

Application Design to Release Stress

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Abstract: In this research, we design an application to release user's daily stress. It is said that contemporary people are in a pretty stressful situation. For example, in recent years, we have suffered from difficulty to meet friends casually and enjoy talking with them to get rid of our daily stress due to the COVID-19 pandemic. In other words, the variation of ways of overcoming stress have been limited. In addition, people have deteriorated relationships with their family members because of the longer stay-at-home time than before. Health problems such as the onset of depression caused by the stress of the pandemic are also becoming more serious. Moreover, people are worrying of increasing the number of suicides. This situation is one of the problems that people consider it important in the society recently. Therefore, there is an urgent need to find solutions to such a situation. In this research, we develop the functions to cope with daily stress easily for the application of the smartphones that anyone has. We include functions in this application we suggest in this research. They are "vent mode", which is a dynamic de-stressing method by words, "empathy mode", which is a static de-stressing method, and "physical touch mode", which is a dynamic de-stressing method that is accompanied with physical exercise. In addition, we design the application for de-stress in order to break through the stressful situation these days.

Key words: Application, communication, de-stressing, empathy, frustration, physical touch, smartphone, stress relief, vent.

1. Purpose

This research aims to develop an application with which people can relieve their daily stress without direct contact with others. There are many people who may be frustrated in everyday life regardless of their generations [1]. The number of people who have stress as a result of the COVID-19 pandemic and have difficulty coping, has increased in the last few years.

Especially the opportunity for interpersonal communication has decreased in almost every situation due to the need to stay at home during the pandemic [2]. People also buy things online, and they often order the meals for delivery. Needless to say, tasks in work and classes in school has become online as well. People also communicate each other online by using video calls. In addition, we enjoy 'online drinking party', which is the way to drink alcohol and talk with others mocking face-to-face communication by using video conferencing tools.

However, events with those systems are just alternative treatments with limited effects, and people lack direct communications. In short, now people cannot avoid finding the stress in every aspect of life [3]. For 'stress release', people usually exercise, go outside or hang out with our friends, but most of them are hard to do in the pandemic.

In this research, we propose the mechanism of “a stress-release tool without human direct contact” so that people can get rid of their stress casually by using smartphone. We also create the prototype application.

2. Background

Due to the recent COVID-19 pandemic, lots of style changes like ‘telecommuting’, ‘remote work’, or ‘staggered working hours’ have been expanded in the society in order to prevent the infection and the spread of COVID-19 [4]. Some of the people have been damaged by the recession, which leads to losing a job or pay cut, in the pandemic.

In addition, the number of the people who feel tired has been increased even though they do not have the experience of being infected with COVID-19. For instance, there are people who have health problems like depression caused by stress due to the pandemic. People also have the deteriorated relationships with their family members because of the longer stay-at-home time than before.

Thus, it is said that more people are in a situation in which it is quite easy to become stressed. In the worst case, there are suicides due to such a serious situation. The number of suicides in Japan had been decreasing every year until 2020 when the suicide rate increased for the first time in 11 years, likely due to COVID-19 [5].

In this research, we design an application as a tool for stress release casually. We also design it for stress releasing in order to create an environment where others can break through any situation where they may easily get frustrated.

3. Related Research

3.1. Estimation of the Human Stress by Smartphone

Smartphones have many sensors like GPS or accelerometers for control. We can acquire the users’ action data passively by those sensors. Focusing on this characteristic, previous research about the use of smartphones to estimate user stress has demonstrated that such information that can be obtained from these sensors [6]. According to research by Hamaya *et al.* (2020), user stress can be estimated by analyzing log data, which is collected when using or carrying a smartphone, from both the “time perspective” and “spatial perspective” [7].

3.2. Speaking Positive Penguins

“Positive penguins” are one of the popular characters in Japan. It always gives people positive words and makes people happy. Recently, a life-size stuffed plush of the character has been released. This tool has functions to cheer people when they talk to him about anything or trivial matters. In short, this is a tool to encourage people to get self-esteem.



Fig. 1. Speaking positive penguins.

