Title	SAUDADE : reviving travel experiences through sound to evoke positive emotions
Sub Title	
Author	Bektachi, Zineb(Sugiura, Kazunori) 杉浦, 一徳
Publisher	慶應義塾大学大学院メディアデザイン研究科
Publication year	2018
Jtitle	
JaLC DOI	
Abstract	
Notes	修士学位論文. 2018年度メディアデザイン学 第654号
Genre	Thesis or Dissertation
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO40001001-00002018-0654

Master's Thesis
Academic Year 2018

SAUDADE: Reviving Travel Experiences
Through Sound to Evoke Positive Emotions

Graduate School of Media Design,
Keio University

Zineb Bektachi

A Master's Thesis
submitted to Graduate School of Media Design, Keio University
in partial fulfillment of the requirements for the degree of
MASTER of Media Design

Zineb Bektachi

Thesis Committee:

Associate Professor Kazunori Sugiura	(Supervisor)
Professor Akira Kato	(Co-Supervisor)
Professor Kai Kunze	(Co-Supervisor)

SAUDADE: Reviving Travel Experiences Through Sound to Evoke Positive Emotions

Category: Design

Summary

People travel in search of strong emotions that differ from those felt in their daily life. By capturing the memorable experiences of their holidays, they hope to have something they reminisce about, because remembering and imagining can be as powerful as reliving the experience again. However, with the advances in technology, people accumulate a large number of digital mementos that they do not revisit as often as they intended to do. Researchers have been exploring the impact of tangible mementos and how they differ from their digital counterparts. We propose the concept of "SAUDADE", a tangible encapsulation of travel memories, using emotional nostalgic design approach that combines familiarity and novelty. This concept uses sound instead of visual or audio-visual mementos since sound contributes to evoke emotions. In this research, we will discuss whether sound can be used as a memento, whether tangible interaction can facilitate navigating and revisiting sounds and finally whether the practice of reviving memories of past travel experiences through sound can have a positive emotional impact on people or not.

Keywords:

Positive Emotion, Tangible Interaction, Memorabilia, Tourism, Well-being, Sound Mementos

Graduate School of Media Design, Keio University

Zineb Bektachi

Contents

List of Figures

List of Tables

Acknowledgements

As I wrote the last pages of this thesis, I could finally feel how near I was to the closure of one chapter in my life which is the graduate school. Coming to Japan and doing this program was a dream come true, and I am grateful for everything I experienced so far, the good times, the bad times, everything.

First, thank you Allah for guiding me towards this journey, giving me strength, balance and wisdom to overcome all the challenges I've been through and all the ones I will gladly embrace in the future. Verily, with every hardship comes ease.

I would like to thank Design The Future Award for funding my studies and giving me the opportunity to do this program. I also thank Professor Kazunori Sugiura for allowing us to show our individuality and creativity, Professor Akira Kato for his constant support and valuable advice, none of this would have been possible without you, Professor Kai Kunze for reading my thesis and for giving me hints about my topic in my presentation.

I am thankful to my family as well, for believing in me and I dedicate and credit all my achievements to them. This research has gone through ups and downs, but the motivation behind it remained untouched. I would like to thank, my housemate and close friend Naomi for being my emotional support, for listening to me and encouraging my project every step of the way. Her friendship is what I take with me and will always value. I would like to thank Yuni for being such a lovely person to look up to and admire as a researcher, designer, and person. Fafa, for all the progress meetings we had and all the long discussions until this research finally took shape. Laura, for reminding me that less is more. DingDing for supporting me when I was doubting myself and what I was capable of. Rahma, Abir, Imene for being my girl squad which made me feel at home even when I was miles away from my country. Thanks to my research participants who were

patient and honest about their feedback. Thanks to all CREATO! members for struggling together, for being selfless and standing up for one another. Thanks to my batch mates in KMD for all the memories we have, I am honored and blessed to have met all of you here in Japan. Thank you, anyone who is reading my thesis, thank you for being interested in my work, and I hope it can be useful for your endeavors.

Finally, I hope I can contribute to people's life in the same way they contribute to mine everyday. I wish people can take time to appreciate their surrounding, what's in front of them, I wish they find happiness in the little things, I wish they hear more often when speaking becomes a burden, and I wish they make enough memories they would want to cherish forever.

Chapter 1

Introduction

1.1. Background

In our lives, the defining moments are associated with distinct emotional states. When we have a delightful encounter, when we attend an interesting lecture, or when we receive an act of kindness from a stranger; all of these moments are emotionally charged and hard to forget. Whenever we want to project ourselves back in time, we remember how our experiences made us feel, how they affected us physically or how they changed our behavior. And because recollecting emotion can also induce a similar emotion, we often escape our real world and duel in memories, imagination and dreams.

What is Emotion ?

Emotion can be hard to define as it's a feeling and not something that can be simply put in words, however the academic definition by Watson and Clark (1994) at the University of Iowa, states that emotion is psycho-physiological response to external stimuli or a result of a mental process. There exists positive and negative emotions, both are beneficial for the person. One might think that negative emotions are not important in our lives, however without them we might be using a wrong approach without realizing it so we continue the same line of action, lose physical and cognitive resources and not even achieve our initial goal. As for positive emotions, Fredrickson [3] defines them as pleasant or desirable situational

responses ranging from *Love* and *Joy* to *Inspiration* and *Awe*. Positive emotions have the power to not only improve our instant state but they act like markers for the person's well-being and happiness which enhance future growth and success as well.

Emotional Design

As we now understand the benefits of emotions, designers just like researchers have been concerned about creating products that induce emotional responses, and they have concluded that the best way to do that is to design in such a way that considers the cognition, disposition and environment of the user. The first step to attain this is by using affordances to avoid negative responses. Affordance means to design something that has the same level of understanding to the users who encounter it for the first time, and there are four types of affordances: cognitive, physical, sensory and functional. [6] If we are able to design a product that we can naturally use at first sight, the users will trust the product, and therefore the product will change the way they feel and behave. This can be summarized in the product-emotion cycle (figure 1.1).
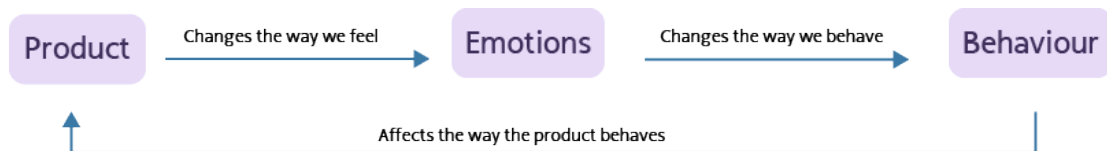
Figure 1.1: The Product-Emotion Cycle

A successful case of emotional design is the update of Google Calendar shown in figure 1.2, which now displays an illustration for certain events by picking up the keyword from the title. It works for even random events such as gym or dentist appointment. This process has proved to motivate users to create events in their calendar and anticipate the artwork that will show up, it has also transformed the simple task of recording an event in a calendar into a source of positive emotions.

4
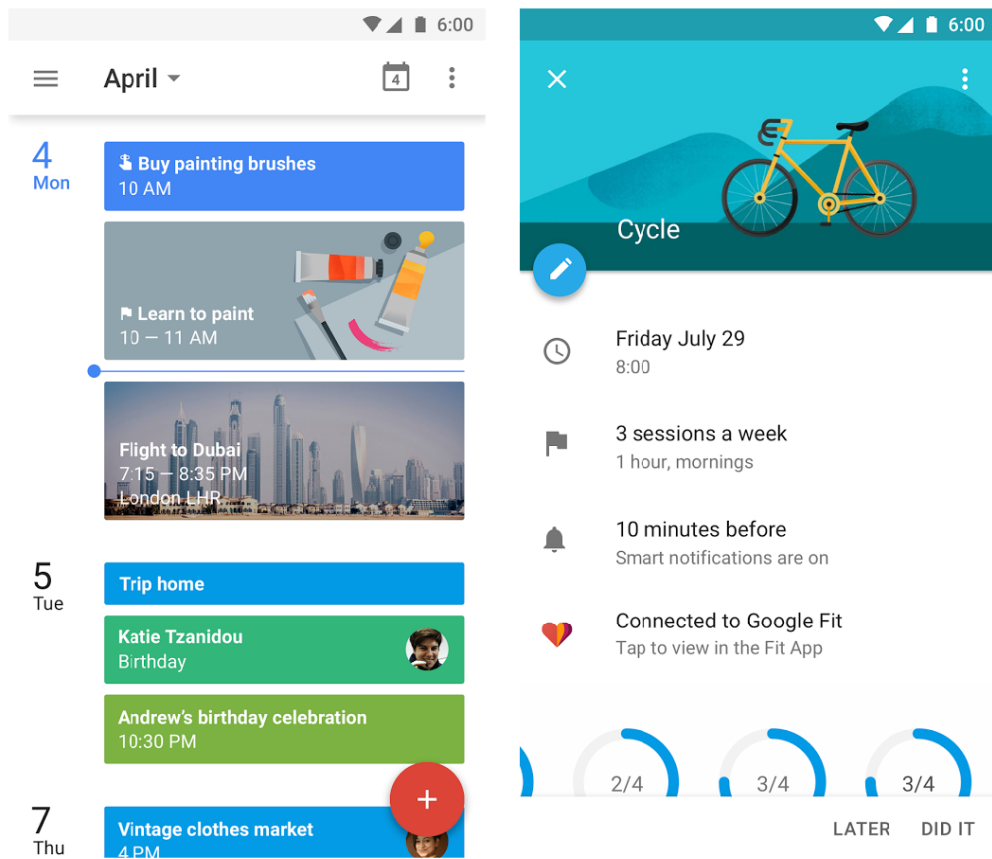
Figure 1.2: Emotional Design of Google Calendar: Event Illustration

1.2. Motivation

The experience of traveling can elicit a wide range of emotions in a short time. In a way, traveling is also an active social learning journey. My motivation for this project is my passion for traveling, I specifically like the memory making process during a trip. This need to have something to reflect back on, has encouraged me to try new things for the first time, explore new places without a specific aim, or even do the activities I like the most which I don't get to do in the daily life context, but somehow travel paves the way for that. As much as I love traveling, I often find myself coming back home feeling sad the trip has reached an end and feeling anxious about me resuming my daily activities and dealing with my responsibilities. This feeling has led me to think about ways in which I can revive my travel experience, other than talking about it to family and friends, or sharing pictures and videos on social media, or simply viewing them once in a while. What if we would have a tangible reminder, rather than the digital ones ? What if this tangible artifact can encapsulate an element of our trips and take us back in time through imagination of the good times we had ? What would it makes us feel ? How would this affect our well-being ? and how can it support our memory that we cant always account on ? This research will explore and try to answer all these questions and assumptions.

1.3. Focus Group

In order to understand people's perception of travel, a focus group session was conducted to discuss topics such as motivations to travel, travel and personal interests, solo travel vs group travel, sharing and validating travel experiences, the most memorable moments of the trip, and how travel relates with personal flourishing and growth. The 26th of January, 8 participants from various countries (Tunisia - Argentina - Italy - Greece - Taiwan - United States), ages ranging from 24 to 30, took part in the discussion that lasted for two hours. The discussion was video-recorded for further analysis and transcription. The questions were semi-structured with a set number of questions and follow up questions that the author deemed fit.The main questions asked can be seen in Appendix C.

After re-watching and transcribing the focus group video, the participants' statements were categorized into themes. In few cases, more than one participant shared the same opinion or motivation. There was several reasons that motivate people to travel: curiosity about an unknown place, celebrating a holiday, seeking knowledge about something related to the place, visiting family and friends, profiting from an opportunity such as a railway pass, self reward after achieving a major milestone, and keeping company to another traveler. People do travel to pursue their interests such as Anime, art, music, camping, nature, and games.

> P6: I usually travel because I love nature and I want to see something new or something different in nature. Or for some cultural experience that is somewhere else like different kinds of people, or I can have a different perspective on life if I see something like that.

When it comes to traveling in a group or solo, opinions were divided. People who enjoy traveling in a group prefer a small group of two to three people, so that they can share their experience in real-time, struggle together in case of a problem, for safety purpose, or to bond with people and get to know them deeply. As for those who prefer traveling solo, they travel to practice a hobby or an activity that requires them to have a personal space, they like to connect to nature more than people, and they take it as an opportunity to reflect on self and peace of mind.

> P4: I prefer traveling alone, because camping is something you do alone. You feel more at peace, you enjoy being alone, it's like a precious moment to think about life and think about your future and I would prefer go in alone now.

Most people like sharing their travel experiences and in different ways. The majority of participants like to share their experiences privately: bringing a souvenir, video calling on the spot, sending photos to family, sending postcards and so on. But the most memorable of their trips, could not be shared or expressed. Some participants referred to it as the vibe, the silence, or the ambience. At the end, the participants talked about the benefits of travel, that it makes the person self-reliant and responsible, it changes misconceptions, inspires people to take the first step, appreciate their own identity and build a new philosophy of life.

