)' produced in Japan, digital learning content such as 'Nintendogs (2005)' produced by Nintendo, a Japanese video game company, began to be developed. In 2023, 'Peridot (2023)' based on augmented reality will appear, showing digital training content that is more advanced than previous ones in terms of elements such as interactivity between people and characters and realism of character movements.

In this study, we analyze detailed content elements such as character design, interaction, and realism of 'Tamagotchi', which can be seen as the origin of digital training content, and 'Peridot', developed in 2023. Furthermore, we would like to find out how the detailed elements of the content have changed when 'Peridot' is compared to 'Tamagotchi'.

2. Tamagotchi and Peridot research

2.1 What is Tamagotchi?

'Tamagotchi (2023)' is an electronic pet content invented by Japan's Aki Maita in 1996 and released by electronic game device company Bandai after purchasing the idea. It is a bitmap contained in electronic devices. It is a character development game machine designed to allow users to raise and play with their own pets. Starting from an egg state, once the character hatches, you must provide staple food and snacks, clean up excrement, and play with it. The character grows according to the owner's faithful upbringing. 'Tamagotchi Plus', developed in 2004, was equipped with an infrared communication device, enabling communication with other players (fighting between Tamagotchis, exchanging gifts, etc.).[4] Since then, various versions of Tamagotchi have been used for play, communication, and communication. It was released with various features updated, such as display, and recently released products appear to have been produced with a color screen.



Figure 1. Tamagotchi model[5]

2.2 Character design of Tamagotchi

I can check out 276 character designs on the Tamagotchi official website. The characters that can be seen in Tamagotchi have 2D designs. Various objects, including real animals, imaginary animals, aliens, food, and objects, are personified and expressed in simple and cute drawings. The colors of the characters confirmed in the color version are closer to pastel tones than primary colors. As the characters are expressed in cute and unique drawing styles, it is presumed that they are trying to convey a soft feeling. These characters appear as bitmap images on the screen of electronic devices and move with simple graphic

motions.



Figure 2. Tamagotchi characters

The character's growth stages consist of egg → infancy → childhood → adolescence → adulthood. In the case of the recently released model, some of the names have been changed from egg → infancy → rebellious stage → puberty → friend stage. The cute design is maintained from infancy to adulthood. The character's growth may change depending on care misses, changes in food, items, and affection (or happiness).

2.2 Interaction of Tamagotchi

The characters in Tamagotchi interact with users through notification sounds and device button clicks. You can increase your affection level with the characters through consistent care, such as feeding them meals and snacks, or playing games (mini-games using Tamagotchi characters). When it is meal time, the characters call the user through the device's notification sound. Users must use the device's buttons to provide meals or snacks to the characters. After eating, the characters defecate, and if this is not cleaned up quickly, the characters will get sick. If your character gets sick, you can cure the disease by clicking a button and giving an injection. If treatment is delayed, death may occur.

Tamagotchi raised properly with consistent care evolve according to standard character growth stages. However, due to illness and lack of play, Miss Care changes into a different character. Products released afterward have increased interactive elements such as marriage between characters, creation of second generations, acquisition of money, and purchase of items through mobile devices using infrared communication and Bluetooth.

Providing a meal to a hungry character increases the feeling of fullness, cleaning the character's excrement can help the character grow healthily, and the process of increasing affection through play is training content that clearly shows the interaction between the user and the character. This is considered an example. Although it is a simple action that involves receiving notifications through device sounds and screen displays and responding by clicking the appropriate button, the content can be seen as very similar to the interaction between an actual caregiver and the pet.



Figure 3. Tamagotchi character eating and defecating[6]

2.3 Realism of Tamagotchi

Tamagotchi characters move and sleep according to their activity time and sleep time, just like real creatures. During activity time, activities such as feeding or playing are possible. At bedtime, the character sleeps soundly and rests. The character's activity time and bedtime are programmed so that they can be modified, so they can be adjusted to suit the user's life rhythm.

Also, characters have a lifespan. Characters show differences in their meal cycle and amount of food depending on their growth stage. If not managed properly, it can lead to illness and, in the worst case, death. A character that has grown normally and reached the end of its life is represented by an angel icon when it dies. However, characters who died due to disease appeared on the screen as ghost icons.

Tamagotchi has great significance in that the process of caring for an actual living being can be felt similarly through the characters. However, the low-quality bitmap images and the graphic motion of characters that only operate in the bitmap space on the small screen of small devices felt like they lacked realism.