This figure shows a doll of positive penguins. If users speak something, he answers anything to cheer them. Japanese people have national tendency: “diligence” and being hard on themselves [8]. This tool enables users to speak out something that they work on hard in daily life and to feel like getting their hard work approved. In this way, users can release everyday-stress easily.

3.3. “Neuro Baby” with Which Users Can Communicate with Human by the Voice

“Neuro baby” is a baby that digitally lives on a computer. It is a digital life system that communicates with humans through voice. With this system, people can feel an attachment to “Neuro Baby” just as if they had their own baby [9].



Fig. 2. The image of “Neuro Baby”.

The figure on the left side is the image of neuro baby on a screen. Another one on the right side shows how it is actually used. Users can cherish the baby whenever they like. For example, the baby disappears from the computer screen when users feel tired of communicating with it. The baby appears on the computer when users turn on the power when they would like to communicate with the baby. In addition, users can decide the personality of the baby according to the users’ preference, and the baby also has the ability to learn about the user because “Neuro Baby” is a replication of a human.

With “Neuro Baby”, users can casually feel an attachment and a mock experience as if they are taking care of a real baby.

4. Mechanism to Get Rid of Stress

In general, ‘stress’ is one outcome of the buildup of ‘frustration’. ‘Frustration’ is defined as ‘the suppression of anger or resentment in one’s mind, which is not released to the surface’. It is said that to ‘get rid of frustration’ is ‘de-stressing’ [10].

‘Releasing stress’ can be promoted by emitting ‘the anger or resentment we suppress in our minds’ out of our minds [11]. The way to release these emotions are usually by speaking out or physical exercise [9]. Regarding the former, we release stress by putting our thoughts or feelings into words and speaking out. As to the latter, we can emit our stress by releasing physical energy like hitting or kicking against other humans or objects.

Besides these dynamic and active ways, people can also get rid of stress in static and passive ways. For instance, people can release stress by receiving affirmation from someone or having them agree with their positions or thoughts regarding stress [12].

Thus, there are two methods for humans to de-stress: an ‘active method’ and a ‘static method’. In the research, we set three modes to release stress in the application we developed.

One is a dynamic method, and it is stress-releasing function for the smartphones that uses words or physical touch. The other two methods are static, which allow users to release stress by getting absolute empathy and agreement from the smartphone application.

5. The Overview of Proposed Application

5.1. Vent Mode

“Vent mode” is a dynamic de-stressing method by words. By shouting complaints to an avatar of a person whom a user dislike in the application, he or she can let off daily stress against others. In this mode, user can set a human face that he or she would like to shout to as the avatar image. The user can feel the exhilarating feeling as if user punished the person whom he or she dislikes from the front. In this way, user can get rid of the daily stress to the ‘enemy’ directly on the application.

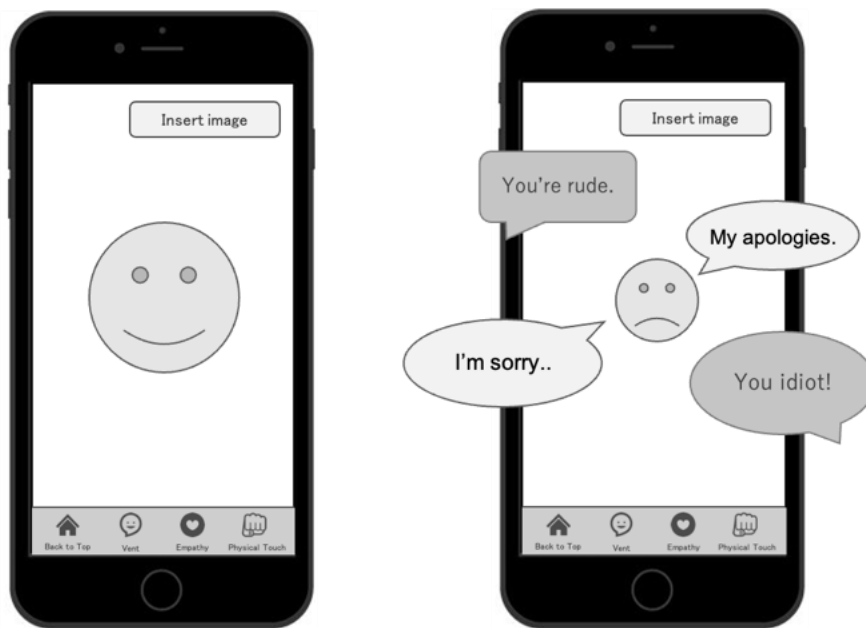


Fig. 3. Vent mode design.