1.4. Research Goal

The goal of this research is to propose a tangible artifact that can be used at home to encapsulate previous travel experiences. The medium that we choose to explore in this research is sound. The auditory system is the first sense developed for human beings at the last weeks of pregnancy [20], which makes it a highly important sense, it's also an important element of an experience but we don't pay much attention to it. There is no existing social norm about capturing sounds from trips similarly to taking pictures or recording videos. Most of the time, sounds are recorded for a professional purpose such as acoustic design or urban sound-scape preservation. Through this research, we have a main goal which is extending the happiness experienced by travelers to their daily life through memory revival. We also implicitly aim at making people more aware of their surroundings, especially the sounds and the ambience. Furthermore, we aim at giving a new meaning to sound recording.

1.5. Thesis Structure

This thesis consists of 5 chapters.

CHAPTER 1: Introduction

introduces emotion, emotional design, the personal motivation behind this project, the focus group conducted as an early investigation, and states the research goal.

CHAPTER 2: Literature Review

presents the literature review about the three areas related to this research which are: travel and well-being, tangible memorabilia, and sonic mementos, then presents existing approaches.

CHAPTER 3: Concept Design

explains the design process which starts by understanding the target user, then executing a pre-test, stating the research questions, then the process of ideation, user scenario and a summary of how the concept works.

CHAPTER 4: Evaluation

evaluates the concept using two user tests, one for the positive emotions and memory, the other for the user interaction, then discusses the results and findings.

CHAPTER 5: Conclusion

proves the concept and discusses the limitations of this project and possible future work.

Chapter 2

Literature Review

2.1. Overview

This research is closely related to three areas of interest. Here we present some works from the literature that support the main concept. First, the area of travel and how it connects to well-being, positive emotions, and how can imagination extend the benefits of travel in daily life. Then, the area of tangible memorabilia which talks about the relationship people have with tangible objects and why they are valuable for reminiscing. Finally, we talk about how sound is explored as a memento for different scenarios.

2.2. Travel and Well-being

There is a growing interest in improving one's well-being and quality of life, especially when we lead stressful and fast-paced lives. Subjective well-being as explained by Dr. Seligman who is an avid promoter of positive psychology: "it has several measurable elements, each a real thing, each contributing to well-being, but none defining well-being".

He also identified five of these elements in a form of a model called PERMA: (P) Positive Emotions, (E) Engagement, (R) Relationships, (M) Meaning, (A) Accomplishment. Ever since, this model has been used in several fields [18] including tourism. In the literature, there are multiple study cases about happiness

P - **Positive Emotion.** Feeling good, positive emotions, optimism, pleasure and enjoyment.

E - **Engagement.** Fulfilling work, interesting hobbies, "flow."

R - **Relationships.** Social connections, love, intimacy, emotional and physical interaction.

M - **Meaning.** Having a purpose, finding a meaning in life.

A - **Accomplishments.** Ambition, realistic goals, important achievements, pride in yourself.
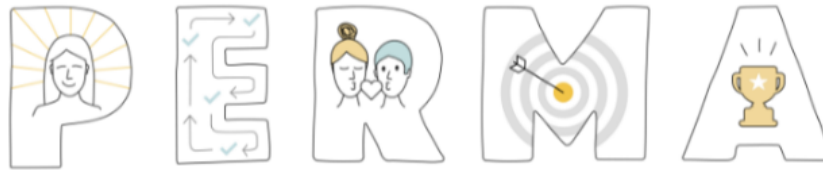
Figure 2.1: PERMA model pillars

in the context of tourism. One of them is Ratz et al. [21] which talks about travel as a happiness factor in Hungary. The paper identified that among life-events and experiences that generated happiness the most for the participants; were the ones related to travel. The content analysis from the interviews conducted resulted in a number of keywords or concepts that are related to subjective happiness, and most of them are not related to the place itself but more to the situation, the encounter, the moment. (Care-freeness, Sense of Belonging, self-actualization, romance, freedom, first individual trip, dream and so on). This research highlights the necessity to make the most out of this happiness-inducing capacity of travel experiences. The question is, if people travel in the pursuit of happiness, what happens when they come back to their daily life routine ?

On one hand, Nawijn et al. [16] found that people score higher on positive emotions than on negative emotions during the vacation trip, but [15] the benefits in the aftermath are either absent or short-lived when it comes to subjective well-being. On the other hand, Coffey et al. [2] claims that a vacation filled with flow experiences (i.e. an autotelic vacation) has the potential to offer lasting psychological and physiological benefits that extend long after the vacation has ended. Therefore, one of the reasons why some people are unable to extend the benefits of travel to their daily life, is that they were unable to achieve a reasonable

state of flow in their trip. And that could be explained by the contemporary conditions in which we live, it has become difficult to fully disconnect when we travel. For some working people it is important to respond to e-mails or attend to urgent matters even during a vacation. This process can break the flow, and distract the traveler by taking him back to the conditions he was escaping from. It could also happen when we try to stay in touch with family and loved ones, or when we're simply consumed by inner thoughts and worries. Social media has an impact as well, especially for millennials or Generation Z travelers who are constantly updating their audience about their trip, living in their smart devices, and seeing the world through their camera lenses. Rubin explores in her book *Happier At Home* [22] whether we can improve our sense of happiness by simply being in our place of living and mindful of what is already around us, rather than traveling far to seek new sights and experiences. However, the writer Tolle [25] suggests when he talks about perception; that some people feel more alive when they travel and visit unfamiliar places or foreign countries because at those times sense perception or "experiencing" takes up more of their consciousness than thinking; they become more present. Which means that people who are possessed by internal dialogue have their body traveling but their mind remaining in the same place and not going anywhere. Regardless, people still opt for travel as a retreat, so that they can deal with their problems in an alternative setting which then helps them to face it in their everyday life when they return, and this is the true value of transformational tourism. The book Travel and Imagination [12] compiles a number of papers that try to fill the void of literature in other types of travel which are not given much attention in research. Though travel can be corporeal, we should not ignore the importance of emotional journeys, or travel in represented worlds such as art or cinema. Travel draws its meaning from the surrounding conditions, people experiencing it and people observing it, not from itself. Therefore, one way to blur the boundaries between our daily life and the idea of travel is imagination.

> Imagination is equally crucial to the identity of the traveler, to the experience of travel and to the way travelers conceptualize these experiences for themselves and others.

2.3. Tangible Memorabilia

People take photos to remember things they want to hold on to, because they cannot rely on their organic memory to do so for a long time. Lately, there is a problem with photo-taking. It is presumed that it affects the memory of the captured experience. An interesting study by Soares et al. [24] tackles this issue by trying to explore the reasons behind a photo taking impairment effect on the memory. The results show that indeed taking photos causes participants to limit or disengage their attention when encoding an experience, an effect that is assumed to take place regardless of whether participants believe the photos are being saved. The study speculates that encoding the experience at the time of picture taking was disrupted by a sort of automatic cognitive offloading. In a way, people develop a sort of implicit transactive memory system with cameras such that they automatically process information in a way that assumes photographed information is going to be offloaded and available later even if they consciously know this to be untrue. In other words, taking photos can impair a persons ability to remember the details of the experiences being photographed, an effect that appears to linger even after the camera has been put down. In line with this study, Russel Banks [17] who is an American novelist who prefers words to images states that:

> To photograph it was somehow to reduce and domesticate my experience and ultimately to kill it.

Another problem worthy of attention is that nowadays, people are amassing a large number of digital possessions in such a short time, while spending little to no time organizing it. The collections range from documents, photos, blog posts, videos and so on. This results into a difficulty in revisiting the acquired content, managing or sharing the repositories for non expert people. This problem has garnered the attention of many researchers, one example is Kalnikaite et al. [10] who introduced MemoryLane as a digital memory application for capturing, organizing and reflecting on digital representations of mementos such as pictures and audio narratives of people, places and objects. The reflection is intertwined with organization because it uses annotation through text or sound narratives. It was implemented in three contexts : home, places, people. The interface of Memory-

Lane home can be seen in (figure 2.2). Even though technology makes it possible
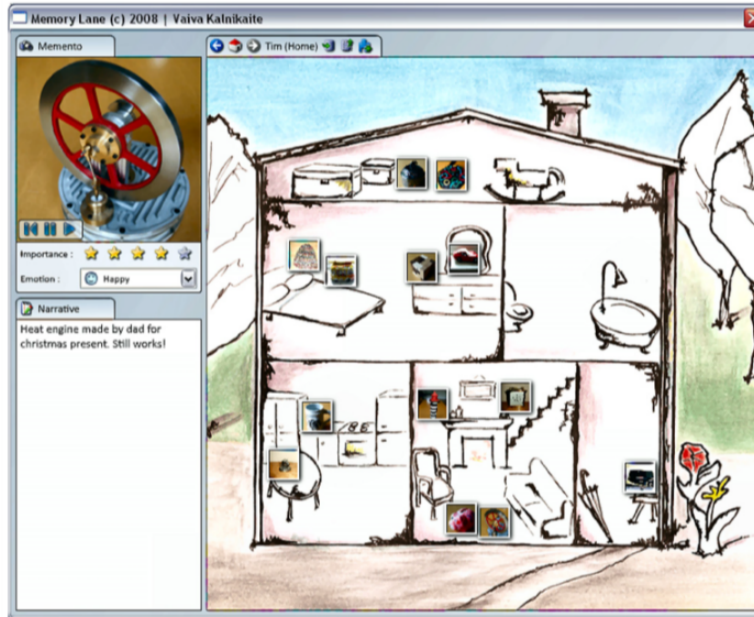
Figure 2.2: MemoryLane Home interface.

now to organize content in a bulk and even send notifications or reminders to view them, people's reaction to this process cannot be compared to the physical and tangible counterpart. The research done by Jones et al. [9] has some interesting findings about this matter. The paper examines the challenges of people who manage large collections of physical sentimental artifacts, in order to pave the way for future design possibilities when it comes to digital mementos. The paper also explains how physical items have important characteristics to support the way people recollect their memory. One is the material interaction that holds many facets of the memory itself, and second is that physical objects have the ability to help the person focus on a specific time, place, person, because of their locality and visibility. Another interesting point from this study is identifying organization patterns for physical items, that were called "Curation Regimes" and categorized into three: Storage Regime, Attention Regime and Display Regime.

- Storage Regime is similar to digital curating, which means keeping it all and dealing with it later.

- Selection Regime which consists of keeping a representative sample of the whole collection, or keeping only the best.

- Display Regime which means rotating through items by displaying each at a time, or maintaining a special collection.

It's also important to note that some participants opted for re-purposing the artifacts they wished to keep despite them lacking of purpose. They would transform them partially or fully by giving them a new role. To conclude, if we want to use these findings as guidelines for design, the issues we need to consider are :

- How can the process of curation in a tangible/digital context be better integrated into people's everyday life ?

- How can we design a system that understands people's difference or change in sentiment towards the curated content ?

2.4. Sonic Mementos

While previous research focused on visual mementos, the direction we want to take in this work is centered around sound as a promising and powerful memory cue. Oleksik et al. [19] proposed a number of *Sonic Interventions* to enhance and extend the use of domestic soundscapes that they previously studied. Their research was about defining and understanding the different types of sounds that can be found in the household, and how do family members manage and value these sounds. Due to the fact that some sounds were objective and others subjective, there was a difference in which what the listener chooses to foreground and background while recording and While listening back to them as well. One of the proposed sonic interventions, was the *Sonic Gems Bowl*. It is composed of a pendent that acts as the recording device, and a bowl where the detached gems can be displayed. In default mode, the pendent records and erases continuously, storing a minute of sound behind the current time on the chip in the gem. It has two buttons for retrospective and prospective sound capture. Pressing the retrospective capture button archives the last minute of recorded sound. Pressing the prospective capture button starts a new sound recording until pressed again. Once recorded, a sound can be reviewed or deleted on the pendant itself, or kept

Figure 2.3: The Sonic Gem recorder and Sonic Gem Bowl.

safe in the gem by removing it from the pendant. Recorded gems can be displayed in a bowl, which plays back the corresponding sounds as a gem is moved past a sensor. An overview of the sounds can be obtained by rummaging through the gems as shown in (figure 2.3).

Keisha Jayaratne [8] proposed *The Memory Tree* as a physical symbol of the family's history and memories using sound bytes recorded and stored in its leaves. The results of this study show that the proposed design successfully facilitated reminiscing both in recording and playback stages, even if users did not identify sound as the memory cue. The purpose of the project was to use sounds to reminisce about loved ones, because reminiscing about them is vital for maintaining the connection. All in all, sound can highly evoke memory and emotions whether isolated or used in conjunction with visual items. However sound mementos have different properties and practices than any other medium, and because there are no existing social norms around sounds as a way to capture and collect memories, there is room for innovation and exploration. Sound can also be used as a cognitive intervention to help patients at risk for Alzheimers or individuals struggling with memory concerns. Motif [4] is a wearable device that plays songs in response to particular people, places and situations. The major roles of Motif is to trigger memory and provide a context. This design maximizes social connectedness by enabling wearers of Motif to record and associate some of their favorite songs with people in their social circle.