2.4 What is Peridot?

'Peridot (2023)' is an augmented reality (AR) content developed by 'Niantic', an American location technology-based augmented reality production company. You build a bond by hatching and nurturing the virtual magical creature Peridot (hereinafter referred to as 'Dot'), and after growing it into an adult, you can grow a new generation of Dots through mating with other Dots.[7] Each individual dot has seven different external characteristics (pattern, tail, horns, feathers, material, face, ears) and also has various unique personalities. Users must connect consistently to provide food and engage in interactive activities such as play to increase satiety and happiness. The dot uses real-time mapping and location-based AR technology to move vividly within the user's mobile device screen.

2.5 Character design of Peridot

Dots are virtual magical creatures that exist in the augmented reality space on the camera screen through real-time mapping. Dots not only walk and run on the ground, but they can also climb tree branches and fly in the sky. The dots implemented in 3D have characteristics found in real or virtual animals and plants in each body part. Depending on how these characteristics are combined, the appearance of each dot becomes countless. Additionally, when dots breed, some of the parents' characteristics are passed on to the second generation.

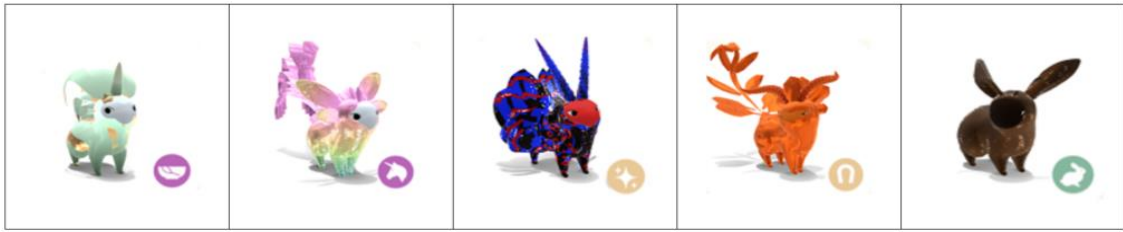


Figure 4. Various types of Peridot characters[8]

The growth stage of the dot consists of 'baby → child → subadult → adult → companion → friend → eternal best friend → soul best friend', and the external characteristics of the individual during the 'baby → subadult → adult' period This changes noticeably. There are no obvious changes in appearance after becoming an adult. When the appearance changes, the tail, horns, and face become more prominent, and the body grows larger. The length and width of the tail and horns increase, and the size of the eyes decreases. As Dot grows, its physical structure changes as a virtual creature to give the user the feeling of being a magical creature. As the child grows, the size of the eyes becomes smaller compared to the face, creating a cute and cute design that decreases as the child grows older.

2.5 Interrection of Peridot

Dots interact with the real world on the screen through camera movements and screen touches. By interacting with natural materials such as land and water, it is possible to acquire items by digging into the ground or going into the water.[9]

Interaction with Dot consists of feeding and playing. By touching the surface of the screen up or down, you can get dot food and play items. It is also possible to apply items to dots by throwing them on the screen using the touch function. If you give food and throw a ball to play, each gauge bar fills up and the object's satiety is buffered. If you provide food and play with the child, or use the touch screen to stroke the dots, a star-shaped icon will fly to the happiness gauge, showing that the happiness level is increasing.

The process of interacting with a character by touching the capacitive screen of a mobile device (smart phone, tablet PC) is significant in that it is similar to the actual parenting process of increasing intimacy by stroking a companion animal. The sight of a character showing a relaxed expression and increasing happiness through the act of stroking can be seen as an excellent example of interaction in companion animal training content. Another excellent example is the way Dot retrieves a ball by throwing it into the real world on the screen.



Figure 5. Peridot reacts to the ball and retrieves the thrown ball

2.6 Realism of Peridot

The dots move on the screen of the mobile device according to the camera moving speed. When the user starts walking, the dots on the screen also walk ahead of the user on the screen, and when the camera focuses on a bed or desk, the dots on the screen come up on top of the object shown by the camera and sit down or play a joke.

Another thing to note is that it is programmed to recognize differences in objects. Dots can move through objects, and dots hidden by objects are expressed in shades of gray. Users were able to figure out where the dots were located even if they were not visible in front of them. This level difference recognition can be clearly seen in play with dots. The toy ball thrown into the space on the screen through touch bounced when it hit some object.

By enjoying play while being in the same space as the dot, I confirmed that although it is a limited space in a mobile device called a virtual environment, I can feel the reality of being with my pet wherever I am in the real space.