This figure shows that you use vent mode actually. When you say something bad to an avatar on this application, he feels sorry and say something sorry.

5.2. Empathy Mode

“Empathy mode” is a static de-stressing method. This mode has functions to reply to the comforting words to user and empathize with what he or she says, when users talk to the avatar about the daily complaints or name-calling. People keep calm mood by releasing their daily dissatisfaction in direct communications with others. However, it is now difficult for people to see someone directly to prevent further infection spread in COVID-19 pandemic. This is the reason why the number of opportunities to talk with others directly have been decreased recently. There are a lot of people who spend time, being frustrated with the daily dissatisfaction.

The avatar in this application gives those users kind words and represent empathy to what they talk. With those reactions, users can get a satisfaction as if somebody listened to what they said without direct communication with others.

This figure shows that you use empathy mode actually. When you say something that you would like sympathy for, an avatar on this application relates to your words and speaks to you in a way that is close to your heart.

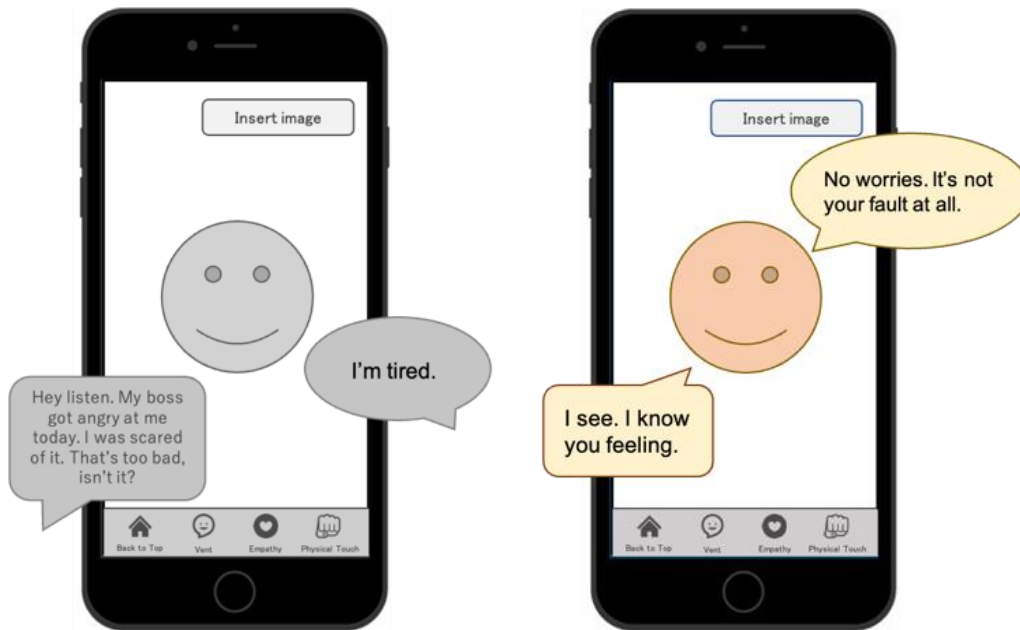


Fig. 4. Empathy mode design.

5.3. Physical Touch Mode

“Physical touch mode” is a dynamic de-stressing method that is accompanied with physical exercise. Users can release stress by users’ physical touch onto the interface paired with the smartphones. Specifically, users are required to connect smartphone to the special cushion-shaped interface. Users can get rid of the stress by punching the interface.

A lot of people have the experience to reduce stress largely by the attacking actions like kicking or punching something when they feel stressful or angry. The products for just punching to release stress have been in the market. Regarding the proposed application, users can freely customize the avatar or the character to punch on display.