Chapter 3

Concept Design

3.1. Understanding The User

Understanding the user is a very important step in any design project. A fieldwork was conducted to observe how the tourist moves in the space, to what extent he's aware of his surrounding, and what is his approach to capture a memorable experience.The fieldwork takes place in Roppongi, the event in this case is Roppongi Art Night 2018. This event consists of a diverse range of works including not only artworks but also design, music, video and performance pieces that are scattered around the Roppongi neighborhood, creating an extraordinary experience, while proposing a lifestyle that celebrates the enjoyment of art in everyday living. The reason why this event was chosen as the location of the fieldwork is because it's a multi-sensory experience, therefore the author wants to observe which elements and mediums of the surrounding appeal the most to the tourist.

Insights

The tourist was more interested into art installations because they were not static and seemed to be lively and unpredictable. The tourist also stopped at several occasions to take pictures around the city mostly of the scenery and not of himself. Certain spots involved leaving a personal touch on the location (such as adding a sticky note to the wall or decorating your own paper cup) or having a personalized picture from the location (such as photo booth). These spots

seem to attract a wide range of visitors. There was a website for checking the events schedules, but the tourist preferred to take a booklet at the information desk as a physical memory from the event, and for sharing the experience with friends. A total of 19 photos, 2 videos and 2 audio recordings were taken by the tourist during the fieldwork. This shows that visual mementos are still the most common way to record an experience, however the audio recordings had more emotional value to them. The tourist explained: "*I recorded the music coming from the tower installation because it was pretty unique, it was a combination of mechanical sounds you hear at the train station or at a construction site...I like the way it was remixed to depict the urban unpleasant sounds at the same time as I'm watching the performance which had a brighter vibe.*" In the same performance, the tourist audio recorded a performance of two girls singing because at that moment he was moved by their voice and the lyrics of the song; it was not something he would have the opportunity to hear again. All in all, sound is an interesting aspect of our surrounding. The concept in this research allows tourists to become more conscious about it, and use this practice not only to reminisce about past experiences, but to evoke the same emotions felt at that time as well.

3.1.1 Target Persona

Defining the target persona helps to understand which kind of audience will benefit the most from this project. We can understand their motivation, their needs and the challenges they might encounter. The persona in this case, is someone who enjoys traveling and likes to record the experiences in a private way. The persona would like to use the recorded memories as a personal way to support subjective well-being, because the persona believes the happy moments of the past can boost their mood in the present and motivate them to create more memories for the future. The persona enjoys collecting tangible things and needs to revisit them visually because they are the symbol of their experiences and also a way to express their hopes and needs.

The figure 3.1 is an example of a target persona that can give a realistic user scenario of this project.

Mary Stewart

BIOGRAPHY

Mary enjoys going on trips as a retreat from her stress. She likes collecting postcards from every location she visits and buying souvenirs. Mary has a strong bond with her friends and family, she prefers to maintain her relationships by often making time to see her loved ones. She is not content with digital natives lifestyle and prefers to keep her values and not blindly join a trend. Mary seeks happiness in the little things.

Goals

– She needs a new way of recording her experiences.
– She needs an instant boost of mood in times of despair.
– She needs to form a habit that contributes to her well-being

Motto

Design is intelligence made visible.

I'm looking for a new way to record and reminisce about my travel experiences.

AGE: 27
OCCUPATION: Interior Designer
HOBBY: Travel – Reading

Figure 3.1: Target Persona

3.1.2 Pre-test

In order to find out about the user's perception of sound as a way to capture a memorable moment of the trip, two participants were asked to capture moments during the trip that they would like to remember later on, using only sound as a medium. Equipped with their smartphones to ease the task, the participants engaged in the task. There was no limit for the duration the participant would want to record because we didn't want to restrain their creativity and we want to analyze their decisions and find out about how they perceived the task and what they would experience along the way. When the participants were back from their respective trips, they exported the recorded sounds from their devices and handed them to us. An interview session was scheduled to replay the sounds and discuss about it. The interview starts with asking the participant to report on the general understanding of the task, then proceeds to replaying the sounds one by one and observing the reaction of the user and the time it takes to remember.

First User: P1

(P1) is 30 years old, she's a graphic designer, she went on a trip for 5 days to Fukuoka area in Japan. The participant visited the area of Fukuoka for the first time, while traveling she was able to record a total of 5 different sound clips of which the duration ranges from 5s to 36s. Since she was not familiar with the idea to record sound for capturing the memorable moment she collected some sounds that she called *interesting*. The table 3.1 presents the information about the sounds. The sounds were labeled by the participant while replaying them during the interview session, then the researcher classified their type according to Schafer's [23] taxonomy of sound types.

Table 3.1: Sounds collected by participant P1

Sound Label	Sound Type	Duration	Details
Nagasaki Tramway	Mechanical Sound	18s	The sound you can only hear of the streetcar in Fukuoka.
Atomic Bomb	Sound as Indicator	6s	The clock in the museum of peace which marks the time before the explosion of the atomic bomb.
Dani Plays Piano	Sounds and Society	36s	A friend practicing piano and making a mistake.
KyuDai Cafeteria	Sounds and society	16s	Ghibli song playing in the cafeteria of Kyushu University
Rainy Night	Natural Sounds	5s	Rainy night in Fukuoka.

Out of the 5 sound clips collected, the participant chooses three that she would consider for future replaying because they were more *pleasant* and *personal*. All in all, the following is the summary of insights from the interview:

- The participant had her eyes closed to focus and remember the sound.

- The participant was smiling when she was able to recall when and where it was recorded.

- The participant focused on the sound that was intended for recording even though it wasn't always in the foreground.

- The participant found the task of recording sounds easy.

- The participant likes tagging and labeling things so they were open to the idea of having a recorded narration that explains the memory as an additional function but not mandatory.

- The participant likes to revisit previous mementos however she also prefers if there is a way to get rid of content that is not so special anymore to give space for new memories and experiences.

Second User: P2

(P2) is a 24 years old accountant, he went on a trip to his hometown in Indonesia for two weeks. He recorded 4 sounds of which the duration ranges from 62s to 185s, as seen in table(3.3). After the trip the participant continued recording different sounds to remember but preferred not to share them with the researcher. The sounds were labeled by the participant while recording, then the researcher classified their type according to Schafer's [23] taxonomy of sound types.

Table 3.2: Sounds collected by participant P2

Sound Label	Sound Type	Duration	Details
Airport Reunion	Sounds and Society	67s	In the airport for a reunion with parents after 2 years.
Darmanata Villa	Natural Sounds	62s	Sound of crickets at night, near the pool with his brother.
Church Time	Sounds and Society	90s	At the beginning of Sunday service.
Valery	Sounds and society	185s	Accroyoga session at the beach with people singing and dancing nearby.

The participant wanted to keep all the sounds recorded and did not find any of them irrelevant. Most of the memories captured are so *personal* and *emotional* for the participant. The following is the summary of insights from the interview:

- The participant listened to the first sound and could not recognize it at

first, however when he heard his voice asking his father "How are you?" he could remember that it took place in the airport, and the participant said that suddenly the recording started to make sense, the announcement in the airport, the people walking by dragging their luggage or talking.

- The participant found the task of recording hard at the beginning, but as soon as he got used to it he enjoyed it. He remembers how he learned the right time to record, which moments are worth recording and he started being more aware of the sounds around him.

- The participant had a problem keeping the sounds on his smartphone and would prefer if there is another way to store and replay them.

- The participant likes the fact that the recorded sounds are not perfect, because it makes them special.

> *Even though it was my intention to record the sound of crickets in the background, my brother talked while I was recording, which makes the sounds more special... and more personal since I am the one listening to them anyway.*

3.2. Research Question

The questions we aim to answer through this research:

- **Q1:** Can sound be used as a memento to capture the travel experience?

- **Q2:** Can listening to the sound a while after the travel increase the positive emotions instantly and bring back the same sensations felt during the travel?

- **Q3:** Can recording sound make the user aware of the ambiance and the acoustic portion of an experience ?

3.3. Ideation

Based on the literature review, the findings of ethnography and the findings of the pre-tests, the ideation process aimed at generating ideas that inform the

physical object's design as well as the interaction. There was three key challenges to have in mind:

- Making the digital mementos (sounds in this case) visible and easy to access.

- Keeping the navigation of sounds mysterious and evocative.

- Combining familiarity and novelty in the artifact's design.

After a session of brainstorming using sticky notes and a board, the most relevant ideas were picked up and grouped in terms of context. A visual moodboard was used as an inspiration for the project as shown in figure (3.2).
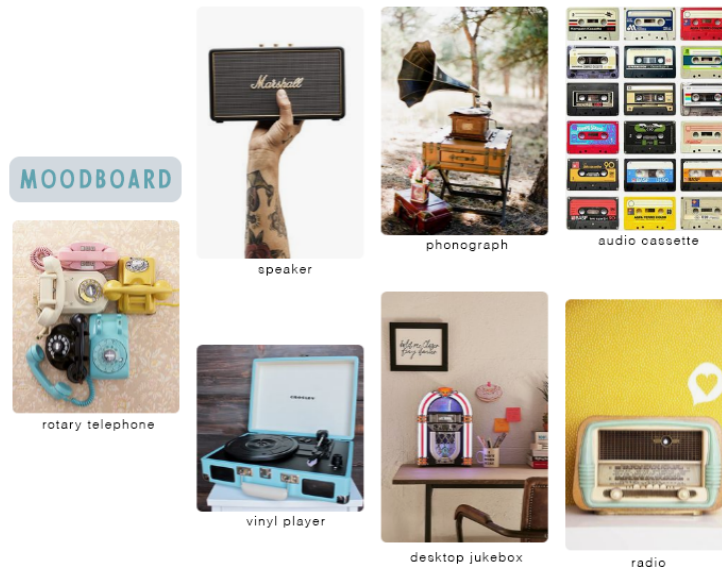
Figure 3.2: Inspiration moodboard

Some of the artifacts were discussed in detail during ideation with regard to their function and the needs they address according to Maslows hierarchy of needs [13]. Out of all the artifacts associated with sounds, the author finally decided on the telephone as an artifact that encapsulates the sound mementos from the trips, given that it's capable to address several needs with its original function. Since this project aims at generating a feeling of nostalgia, positive

emotions through reminiscence and revisiting past digital mementos, what the artifact looks like needs to be considered.

Table 3.3: Inspiring artifacts and the needs they address.

Artifact	Function	Needs Addressed
Speaker	music amplifier	status, recognition
Jukebox	coin-operated music player	belonging, status
Radio	sound transmission	self-actualization, belonging, knowledge
Telephone	long distance call	belonging, affection, safety, knowledge, status

Nowadays, there is a big interest in reviving old concepts because of the warmth they bring and the amount of memories they can evoke. Designers use nostalgia to please their audience on a feel-good level. They try to induce the desire to feel a sense of belonging, meaning, and security, by endowing their creations with emotion and sentimentality which eventually connects with their audience and elicits a pleasurable feeling. Jessica Helfand [7], a founding editor of *Design Observer* describes :

> *Nostalgia privileges memory and perception over reality, and favors a Utopian and imagined past over the real one. Indeed, nostalgia can provoke positive emotions of happiness, connection, confidence, and optimism, and when people feel down nostalgia can raise their spirits.*

As an example of nostalgia in design, these vintage items in figure 3.3 are re-purposed or re-integrated with contemporary items that we use in our daily life, (A) is a cassette shaped USB shown and (B) is a vintage camera smart-phone case.

[A]   [B]

Figure 3.3: Nostalgic Design

When it comes to sound recording, there is a number of proposed concepts for wearable devices that can facilitate the task, Senstone [14] for example is an intelligent wearable audio recorder that syncs to phone, while adding speech-to-text, third-party integration, and more. This kind of product is thought to help students, journalists, engineers, doctors, writers, and creators who want to capture and act upon their ideas. So far, the proposed function consists in launching the voice recorder when you tap on the display, then pressing in on a side button to initiate a recording. Another similar product is called Kapture [11], which is meant to save and replay the last minute of anything you hear. Kapture functions as a 60-second buffered loop. The loop continuously overwrites itself until you tap the device to save a clip. The saved file is downloaded to your smartphone where the duration can be shortened and you can name, tag, filter, and even share it. These two products among others, are attempting to introduce the task of sound recording and facilitate it, however they are not related to the field of travel memories. Future research can help improving sound capturing devices so that they can easily be integrated in one's life.

3.4. Proposed Concept

The proposed concept is "Saudade", an artifact that replays recorded sounds from the previous trips so as to evoke positive emotions instantly and induce a memory travel or an imaginary travel back in time. Saudade is a Portuguese word which means the recollection of feelings, experiences, places, or events that once brought excitement, pleasure, well-being, which now triggers the senses and makes one live again. This definition serves as the motto of this project. The key components of this concept are:

- The recording device that the tourist carries along with him.