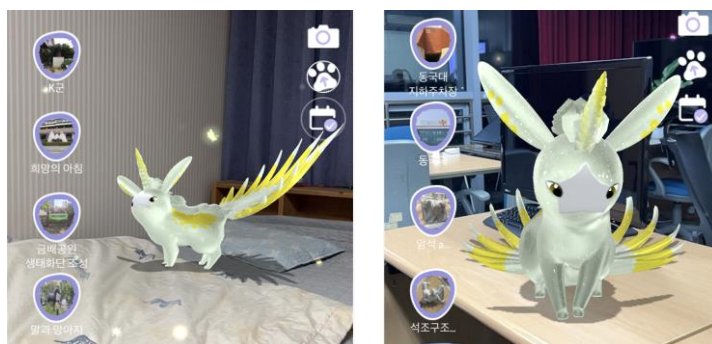


Figure 6. Peridot on a bed and desk in the real space on a mobile device screen

3. Result

Table 1. Result of emergency detection test

Contents	Tamagotchi	Peridot
Detail elements		
Production year	1996	2023
Programing	Bitmap	AR(Augmented Reality)
Character design	2D	3D
Interection	Notification sound, Device button click / Provide meals or play, satiety and affection increase	Moving camera, Screen touch, Real time mapping / Items obtained vary depending on the nature of the material
Realism	Character has lifespan like a real lining creature, it can lead to death due to disease and aging.	Object recognition, Shadow application / Character working in real environment as seen on camera

limitations	Lack of realism due to monotonous background and character design in bitmap format and simple graphic motion	Charac design that reduces the cute appearance, and program errors that frequently occur when the character moves.
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So far, we have studied detail elements, including the interaction between digital training contents ‘Tamagotchi’ and ‘Peridot’. Tamagotchi was created using simple motion graphics in the form of bitmaps, and Peridot was created based on augmented reality created through moving cameras and real-time mapping. Tamagotchi interacted with the user and the character through the device's notification sounds and button operations. Peridot is an augmented reality content that can be run on mobile devices (smartphones, tablets), so it was confirmed that it can be interacted with by moving the camera and touching the screen. Both contents were produced to provide a realistic feel similar to raising an actual pet, but there were also limitations due to shortcomings in various factors.

4. Conclusion

‘Tamagotchi’ has great significance in that it is the beginning of digital fostering content. Feeding, cleaning up litter, and playing are similar processes to caring for an actual pet. It can be highly appreciated that you can experience realistic parenting activities on a highly portable and small-sized electronic device through simple button operation and interaction through electronic device notification sounds. However, in a reality where realistic digital environments such as 3D and virtual reality are becoming more common, 2D designed characters and bitmap environments feel very lacking in realism.

As ‘Peridot’ is content produced by a company that specializes in augmented reality programs, you can feel the excellent quality in terms of realism. Although it is a limited space inside the screen of a mobile device, it is possible to feel the same experience as raising a pet through the dots that interact with the user. However, the character design, which becomes less cute as it grows, and the program's error of not picking up the ball Dot threw, were found to be areas that need improvement. The cute design expressed during the period when the character changes from a child to a sub-adult is an element that makes content users feel the character's external appeal. However, the cute feeling is noticeably diminished as the game grows, which is judged to be unsatisfactory in playing the content in the long term.

Through this research process, it was concluded that digital training content to be developed in the future needs to be developed more realistically in terms of interaction and realism. An example is that an actual pet responds favorably to the sight, voice, and touch of its owner. If the characters in digital training content are pleased with the appearance and voice of the main user registered through the camera or microphone installed on the electronic device, and the character has an unfamiliar interaction when recognizing the face or voice of an unregistered person, The sense of reality using content can further increase. Additionally, when calling or stroking a character by touching the screen, the registered user's touch can be favorably recognized based on fingerprint recognition. When fingerprints other than those of the registered user are recognized, the character's reaction becomes unfamiliar. If this interaction is applied to digital learning content that will be developed in the future, users will be able to experience a higher sense of reality.

The number of people having pets is increasing every year, and the market is also increasing significantly.[3] Living with pets brings positive elements to people. It is said that by raising a companion animal, the owner can feel happiness by voluntarily caring for and caring for a specific object and providing satisfaction and comfort in return .[2] We hope that in the near future, pet digital content will develop further, providing more opportunities for people who have difficulty in experiencing raising a pet in reality due to

environmental or personal issues to enjoy happiness.

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