Users can also change the avatar every time they beat the cushion-shaped interface for punching. Users can feel an exhilaration as if they punched the ‘enemy’ directly by customizing the settings.

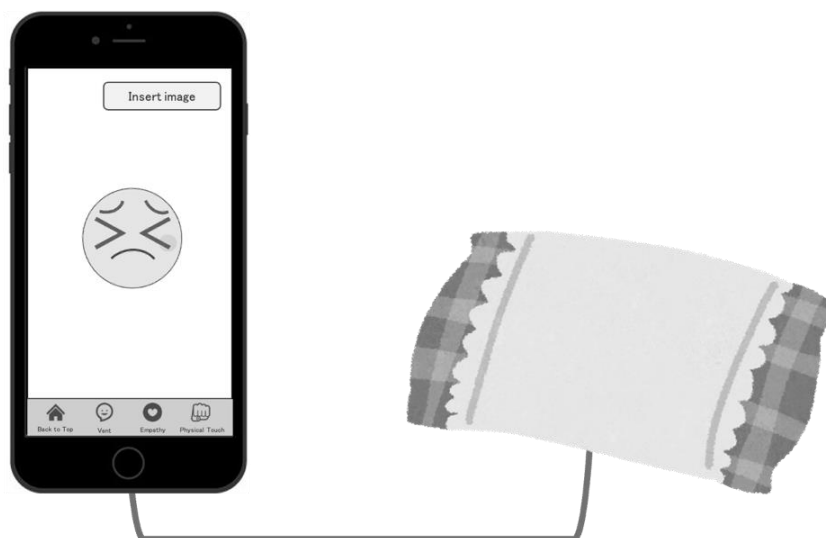


Fig. 5. Physical touch mode design.

This figure is the design that you use physical touch mode actually. If you punch the pillow connected to your smartphone, an avatar on this application looks as if it is in pain from being hit by you.

6. The Execution Image of the Application

6.1. Vent Mode

The execution procedure of “vent mode” is indicated below.

STEP1 Set a picture of an ‘enemy’ as the avatar.

STEP2 Users shout the complaints at or rail against the avatar.

STEP3 The avatar becomes smaller gradually and utters an apology to users.

STEP4 In the end, the avatar cries and ask the user for forgiveness. Then the avatar’s face is exploded and disappears from the screen and becomes ash.

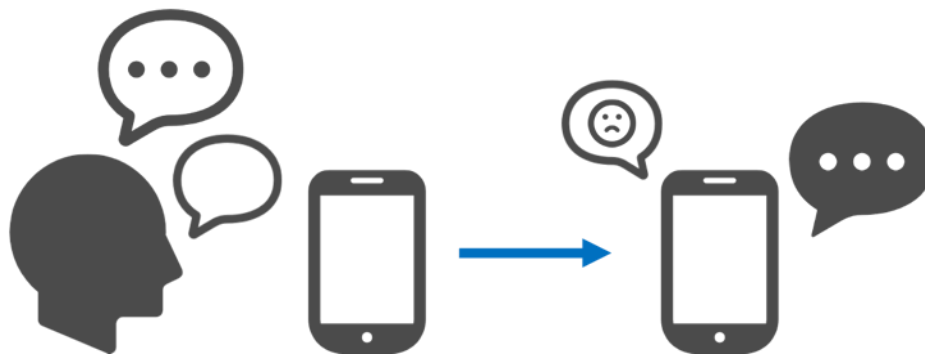


Fig. 6. Vent mode diagram.

This figure shows the diagram to use vent mode on the application that we propose.

6.2. Empathy Mode

The execution procedure of “empathy mode” is indicated below.

STEP1 Users set a picture of a person whom they want to ask for empathy from, as an avatar.

STEP2 Users utter things about which they want to be empathized with such as daily complaints to the avatar.

STEP3 The avatar responds to the users’ words and utters empathizing words.