- The home device which encapsulates the sonic mementos.

The focus of this research is the home device. Saudade is a vintage looking telephone that allows the user to integrate the sounds from his trips into his daily life. This device combines both familiarity given that it's a well-known object by our target group, and novelty because the way it usually functions is being repurposed. The feeling that it translates is that the user can have more visibility of his digital sonic mementos, while keeping them evocative. The evaluated interaction is listening to remember and not remembering to listen. That's why SAUDADE consists of giving the user a *call from the past*, and a frequent habit or moment of bliss that evokes positive emotions, especially valuable in times of distress.

Sound Recording

- The recording device is a high quality audio recording smart wearable.

- Touch the surface of the wearable device to record.

- A sound clip of 30 seconds will start recording automatically.

- The user is notified about success of recording, and can label the sound using audio dictation. The label can be name of the place or a qualification word for the memory at that moment.

- The user can wirelessly transfer the sound clips to SAUDADE telephone once he's back home.

SAUDADE functions

- Setup: The user can choose the preferred time of the call.

- Memo: If the user cannot remember the sound, after a minute of replay, he can view a memo on the screen display of SAUDADE. This memo is either the date of recording, and the label that the user used to tag the sound while recording.

- Favorite: The user can rate their favorite sounds, so that they replay frequently over time, especially when there are no new file pool to play from.

3.5. User Scenario

The figures (3.4) and (3.5) put in context the proposed concept for further understanding.

1 Mary goes on a trip to Aruba, to relax from work and recharge her energy.
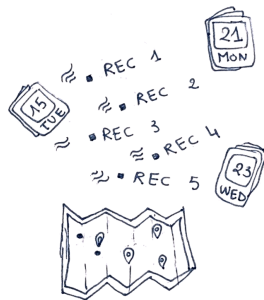
2 She enjoys her time on the beach.

3 She wants to capture this memory, especially the sound of the waves mixed with kids laughing and playing...

4 She uses the recording device of SAUDADE to record automatically 30 seconds of that moment, then she labels it as the location's name using audio dictation.
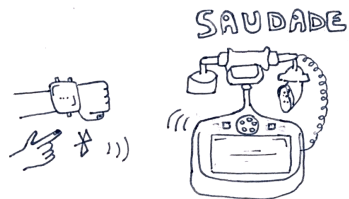
5 Days pass in her holiday, and she records a lot of memorable moments in most of the places she visits.

Figure 3.4: User Scenario part 1

1 It's time to go back home, Mary is back to her daily life duties.

2 She syncs all the sounds she recorded from her trip to SAUDADE telephone.
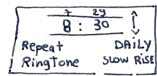
3 Mary sets her preferred "Call From The Past" time, and decides the frequency of calls to DAILY.

4 The next day, SAUDADE telephone rings. It's time to listen and remember the good times...

5 She recalls the sound from the time at the beach, it makes her happy to travel again with imagination of the memories.

Figure 3.5: User Scenario part 2

Chapter 4

Evaluation

In this chapter, the evaluation of the proposed concept "SAUDADE" is discussed. The first user test aims at finding an answer to whether people can have an instant boost in positive emotions after using "SAUDADE" and reviving the memory of their travels. The second user test uses the improved prototype, and evaluates the interaction and usability of the design. Users qualitative feedback will serve as a contribution of findings to inform future design and improvement of this concept.

4.1. First User Test

4.1.1 Objective

The first test attempts to execute the user scenario of the concept, then evaluate users reaction to listening to sounds recorded in their trip, and compare between the emotions felt before and after listening. A summary of what users experience during the testing and what they recall from the trip will be presented along with their comments and suggestions.
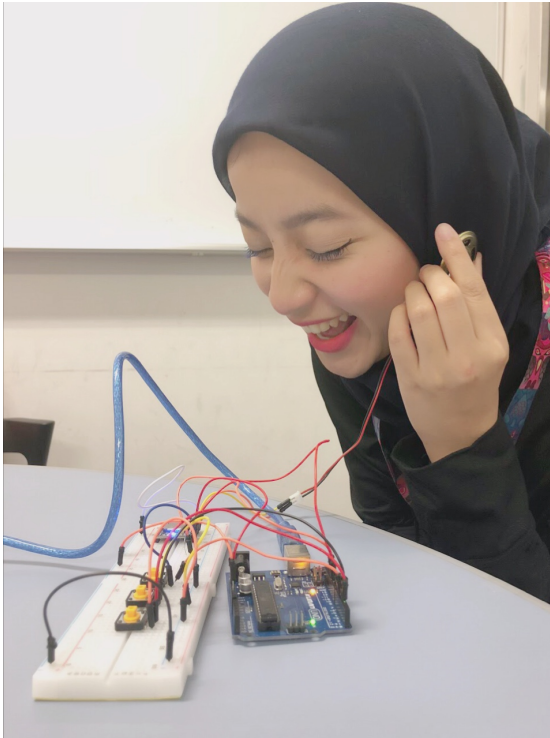
4.1.2 Procedure

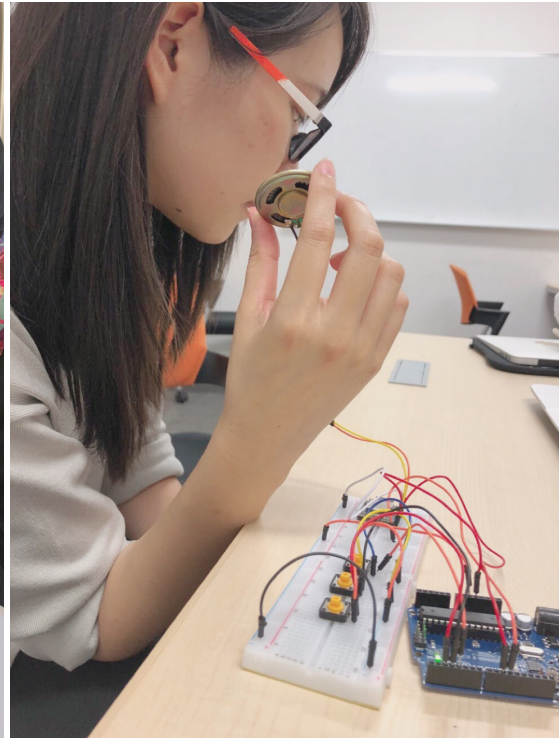

Figure 4.1: User Test 1   Figure 4.2: User Test 2

To start with, 5 participants going on a trip were asked to record sounds that they would like to remember later on, sounds could be either a symbol of the memorable moment or could be the core of the memory itself, the sounds had to be at least 30 seconds long, and the users were not allowed to listen back to them after recording, however they were asked to label them with a tag of their choice. When the participants were back from their trips, a gap of three weeks was considered before proceeding to the replay of those sounds using the first prototype. The users were asked to fill a standard questionnaire called mDES (modified differential emotional scale) before and after listening to the sound. Differential Emotions Scale (DES) was modified by Fredrickson [5] so as

to include a far wider set of positive emotions, the questionnaire used can be seen in Appendix B. The participants are then asked to give their feedback about the concept and to express their opinion about the memo feature which allows the user to get a hint about the sound. This hint is the label of the sound(chosen by user and could be theme, place, qualification...) as mentioned in the user scenario part 1 step 4, figure (3.4) in addition to metadata (date of recording / hour of recording). In the results of Emotions Scale section, the bar charts represent the overall score of positive emotions and negative emotions before and after hearing the sound, by calculating their mean respectively.

4.1.3 Prototype

The first test prototype simulates the "SAUDADE" telephone to replay the sounds collected by the users from their trips. To prototype the sound replay a beginner Arduino kit was used. It is true that the technology already exists and there are several devices to play audio files which are much more developed than this prototype, however the decision to use a micro-controller platform was taken so as to simplify the testing process, and cancel preconceived ideas about this project. This prototype only focuses on the functions that are useful for the concept. The figure (4.3) shows the breadboard view of the prototype and figure (4.4) shows its implementation. The technical details can be found in Appendix A.
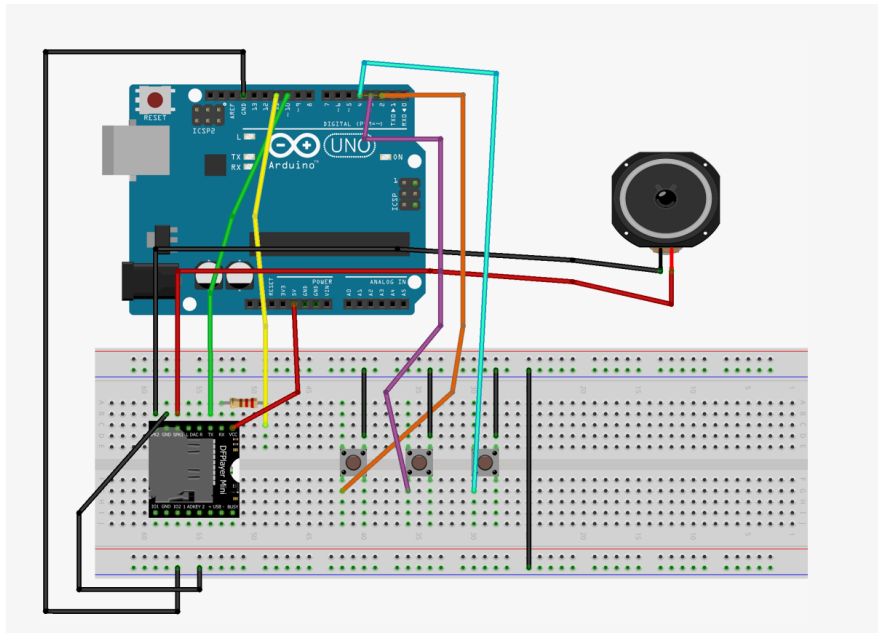
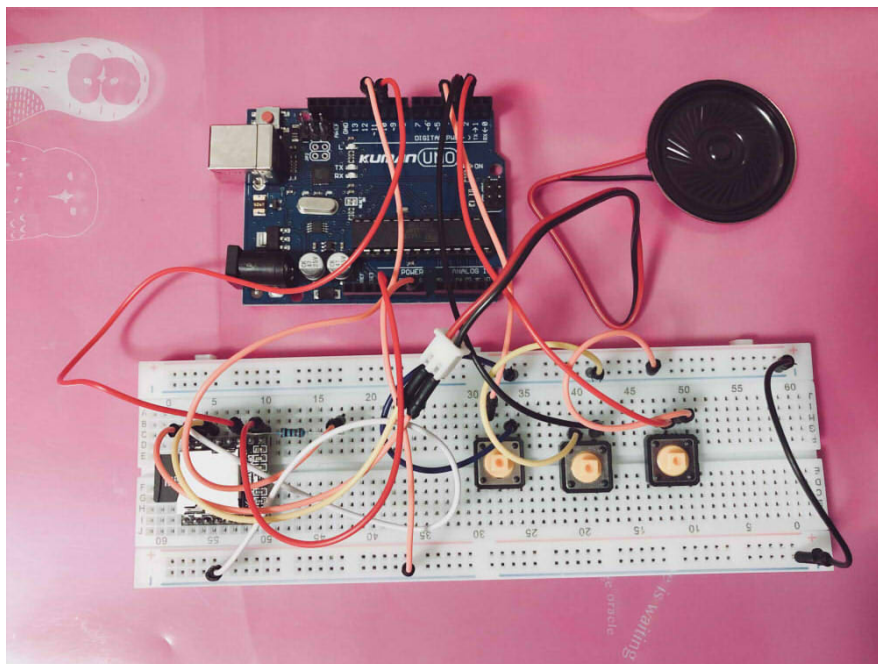Figure 4.3: Breadboard View Of Arduino Prototype

Figure 4.4: Implementation of Arduino Prototype

The sound files were stored in the flash memory card. There was three push buttons in the prototype:

- The first button is "Favorite" to mark the sound as favorite if the user would like to keep it and listen to it more frequently.

- The second button is "Memo" to view the memo hint associated to the sound.

- The third button is "Pause" to pause playing the sound, which simulates hanging up using the phone handle.

The serial monitor screen of the Arduino IDE is used to display the feedback after pushing the first two buttons.

4.1.4 Testing Results

User (A):

User (A) who went on a trip to Osaka for 4 days was able to record only two sounds. The user expressed that those were the major highlights of the trip as it's not the first time to visit Osaka city, however she did not think of recording sounds before this experiment. The table 4.1 shows a description of the sounds recorded. On Day 1 of the testing, due to the lack of sounds to randomize from, and to reverse the order of recording that could bias the user while listening, the second sound was played first.

Table 4.1: User A recorded sounds

Sound Label	Sound Type	Duration	Details
Waiting in cafe	Sounds and society	31s	Ambiance in a cafe while waiting for a friend to come.
Kansai-ben	Human sounds	32s	People talking in local dialect in the train station.