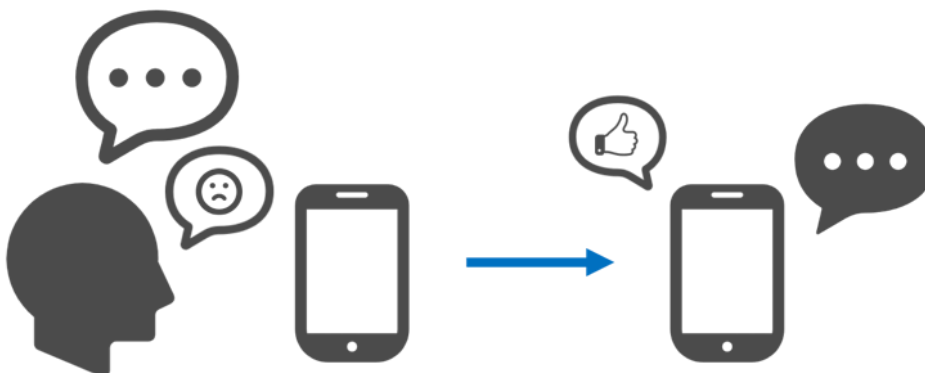


Fig. 7. Empathy mode diagram.

This figure shows the diagram to use empathy mode on the application that we propose.

6.3. Physical Touch Mode

The execution procedure of “physical touch mode” is indicated below.

STEP1 Users set a picture of an 'enemy' as the avatar.

STEP2 Users connect the dedicated pillow-shaped interface to the smartphones.

STEP3 The avatar on the screen reacts as if being punched when the users punch the pillow.

STEP4 The avatar is blown out of the screen and disappears when the users give the pillow a strong blow.

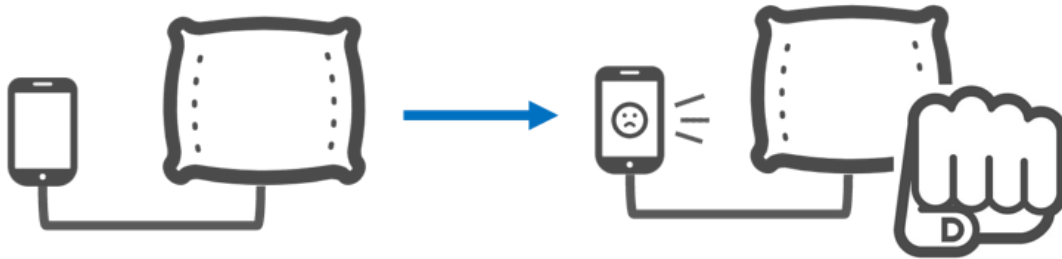


Fig. 8. Physical touch mode diagram.

This figure shows the diagram to use physical touch mode on the application that we propose.

7. Role of the Application

Using the proposed application, users can receive the feeling of “exhilaration” which they feel when releasing their stress to others directly. Moreover, users can also obtain a similar feeling of “satisfaction” as when others empathize with their daily complaints. This exhilaration and satisfaction, which are necessary to get rid of stress, are not something people can generate only after being aware of the presence of others [13]. This smartphone application plays a role of “others”, which is essential to the process of releasing stress. The application enables users to release daily stress by these effective methods, which may be harder to realize in the real world during a pandemic.

“Vent mode” enables users to speak out whatever they cannot usually tell someone they dislike by setting his or her avatar as an ‘enemy’. Regarding “empathy mode,” women especially have the tendency to require empathy to interlocutors when they talk with someone for de-stressing. Therefore, we assume that there is a big demand especially for female users to implement empathy mode to the application [14]. By realizing the multiple de-stressing methods as the application, it will help the process of distress for people. As to “physical touch mode,” we expect that users can obtain an exhilaration as if they punched others by the presence of the pillow-shaped interface dedicated for de-stressing, which connects to the system.

8. Conclusion and Future Works

We devised this application to get rid of the stress more easily in order to help resolve mental problems due to the COVID-19 pandemic. We suppose that the demand for the application will increase in the future even after the pandemic due to the high ownership rate of smartphones today. As a future task, we plan to implement the application at the next developmental stage, and conduct testing from the viewpoint of utility, practicality, functionality, and usefulness. We then reflect further improvements to the application system.

Conflict of Interest

The authors declare no conflict of interest.

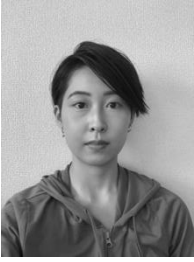
Author Contributions

Mizuki Watanabe conducted the research; Takayuki Fujimoto suggested the idea of the research; Mizuki Watanabe wrote the paper.

References

- [1] Kido, H., Hashizume, A., Baba, T., & Matsui, T. (2016). Development of an application for measuring stress state using heart rate variability index based on user evaluation. *Organization for Promotion of Human-Centered Design, Organization Journal*, 12(1), 1-8.
- [2] Kamita, T., Matsumoto, A., Ito, T., & Inoue, T. (2021). A chatbot promotes continuous use of a self-guided mental healthcare course. *Transactions of the Information Processing Society of Japan*, 9(1), 43-52.
- [3] Kamita, T., Matsumoto, A., Tawaratsumita, Y., Nakamura, A., Fukuchimoto, H., Mitamura, H., Suzuki, H., Munakata, T., & Inoue, T. (2020). Combination of self-mental care applications based on sat method. *The Institute of Electronics, Information and Communication Engineers of Japan*, 12, 1-6.
- [4] Tanaka, Y., Shimada, H., Okajima, I., & Nomura, K. (2021). An attempt to develop a smartphone application for stress management based on cognitive-behavioral therapy: A study of its effectiveness in workers. *Cognitive Behavioral Therapy Research of Japan*, 47(1), 20-21.
- [5] Office of Suicide Prevention, Ministry of Health, Labor and Welfare. (2021, Mar. 16). The situation of domestic suicide in 2019. *Annual Change in the Number of Suicides*.
- [6] Hamaya, T., Ochiai, K., Yamamoto, N., Fukazawa, Y., Kimoto, K., Kaminishi, K., Ohta, J., Terasawa, Y., Okimura, O., & Maeda, T. (2020). A method for estimating users' stress based on spatio-temporal smartphone log analysis. *Transactions of the Information Processing Society of Japan*, 62(4), 1113-1127.
- [7] Hamaya, T., Ochiai, K., Yamamoto, N., Fukazawa, Y., Kimoto, K., Kiryu, K., Kaminishi, K., Ohta, J., Terasawa, Y., Okimura, O., & Maeda, T. (2019). A method for estimating stress from smartphone logs considering the interaction between stress and attention function. *Proceedings of the Multimedia, Distributed Coordination and Mobile Symposium 2019 of Japan* (pp. 759-769).
- [8] Takashina, H., Suzuki, H., Shiratsuka, R., Ohashi, K., Miyashita, T., & Yokomitsu, K. (2009). A review of smartphone application programs for psychological support of depressive symptoms in Japan. *Cognitive Behavioral Therapy Research*, 47(1), 1-10.
- [9] Tosa, N. (1995). Robotic art that can communicate with humans by voice: neuro baby. *Measurement and Control*, 34(4), 311-314.
- [10] Tsuchiya, M., Umanodan, R., & Hojo, R. (2015). Self-care for reducing stress symptoms and improving productivity: Education based on mindfulness and acceptance. *Research on Occupational Safety and Health*, 10(1), 19-23.
- [11] Matsuo, N., Hayakawa, S., Harada, M., Takeda, K., & Furihata, K. (2014). Development of a stress state detection system from speech. *Proceedings of the Multimedia, Distributed Coordination and Mobile Symposium 2014 of Japan* (pp. 131-137).
- [12] Suzuki, S., Shimada, H., Miura, M., Katayanagi, H., Umano, R., & Sakano, Y. (1997). Development, reliability, and validity of a new psychological stress response scale (SRS-18). *Japan Society of Action Medicine, Action Medicine Research*, 4(1), 22-29.
- [13] Kanchia, S., Sabelaa, M. I., Mdlulia, P. S., Inamuddinb, & Bisetty, K. (2017). Smartphone based bioanalytical and diagnosis applications: A review. *Biosensors and Bioelectronics*, 102, 136-148.
- [14] Soshino, S., & Kamioka, H. (2014). Stress behavior estimation using smartphones. *Mobile Network and Applications*, 114(210), 1-6.

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