- User (A) heard the sound few times, before giving her feedback.

- User (A) mentions that she would have preferred if the quality of the recording was better so that she can hear the dialect of Kansai in a clear manner, but understands the limitations of the prototype.

- User (A) remembers that she was standing while recording, that there was a big crowd.

- User (A) mentions that she would press the button (Favorite) if the quality was better as she really enjoys this sound and would like to keep it because it reminds her of the atmosphere of a region she really likes in Japan.

- User (A) mentions that she likes listening to things that are not in her current environment, things that have a human sounds or related to an experience with people she likes and misses.

On Day 2 of the testing, the first sound was played.

- User (A) heard the sound replaying for 3 times before giving the feedback, it was the pleasant music played in the cafe while she was waiting for her friend to join.

- User (A) first recognized the sound was from a cafe, then to remember further which cafe exactly, she used a reference of people she met during the trip. *"It was even before I met friend1 and friend2, I had that time alone, so I guess that's when I recorded. When I was with them I didn't record for sure. I didn't record when I was with friend3 as well.."* she said.

- User (A) heard the music playing in the cafe and started describing vividly the environment of the cafe, how it looked like a library, the position of the shelves, the counter, and the side where she was sitting.

- User (A) stayed long in the cafe waiting for the friend, therefore she could not remember the moment precisely when she started recording, therefore after replaying the sound 5 times, she had the option to view the memo which was the day and hour of recording.

- User (A) did not press the button (Delete) or the button (Favorite).

Additional feedback was given after filling the post-survey, with regards to the feature of memory aid:

"For me it's good because it can put you in context, because you don't want to get frustrated while trying to remember. And personally I like to organize files and tag them myself so I would like to see the date of the recording, maybe the hour for other people, and maybe the place if I'm a person that travels a lot. I don't like the idea of recording my own narrative of the sound because the good point about this concept is trying to revive the memory without getting much information. I prefer to recollect the memory myself..."
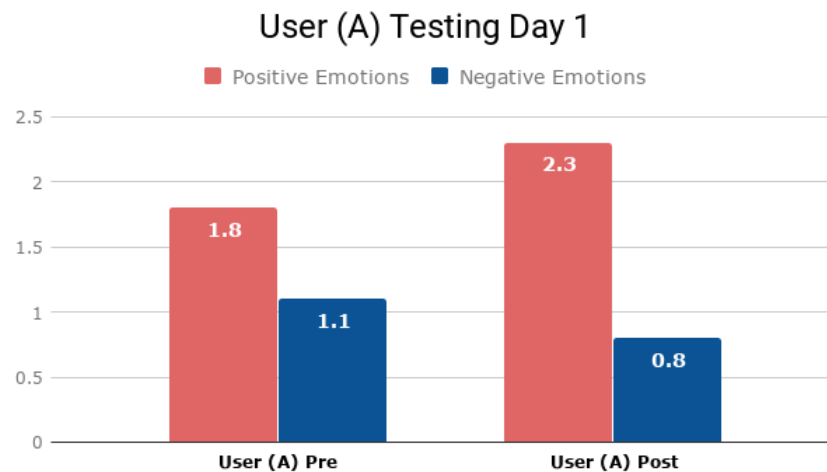
Results of the Emotions Scale:

Figure 4.5: Result of Pre and Post Questionnaire Day 1
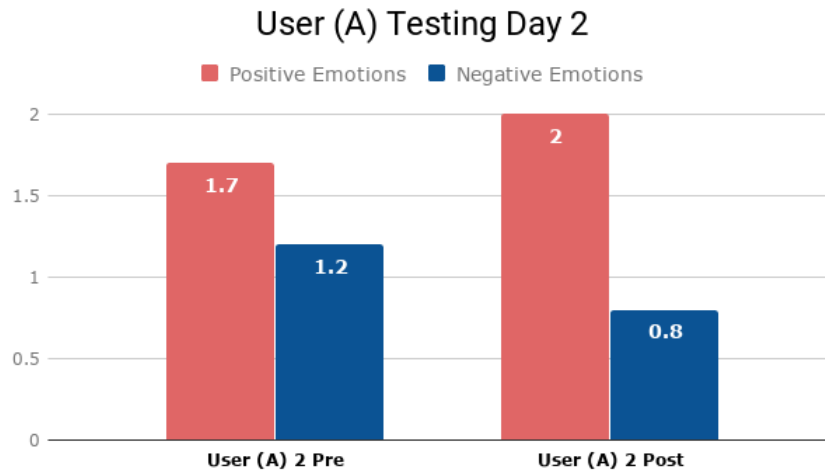
Figure 4.6: Result of Pre and Post Questionnaire Day 2

User B:

User (B) went on a trip to Kyoto and Nara for 4 days, she was able to record 3 sounds. The table 4.2 shows a description of the sounds recorded. On Day 1 of the testing, the third sound was played.

Table 4.2: User B recorded sounds

Sound Label	Sound Type	Duration	Details
Day in Park	Natural Sounds	31s	Natural bird sounds and ambiance in the park.
Crying Deer	Natural Sounds	11s	Surprising sound of the deer.
Last song	Human Sounds	38s	Street performer sings a lovely song in front of the station.

- User (B) recognized the sound as soon as it was played.

- User (B) described with affective words what happened in that moment: "I remember it was in Kyoto station, it was the last day of the trip, it was

raining and gloomy and there was this guy playing with his guitar, and it was nice because the trip overall was great and while the last day was stressful because we were leaving, listening to someone singing at that moment was cute and relaxing, that's why I recorded it..."

- User (B) pressed the button (Favorite).

Additional feedback was given after filling the post-survey, with regards to the ringtone and the feature of memory aid:

- User (B) prefers a melodious ringtone before playing the sound rather than a common phone ringtone because this latter reminds her of stressful calls.

- User (B) did not feel like she needed the memo feature, because the process of recording sounds helped her remembering the sound, but thinks that in a year or so it should be useful.

- User (B) mentions that the option of marking as (Favorite) might not be useful because she is afraid she would mark most if not all the sounds as favorite after listening to them, but suggests to have a rating system to select the best sounds.

On Day 2 of the testing, the second sound was played.

- User (B) was surprised and amused because of the story related to that sound; she first heard the crying sound of a deer and thought to record it because it sounded cute, but when she approached it she was startled by the intense sound of the deer and it got recorded.

- User (B) qualifies this sound as obscure but still funny because of what happened.

- User (B) suggested to skip this sound because it was shorter than 30s and also not that meaningful, but the author thought it was a good finding.

- User (B) was conscious about the background noise and the other sounds that are not related to the intended captured sound.

Results of the Emotions Scale:

Figure 4.7: Result of Pre and Post Questionnaire Day 1

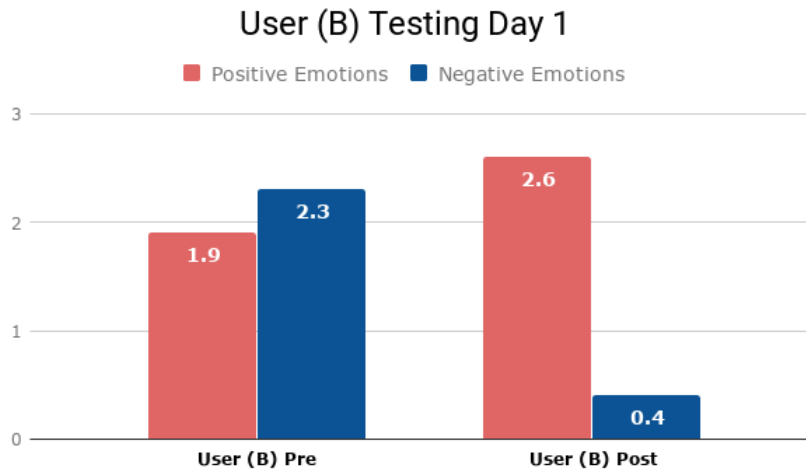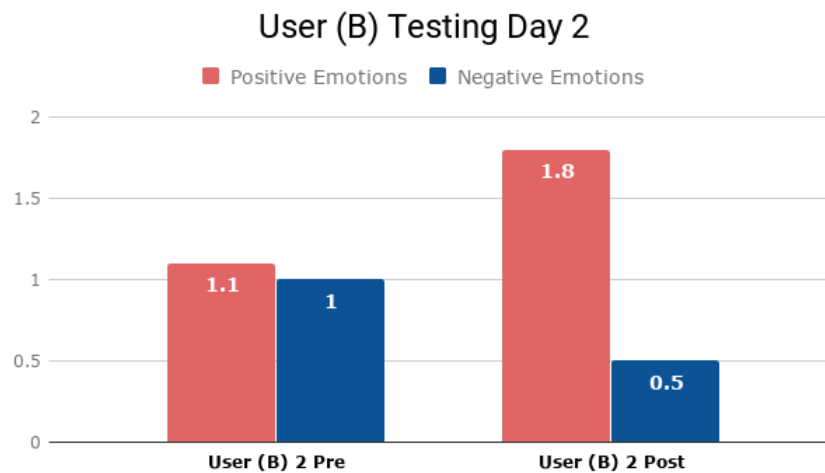

Figure 4.8: Result of Pre and Post Questionnaire Day 2

User C:

User (C) went to Nagano for a weekend getaway trip. The user recorded a total of 5 sounds, the table shows a description of the sounds recorded during the trip. on Day 1 of the testing, the 4th sound was played.

Table 4.3: User C recorded sounds

Sound Label	Sound Type	Duration	Details
Gondola	Human Sounds	59s	Instructions while riding the gondola.
Lake Asahino	Natural Sounds	46s	Sound of the water flowing.
On My Way	Natural Sounds	45s	A windy walk towards the car to start the trip.
Owakudani	Sounds and society	60s	The ambience in the place and sound of the wind.
Photo	Human Sounds	46s	Friends laughing and talking while trying to take a picture.

- User (C) started describing the memory she had related with the sound and how she felt at that time, then she seemed to be unsure towards the end.

- User (C) got mistaken on her memory because it was a windy day, so she could not differentiate between two memories where it was windy in the sound clips "On my way" and "Owakudani".

- User (C) checked the memo which is the label and could finally remember accurately that the sound was from the moment near the lake Owakudani.

Additional feedback was given after filling the post-survey.

- User (C) expressed that the overall feeling from the trip was negative so it

was not something she would like to remember, however the sounds recorded were meaningful for the good times.

- User (C) was already used to taking pictures, or videos. However she rarely looks back at them.

- User (C) found it difficult to decide on the best time to record, because it felt awkward to use the smartphone, but she would prefer an unobtrusive way to record.

- User (C) realized the power of sounds to remember and was surprised that it could bring back vivid memories with a timeline of positive and negative events.

On Day 2 of the testing, the 1st sound was played.

- User (C) recognized Japanese instructions and she went on to describe a moment in the car. "I remember it was in the car, with the GPS talking. Two people in the front, the husband was driving and the wife was translating the GPS instructions to his language.And I was trying to sleep..."

- User (C) asked to check the memo to confirm the memory, then she realized it was a false memory.

- User (C) described the real memory in detail, that in fact it happened in the gondola and there was Japanese instructions as well, however in the background there is the voice of the husband giving funny comments as well.

- User (C) realized that the description she gave at first was from a moment she intended to record but did not, and she got confused when she heard the Japanese instructions as a foreground sound while ignoring the background sounds.
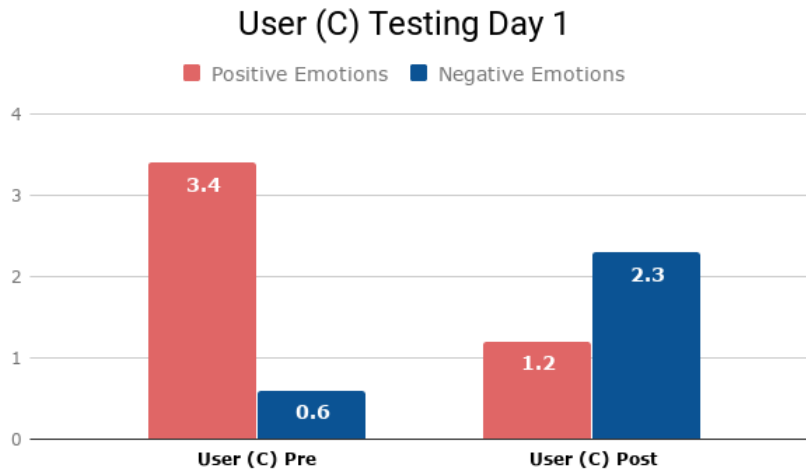
Results of the Emotions Scale:

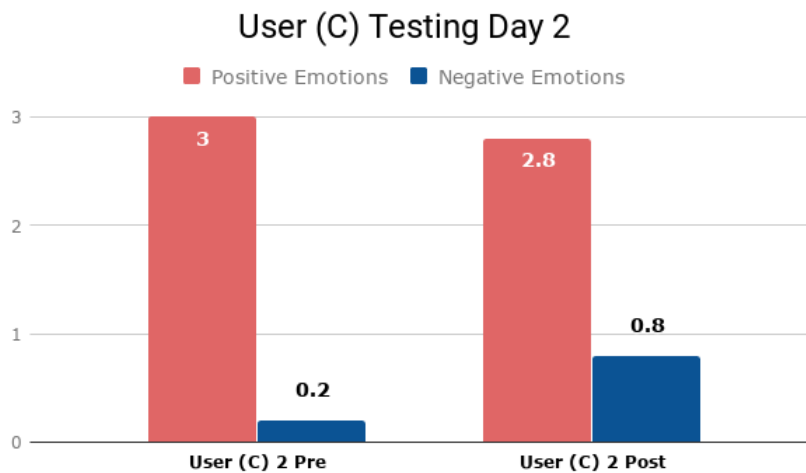Figure 4.9: Result of Pre and Post Questionnaire Day 1

Figure 4.10: Result of Pre and Post Questionnaire Day 2

User D:

User (D) went on a trip to Kansai area (Osaka, Kobe, Kyoto) for 6 days. It was the first time to visit this area, the user recorded a total of 10 sounds shown in the table 4.4. The sound labeled *Private* cannot be described in detail because it's a private conversation that the user wanted to keep as a memory.

Table 4.4: User D recorded sounds

Sound Label	Sound Type	Duration	Details
Herbal	Human Sounds	39s	A friend singing a song while sitting in the herbal garden.
River	Natural Sounds	20s	Sound of the water flowing.
Train	Mechanical sounds	31s	Commuting on the train.
My Voice	Human Sounds	17s	Echo of user's voice under a dome near the station.
Water	Natural Sounds	12s	Sound of the water pouring in the park.
Waterfall	Natural Sounds	33s	First stop at the waterfall hike.
Waterfall 2	Natural Sounds	32s	Last stop at the waterfall hike.
Sorrow	Sounds and society	32s	Sad music in front of the ferris wheel.
Private	Human Sounds	10s	private funny conversation of a friend.
Cable car	Quiet and silence	32s	The silence while taking the cable car over a big forest.

On Day 1 of the testing the 8th sound was played.

- User (D) could not recognize the memory behind the sound, but she recognized that it's associated to an amusement park.

- User (D) recognized that it was recorded in Kobe after multiple replays.

- User (D) checked the memo and she was able to identify finally that she recorded it in front of a ferris wheel that she wanted to ride but was not able to due to time limit, so she stood there enjoying the sad music and wanted to record the mixed feelings of that moment. The user was totally delighted to remember the moment and was emotional.

- User (D) pushed the button (Favorite) because she thought the sound represents a good memory.

Additional feedback was given after filling the post-survey.

- User (D) likes the concept, and she expressed that she was taking videos before however she never thought about the sound itself. After participating in this experiment she felt different about things in her surrounding, and felt like she would rather not take that much photos anymore.

- User(D) likes the idea of having a tangible device to replay the sounds rather than doing that on the cellphone.

- User(D) absolutely needs the memo because she believes she forgets things a lot lately.

- User(D) wants to use *SAUDADE* as a reminder of the good times, so that it makes her feel accomplished and inspired in her daily life, and motivates her to travel around more.

On Day 2 of the testing the 4th sound was played.

- User (D) was surprised to hear her own voice, and expressed that she doesn't usually like listening back to herself talking. In the future she would avoid recording her own narration.

- User (D) recorded a narration of the moment so it was really easy to remember the moment, she remembered the station and the dome, how her voice was echoing when she was called her friends to take a photo together. She also remembered that she was hungry at that moment, and she remembered her friend's funny shoes while standing.

Results of the Emotions Scale:
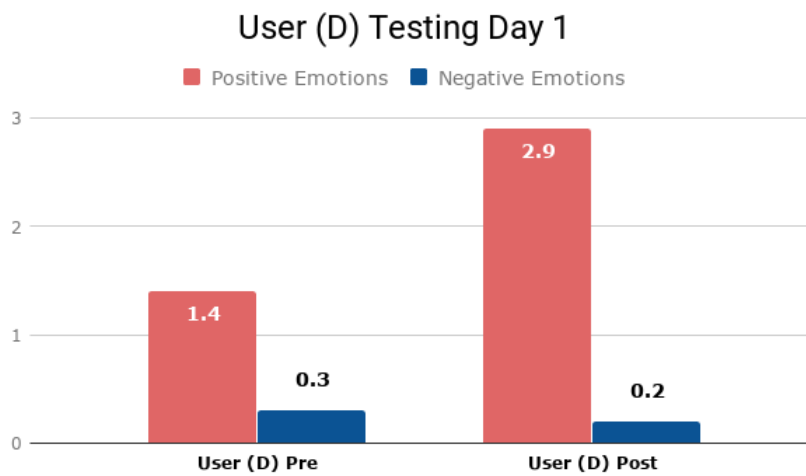
Figure 4.11: Result of Pre and Post Questionnaire Day 1
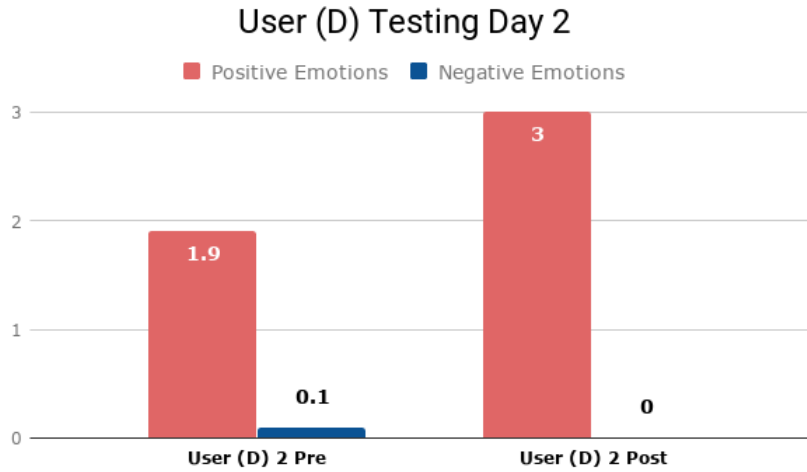
Figure 4.12: Result of Pre and Post Questionnaire Day 2

User E:

User (E) went on a trip to Yokohama area for a weekend getaway. It wasn't the first time to visit this area, but the first time to visit the places where she went to. She recorded a total of 3 sounds shown in the table .

Table 4.5: User E recorded sounds

Sound Label	Sound Type	Duration	Details
Ice cream Land Ballpit	Human Sounds	33s	Ballet sound at an exhibition.
Milk Restaurant Minatomirai	Sounds and Society	32s	Recurring jingle sound while sitting in the cafe.
Old Fashioned Cafe	Sounds and Society	36s	Relaxing atmosphere at an old fashioned cafe.

On Day 1 of the testing the 1st sound was played.

- User(E) recognized the sound because it contained a part of a conversation with a friend.

47

- User(E) was reminded about the ballet music sound in the art exhibition even though the sound was not so evident in the recording. The user wanted to record the sound because it reminds her of her childhood and makes her feel refreshed.

- User(E) expressed that recording was difficult using the smartphone because she was carrying a lot of shopping bags, and she had to use both hands.

On Day 2, the 3rd sound was played.

- User(E) recognized the recording as soon as it played.At the end of the sound clip there is a statement by User(E) that says that something is quite small, this statement made the user confused because her memory of the cafe and the food was that it was big, so she did not figure out why she said that something was small.

- User(E) really likes the sounds of cafes and really enjoys the ambiance in it, they make her feel relaxed and calm. She pressed the button (Favorite) because she doesn't mind listening to this sound again.

Additional feedback was given after filling the post-survey.

- About the experience of sound recording, User (E) feels like sound is better than a photo in the sense that it can bring back the memory and feeling. However she thinks that sound cannot capture the silence in some places like exhibitions or late night quiet scenery. She also thinks it's important to differentiate natural scene sounds such as parks or beaches because they might be similar.

- User (E) stated that she likes spending time in cafes, and she usually focus on other things but this experiment made her conscious of the ambience more. When there was moments she thought were silent, there seems to be a sound beneath it, so she's thankful that through this concept she can uncover more components to her travel experience.

Results of the Emotions Scale:

Figure 4.13: Result of Pre and Post Questionnaire Day 1

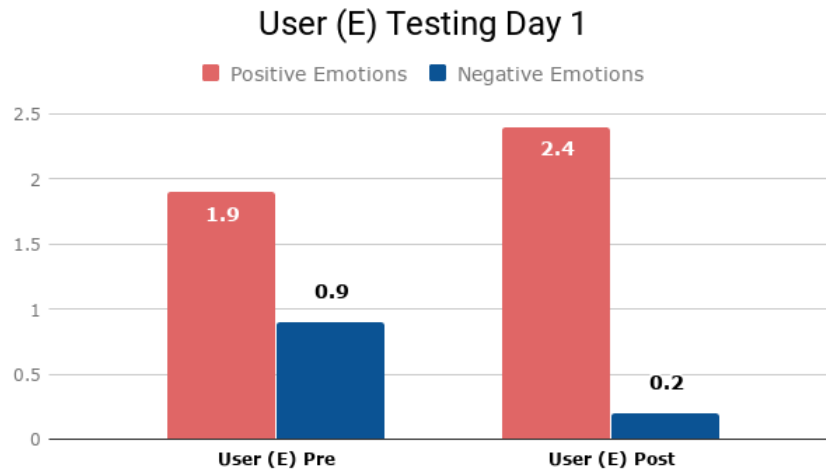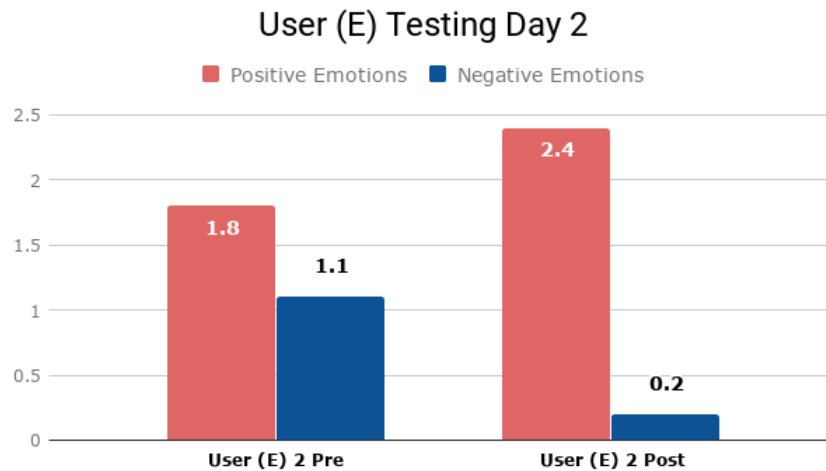Figure 4.14: Result of Pre and Post Questionnaire Day 2

4.1.5 Discussion of Results

After reviewing all the observations and feedback from the participants, we can say that the overall impression about the concept is positive. The following is a summary of insights.

- Users appreciate the design decision to make the sounds mysterious and evocative through the way "SAUDADE" functions.

- Users prefer to have a reasonable level of customization when it comes to the ringtone of the "SAUDADE" phone that calls you to hear the sound, and also for the sound label. Users reject the idea of having a narration that explains the sound, or preset categories and tags as it restricts them and wouldn't be helpful for a memory cue later on in case they forget about the sound recorded.

- Users are happy to replay the sound clip as many times required to remember, so even if the duration is short the replay function makes the user enjoy the process of recollecting the memory and traveling back with imagination.

- Users may have a different feeling about the trip as time goes on so the recordings wouldn't be relevant to evoke positive emotions, and would also temper the way they remember the trip, that's why its important to include a system for deleting or reducing the frequency of unwanted sounds in a natural way.

- Users think they can look back at their memories more often with sound in the concept of "SAUDADE" than with other mediums such as photos and videos. Especially with a tangible item that can easily integrate in the home scenery.

- Users became more aware of sounds in their surrounding after the test. Some users communicated with the researcher about some sounds they noticed or recorded outside of the testing phase.

- When users forget about the memory, "SAUDADE" becomes like an exciting guessing game that gives users the feeling of interest and challenge. If this

practice is done more often we expect users to be more conscious about themselves and their habits.

- Users would like to be able to hear their favorite sounds whenever they want, and especially when they feel the need to relax or distress. That's why we need to include a rating system that doesn't change the core points of the concepts but allows users to select their favorite and most impactful sounds to hear.

See the full mDES responses for users on both testing days in Appendix D. After analyzing the responses of users in the emotions scale questionnaire, we can notice an increase of positive emotions for users (A) (B) (D) and (E) as seen in figures (4.5, 4.6, 4.7, 4.8, 4.13, 4.14, 4.11, 4.12). User (C) as seen in figures (4.9, 4.10) is an exception due to the fact that the trip ended in a negative way for her. Although the sounds recorded were of happy moments, the ending heavily impacted the general outlook of the trip, and brought back the negative emotions instead of positive ones, however the user was still satisfied about how powerful the sound was related to emotions and expects to try SAUDADE in the future for trips she indeed wants to remember. For the other users, there are some common emotions which increased after listening to the sounds such as wonder, serenity, love, amusement and inspiration. For some instances there was also a decrease in two common negative emotions which are stress and anger. The emotions that increased are closely related with travel. Serenity induces new priorities and new views of self, can be acquired by savoring and integrating the current state. Wonder is acquired when encountering beauty or goodness on a grand unexpected scale, it can induce a new way of viewing things as well. Love is related to interpersonal connections that people form and can result into mutual care and social bounds. Amusement is related to cheerfulness and fun. Finally, inspiration induces striving towards a higher goal, and motivates personal growth. If we are able to revive or generate these emotions, even though in a short-lived manner, they have the power to affect the user's behavior on the long run, and spread these emotions to other people.

4.2. Second User Test

4.2.1 Objective

The second test attempts to evaluate "SAUDADE home" interaction using the second prototype, which is composed of a physical vintage phone to give users a realistic feeling of the tangible product, then the Arduino circuit used in the first prototype to play the sound which is incorporated inside the phone, then an iPhone screen which contains the interactive interface mockup. After the test, users are asked to fill a user experience survey.

4.2.2 Second Prototype

After the first user test, there were some findings and observations which led to changes in the second test. Participants hit the button "Favorite" For 3 instances out of 10, which shows that this option might not be useful for all users. However, they hit "Memo" button for 6 out of 10 instances, which shows that users really need a memory aid in case they are not completely sure about the sound and where they recorded it.

Figure 4.15: SAUDADE home

Figure 4.16: SAUDADE home 2

The major changes for the second test concern the following aspects:

- Setting the call time using a time range instead of a fixed time in order to keep the element of surprise and anticipation.

- Rating the sound instead of marking it as favorite to avoid repetitiveness. Rating goes from from 1 for the least favorite to 5 for the most favorite.

- Giving the ability to indirectly delete the unwanted or least favorable sounds from the collection, through the rating system. In this case, rating the sound as 0 automatically moves it to the deletion queue.

- Giving the option of deliberate listening when the user feels the need to, for example when the user is stressed and they would like to hear their most favorite or highest rated sounds. In this case the sounds rated 4 and 5 will be available to replay on pickup of the phone handle.

To test these interactions, a physical prototype along with an interactive mockup and simulation technique were used. Refer to figures (4.15) and (4.16). The figure (4.18) shows the main screen of "SAUDADE home".The user can change the setup as seen in figure (4.20) , or view the memo cue of the call from the past as seen in figure (4.19). To delete a sound the user has to dial (0) and to rate the sound the user has to dial numbers from (1) to (5) in the same way dialing works in a vintage rotary phone.
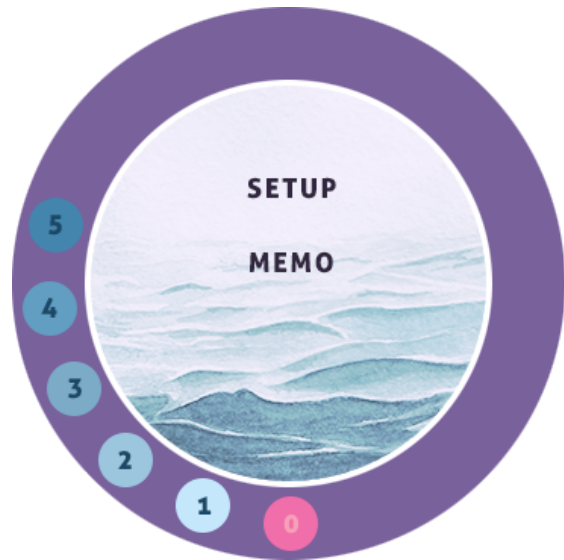
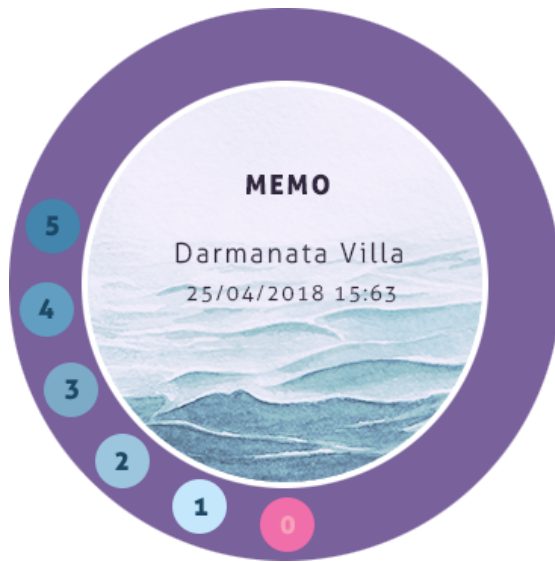Figure 4.17: Splash Screen.   Figure 4.18: Home Screen.

Figure 4.19: Memo Interface.

Figure 4.20: Setup Interface.

Figure 4.21: On Call Interface.

Figure 4.22: Sound Rating.

4.2.3 Testing Results and Discussion

The testers filled a survey (refer to Appendix E) and then were asked to give their feedback about the new interactions in the concept design. The table (4.24) shows the results of the survey which will be discussed qualitatively.

Questions	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
Q1	80%	20%	0%	0%	0%
Q2	20%	60%	20%	0%	0%
Q3	20%	20%	60%	0%	0%
Q4	0%	60%	40%	0%	0%
Q5	40%	60%	0%	0%	0%
Q6	20%	40%	40%	0%	0%
Q7	100%	0%	0%	0%	0%
Q8	0%	60%	20%	20%	0%
Q9	40%	60%	0%	0%	0%

Figure 4.23: Result of user experience survey.

As we can see from the table, testers were mostly satisfied with the overall concept of "SAUDADE", although 3 out of 5 were not sure about the usefulness since they need to use it for a long term to decide about that. Testers thought that indeed "SAUDADE" was easy to use, simple and required few steps to achieve the task of recording/replaying sounds from their travel. All testers agreed that this concept can have a positive emotional impact them, and 3 out of 5 said they would recommend this to a friend, which means they can perceive themselves using it and liking it enough to recommend to another person.

Perceived motivation behind using SAUDADE

The last question of the survey attempts to define what are users expectations from this concept and the result is as follows:
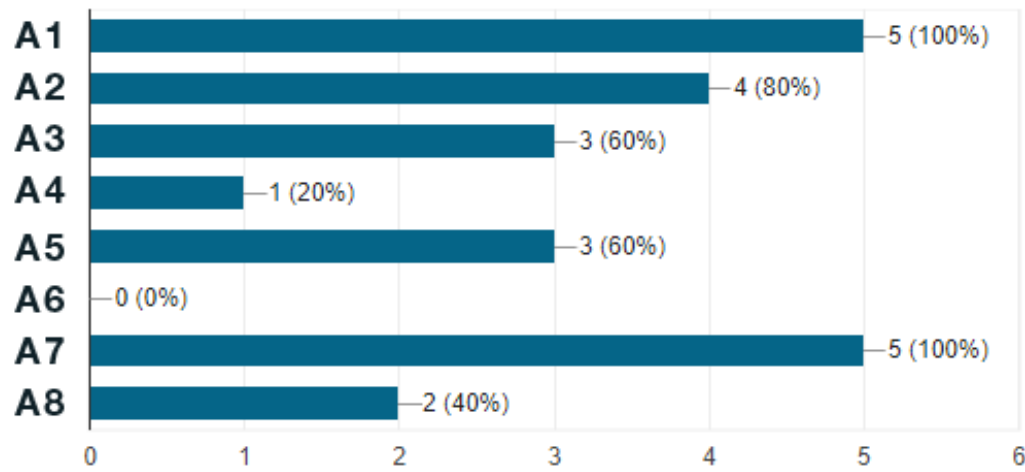
Figure 4.24: Result of user motivation.

A1: Recall my travel memories more often. **A2:** Feel happy reminiscing about the past. **A3:** Appreciate my quality time. **A4:** Cheer up if I'm stressed or tense. **A5:** Entertain me when I'm bored. **A6:** Decorate my personal space and express my personality. **A7:** Value the sounds in my surroundings. **A8:** Motivated to travel more often.

- Recalling memories, feeling happy reminiscing about the past and valuing the sounds in the surroundings were the most selected options; this supports the research questions in this thesis.

- An option was added by the tester in the feedback which is managing unaccountable change of mood.

- A tester expressed that he would like to simplify the interaction when it comes to synchronizing the sounds with the home device, and suggested to have an automatic process when the person is in close distance range with the device.

- There was other comments about whether the wearable "SAUDADE" for recording could also be in a form of an app that can be accessed through smart watches, to attract existing users of wearables.

Chapter 5

Conclusion

5.1. Proof Of Concept

This research presented "SAUDADE", an encapsulation of travel memories through sound. The first research question wanted to explore whether sound was a suitable way to capture memorable travel experiences. Proven by users feedback and their reaction to this concept, we can confirm that the target group started to see a different aspect of their travel through sound alone, and enjoyed keeping audio clips that they would frequently listen to. Although it does not replace taking pictures or videos, participants think that if there is an appropriate concept that highlights the use of sounds they will gladly adopt it. The second research question tried to study the instant positive emotions after hearing a sound memento. Most participants had positive reactions and expressed diverse emotions related to their travel. What contributes to this, is the design aspect which consists of preserving the mystery and anticipation of the sound. Lastly, we were able to witness how some participants were affected by this experience. By thinking about when is the appropriate moment to record, they are indirectly paying more attention to the acoustic scenery. This practice can slightly be compared to when people look for the best spot to take a picture.

5.2. Limitations

Although this research attempted to answer the research questions presented previously, there are some limitations. The first one is the difficulty in recruiting participants, especially when the main purpose of the trip is leisure, it becomes inconvenient to task them with the practice of recording sounds as mementos even though they were interested in the topic and compensated with a cash reward. Another difficulty was that some participants expressed that they were almost forgetting to execute the task given to them, or that their main instinct was taking pictures and videos, however after trying the concept of "SAUDADE" they were amazed by the result and said they would like to try it again. The smartphone was used to prototype the sound recording aspect of this project, however if a wearable device was used as stated in the concept design, we expect to have higher satisfaction and engagement for the practice of sound recording. It is important to mention that this research did not focus on the recording device, but on the sound replaying device in order to define a suitable interaction with the sound mementos. In order to do the testing, a period of three weeks gap between recording and listening was estimated in order to make sure participants forgot about the recordings and did not recall the memories that much. Perhaps the impact of the sound mementos on the participant's emotions would differ drastically if the gap period was longer or shorter. Moreover the prototype was not fully operational for the functions proposed, therefore it could not be used in the participants homes or for more than two days during the testing time. We expect that the interaction design would be improved after observing the users with the prototype integrated with their daily life.

5.3. Future Work

Nowadays, static photos as mementos are becoming more and more generic. Apple iPhone introduced live photos as an attempt to bring photos to life, and they also come with a 3 second sound clip. By introducing this concept of "'SAUDADE" which can definitely be improved, we were aiming to create a new experience that not quite like taking photos or videos. For future work, we would

like to focus on the recording wearable device, and how it can function to give users the most effective experience. As for the home device, we would consider new applications of the concept, such as sensing when the user is in a bad mood and giving him an unexpected surprise, or supporting people who have low attention span, or memory problems to enrich their life with this concept. We also consider how this concept will change if we target a different group, such as people who don't necessarily feel nostalgic or longing for past memories. In this case maybe "SAUDADE" can fulfill a different need such as self-actualization, or status and recognition. It would also be a good direction to explore how can we scale "SAUDADE" from a private home scenario, to a public social sharing platform, that allows families and friends to bond over their shared memories using sound mementos. This concept can also be used for story-telling purpose. Collective global stories could be created and shared by users worldwide using the soundscapes of their surrounding.

References

[1] Bijsterveld, K., and van Dijck, J. *Sound souvenirs: audio technologies, memory and cultural practices*, vol. 2. Amsterdam University Press, 2009.

[2] Coffey, J. K., and Csikszentmihályi, M. Finding flow during a vacation. *The Routledge Handbook of Health Tourism* (2016), 79.

[3] Cohn, M. A., and Fredrickson, B. L. Positive emotions. *Oxford handbook of positive psychology 2* (2009), 13–24.

[4] Druga, S., Maes, P., and Rieger, A. Motif: a wearable sonic cueing device for memory support and cognitive intervention. In *Proceedings of the 2017 ACM International Symposium on Wearable Computers*, ACM (2017), 180–185.

[5] Fredrickson, B. L. Positive emotions broaden and build. In *Advances in experimental social psychology*, vol. 47. Elsevier, 2013, 1–53.

[6] Hartson, R. Cognitive, physical, sensory, and functional affordances in interaction design. *Behaviour & Information Technology 22*, 5 (2003), 315–338.

[7] Helfand, J. The shock of the old: Rethinking nostalgia. `https://designobserver.com/feature/the-shock-of-the-old-rethinking-nostalgia/3807/`, 2005.

[8] Jayaratne, K. The memory tree: Using sound to support reminiscence. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems*, ACM (2016), 116–121.

[9] Jones, J., and Ackerman, M. S. Curating an infinite basement: understanding how people manage collections of sentimental artifacts. In *Proceedings of the*

19th International Conference on Supporting Group Work, ACM (2016), 87–97.

[10] Kalnikaitė, V., and Whittaker, S. A saunter down memory lane: Digital reflection on personal mementos. *International Journal of Human-Computer Studies 69*, 5 (2011), 298–310.

[11] Kickstarter. Kapture: the audio-recording wristband. `https://www.kickstarter.com/projects/1483824574/kapture-the-audio-recording-wristband`, 2013.

[12] Lean, G., and Staiff, R. *Travel and imagination*. Routledge, 2016.

[13] Maslow, A., and Lewis, K. J. Maslow's hierarchy of needs. *Salenger Incorporated 14* (1987), 987.

[14] Miller, M. Senstone first look: Intelligent wearable audio recorder that syncs to your phone. `https://www.zdnet.com/article/senstone-first-look-intelligent-wearable-audio-recorder-that-syncs-to-your-phon`, 2017.

[15] Nawijn, J., Marchand, M. A., Veenhoven, R., and Vingerhoets, A. J. Vacationers happier, but most not happier after a holiday. *pplied Research in Quality of Life 5*, 1 (2010), 35–47.

[16] Nawijn, J., Mitas, O., Lin, Y., and Kerstetter, D. How do we feel on vacation? a closer look at how emotions change over the course of a trip. *Journal of Travel Research 52*, 2 (2013), 265–274.

[17] NEWSHOUR, P. For travel memories, russell banks prefers words to images. `https://www.pbs.org/video/for-travel-memories-russell-banks-prefers-words-to-images-1479774342/`, 2016.

[18] of the University of Pennsylvania, T. T. Authentic happiness initiative. `https://www.authentichappiness.sas.upenn.edu/learn`.

[19] Oleksik, G., Frohlich, D., Brown, L. M., and Sellen, A. Sonic interventions: understanding and extending the domestic soundscape. In *Proceedings of the SIGCHI conference on Human Factors in computing systems*, ACM (2008), 1419–1428.

[20] Querleu, D., Renard, X., Versyp, F., Paris-Delrue, L., and Crèpin, G. Fetal hearing. *European Journal of Obstetrics & Gynecology and Reproductive Biology 28*, 3 (1988), 191–212.

[21] Rátz, T., and Michalkó, G. Travel as a factor of happiness in hungary. *Tourist experience and fulfilment: insights from positive psychology. London, New York: Routledge* (2013), 54–71.

[22] Rubin, G. *Happier at Home: Kiss More, Jump More, Abandon Self-Control, and My Other Experiments in EverydayLife.* Harmony, 2012.

[23] Schafer, R. M. *The soundscape: Our sonic environment and the tuning of the world.* Simon and Schuster, 1993.

[24] Soares, J. S., and Storm, B. C. Forget in a flash: A further investigation of the photo-taking-impairment effect. *Journal of Applied Research in Memory and Cognition* (2017).

[25] Tolle, E. *A new earth: Awakening to your life's purpose.* Penguin Books, 2005.

Appendix

A. Focus Group Questions

- Q1: What is the latest location you traveled to in six months ?

- Q2: What motivated you to go there ?

- Q3: Do you travel to pursue your interests ?

- Q4: Are you more of a solo traveler or do you like to travel in a group ?

- Q5: Do you often feel the need to share your travel experience and why ?

- Q6: How do you share or record your memorable moments of the trip ?

- Q7: What do you remember the most about your trips ?

- Q8: Think back about an experience or an event that changed something in you. What is it ?

B. Technical Details of The Prototype

The components of the Arduino prototype:

- 0.5 W Speaker.

- Arduino Micro-controller.

- Breadboard.

- DFPlayer Mini.

- 3 Push Buttons.

- 1k Ohm Resistor.

- Connecting Wires.

- 2GB SD Card.

C. modified Differential Emotions Scale (mDES)

The modified Differential Emotions Scale (mDES) was created to be a more encompassing measure of positive emotions, than the more commonly used PANAS (Positive and Negative Affect Scale), which exclusively targets high activation positive affective states.

modified Differential Emotions Scale (mDES)

Instructions: Please think back to how you have felt during the past twenty-four hours. Using the 0-4 scale below, indicate the *greatest amount* that you've experienced each of the following feelings.

| Not at all	A little bit	Moderately	Quite a bit	Extremely
0	1	2	3	4

_____ 1. What is the most **amused, fun-loving**, or **silly** you felt?
_____ 2. What is the most **angry, irritated**, or **annoyed** you felt?
_____ 3. What is the most **ashamed, humiliated**, or **disgraced** you felt?
_____ 4. What is the most **awe, wonder**, or **amazement** you felt?
_____ 5. What is the most **contemptuous, scornful**, or **disdainful** you felt?
_____ 6. What is the most **disgust, distaste**, or **revulsion** you felt?
_____ 7. What is the most **embarrassed, self-conscious**, or **blushing** you felt?
_____ 8. What is the most **grateful, appreciative**, or **thankful** you felt?
_____ 9. What is the most **guilty, repentant**, or **blameworthy** you felt?
_____ 10. What is the most **hate, distrust**, or **suspicion** you felt?
_____ 11. What is the most **hopeful, optimistic**, or **encouraged** you felt?
_____ 12. What is the most **inspired, uplifted**, or **elevated** you felt?
_____ 13. What is the most **interested, alert**, or **curious** you felt?
_____ 14. What is the most **joyful, glad**, or **happy** you felt?
_____ 15. What is the most **love, closeness**, or **trust** you felt?
_____ 16. What is the most **proud, confident**, or **self-assured** you felt?
_____ 17. What is the most **sad, downhearted**, or **unhappy** you felt?
_____ 18. What is the most **scared, fearful**, or **afraid** you felt?
_____ 19. What is the most **serene, content**, or **peaceful** you felt?
_____ 20. What is the most **stressed, nervous**, or **overwhelmed** you felt?

Based on Fredrickson, 2009 and Fredrickson, Tugade, Waugh, & Larkin, 2003. Scoring: Use single items to assess specific emotions, or create overall positive and negative emotion scores by computing the mean of 10 positive and 10 negative emotions, respectively. Instructions can be modified to assess emotions in response to specific incidents (e.g., laboratory manipulations or episodes recalled using the Day Reconstruction Method). Scale can be modified to capture emotions experienced over the past two weeks by changing the instructions to "how often have you've experienced…," the items to "How often have you felt ___?" and the response options to 0 = never; 1 = rarely; 2 = some of the time; 3 = often; 4 = most of the time.

D. mDES Responses

	Amused	Angry	Ashamed	Wonder	Scornful	Disgust	Embarrassed	Grateful	Guilty	Hate	Hopeful	Inspired	Interested	Joyful	Love	Proud	Sad	Scared	Serene	Stressed
User (A) Pre	4	0	0	1	1	1	2	0	0	0	3	2	0	2	2	2	2	1	2	4
User (A) Post	4	1	0	2	1	0	1	2	1	0	3	2	2	2	3	0	0	0	3	4
User (A) 2 Pre	4	1	1	3	0	3	1	3	0	1	2	2	1	2	1	1	0	2	1	3
User (A) 2 Post	4	1	1	0	0	0	1	0	2	0	0	3	1	2	1	4	0	0	2	3
User (B) Pre	1	4	1	2	2	1	0	3	3	2	3	2	2	2	2	2	3	3	0	4
User (B) Post	3	1	0	2	1	0	0	3	0	0	3	3	1	3	3	1	1	0	4	1
User (B) 2 Pre	1	2	0	1	0	0	0	1	1	0	1	1	0	2	2	1	2	2	1	3
User (B) 2 Post	2	1	0	2	0	0	0	2	0	0	2	2	0	2	2	1	1	1	3	2
User (C) Pre	4	0	0	3	0	0	0	4	0	1	3	3	3	4	4	3	1	2	3	2
User (C) Post	0	4	1	2	2	3	1	1	2	4	1	0	3	1	0	2	2	1	2	3
User (C) 2 Pre	3	0	0	4	0	0	0	4	0	0	3	3	2	3	3	2	0	0	3	2
User (C) 2 Post	3	1	0	3	0	0	0	3	2	3	3	3	3	3	3	2	1	0	2	1
User (D) Pre	3	1	0	2	0	0	0	0	0	0	1	0	2	2	2	1	0	1	1	1
User (D) Post	4	0	0	4	0	0	1	4	0	0	3	2	2	4	2	2	0	0	2	1
User (D) 2 Pre	1	0	0	1	0	1	0	2	0	0	3	2	1	2	2	1	0	0	4	0
User (D) 2 Post	2	0	0	3	0	0	0	3	0	0	4	3	2	3	4	2	0	0	4	0
User (E) Pre	2	3	2	1	1	0	1	2	0	0	3	2	1	2	2	2	0	0	2	2
User (E) Post	3	0	0	3	1	0	0	2	0	0	2	3	2	2	2	2	0	0	3	1
User (E) 2 Pre	2	1	1	1	1	1	1	2	1	1	2	2	1	2	2	2	1	1	2	2
User (E) 2 Post	3	0	0	2	1	0	0	2	0	0	3	3	2	3	2	2	0	0	2	1

mDES responses by User
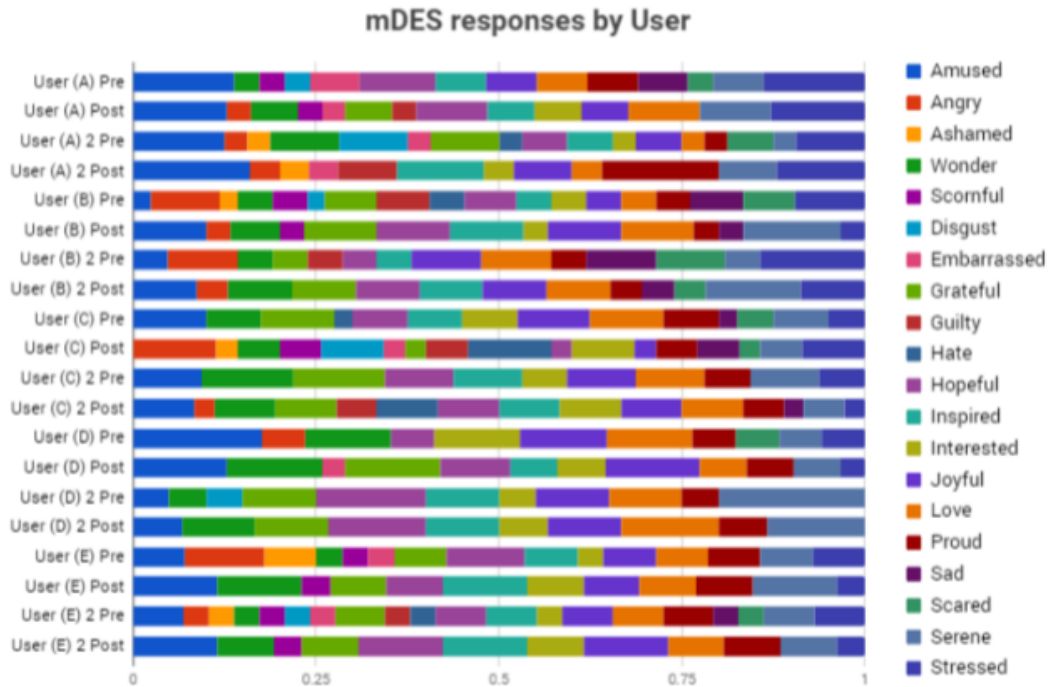
E. User Experience Survey

"SAUDADE" User Experience Survey

Ease Of Use

What do you think about SAUDADE concept design.

I find SAUDADE to be easy and simple to use. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I think SAUDADE requires fewer steps to achieve the task I want. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I don't see inconsistencies using SAUDADE. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

BACK   NEXT

69

"SAUDADE" User Experience Survey

User Motivation

Please share your opinion and thoughts.

I think SAUDADE can make me ... *

- ☐ Recall my travel memories more often
- ☐ Feel happy reminiscing about the past
- ☐ Appreciate my quality time
- ☐ Cheer up if I'm stressed or tense
- ☐ Entertain me when I'm bored
- ☐ Decorate my personal space and express my personality
- ☐ Value the sounds in my surroundings
- ☐ Motivated to travel more often

Additional Comment ?

Your answer

BACK	SUBMIT

Never submit passwords through Google Forms.