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Master's Thesis
Academic Year 2021

CELCAL: A Smart Home Service that Creates Festival Mood

Keio University
Graduate School of Media Design

Han Jia

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

Han Jia

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Abstract of Master's Thesis of Academic Year 2021

CELCAL: A Smart Home Service that Creates Festival Mood

Category: Design

Summary

CELECAL is a smart home service that utilizes a series of smart appliances to create an enjoyable festival mood at home during the whole festival season. By stimulating the sense of sight, hearing, and smell, to trigger people's happy memories related to the festival and reduce the daily stress.

Similar to the advent calendar, users receive different surprises every day. There are three types of surprises: music, smell, and virtual decoration. Users can apply those gifts they receive by different smart home devices: speaker, aroma diffuser, and hologram device connected to the smart home system. Users can also manage their devices with an application.

To test the functionality and proof of concept, I took the Chinese Spring festival as a theme to conduct a series of research and prototype making. After completing the functional prototype and the user interface design, I ran a 14-days user test in the participant's home. I used the methods of journal record, interview and survey, successfully proving that this service is helpful to create an enjoyable festival mood at home and the participant showed high satisfaction with the entire experience.

Keywords:

festival experience, smart home service, memory invoke, mood

Keio University Graduate School of Media Design

Han Jia

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Chapter 1
Introduction

1.1. Background

Festivals are an essential part of most people's daily life. Still, the pandemic has blocked the traditional way of celebrating activities outdoors. Meanwhile, people spent more time at home. There is a higher pursuit of the diversity of home lifestyle.

With the rapid development of smart technology, various smart home devices have integrated more and more convenience and innovative functions into our family life. The future family will be an interconnected smart family. According to relevant market research data, the global smart home market is developing rapidly at a compound annual growth rate of 9.5%. It is estimated that by 2023, the smart home market will reach US$107.3 billion. [1]

So I want to design a smart home service that allows people to experience the joyful atmosphere of the festivals immersively at home and increase the fun of the home experience and relieve stress. I think even after the pandemic is over. This service is of great significance. For example, it provides foreigners living abroad with a festive atmosphere in their hometown; also, people can easily experience festivals in a foreign country without leaving their homes, to experience different customs and cultures, etc.

1 http://m.elecfans.com/article/779215.html

1.2. Thesis Structure

The introduction chapter discussed the background of the festival experience under the pandemic and the development and potentiality of smart home technology.

The literature review chapter discussed the values of festivals, sensory-evoked memories; the relationship between memories and mood; and the introduction of smart home technology and existing smart home service.

The design concept chapter introduces the concept of CELCAL and several scenarios and sketches to visualize this service.

In the prototype chapter, I conducted preliminary research, and I described different prototypes that I designed. There are 1. Virtual experience, which I made into a game with Unity. 2. Functional prototype, which combines devices that realized the functionality. 3. User interface, which I designed and launched in different smart terminals.

The proof of concept chapter said that I designed a 14-days user test in the participant's home. And I used the methods of journal record, interviews, and a survey to validate the design concept.

Chapter 2
Literature Review

2.1. Values of Festival

2.1.1 Relieve Stress and Promote Harmony

Festivals are common but important events in daily life. As cultural events, festivals are always together with specific traditions, celebration activities, and holidays. During festivals, people escape from routine life and spend time with friends and families; thus, festivals are thought to recover equilibrium. People also suggest festivals allow them to relieve boredom, Change pace from everyday life and relieve daily stress. [1] Besides, the mood and atmosphere of festivals bring happiness and promote harmony. [2] Most festivals have a festive theme. Like commemorating history, good wishes for the future, etc. Therefore, no matter the festivals' songs, decorations, or celebration events, all those elements compose the festival atmosphere and influence people's moods. And enjoying the festival mood is an essential motivation for people to spend festivals. [1]

2.1.2 Symbol of Culture Identity

"Cultural identity is the identity of belonging to a group. It is part of a person's self-conception and self-perception and is related to nationality, ethnicity, religion, social class, generation, locality or any kind of social group that has its own distinct culture." [3] A Grown-up background and related social relationships formed one's cultural identity, but coming to a new environment means the previous cultural identity is not adaptable anymore. Fitting in a new cultural background is very distressing, harming an individual's mental health due to the cultural shock. [4] International students are even more vulnerable groups than

others, which show high levels of fear of crime, perceived risk, and avoidance behaviors when facing life and study alone in a new environment. [5]

"A festival is an event ordinarily celebrated by a community and centering on some characteristic aspect of that community and its religion or cultures. It is often marked as a local or national holiday, mela, or eid. A festival constitutes typical cases of glocalization, as well as the high culture-low culture interrelationship." [6] Hence, as a prevalent event that combines specific culture, tradition, community, or even religions, a festival influences people's identities. All processes related to festivals affect the need to belong. [7]

In sum, every region and folk have their distinctive festivals. And people can feel their cultural identity through those festivals. But fitting in a new environment means the confliction of previous cultural identity, and this process is always depressing. Hence, for international students, experiencing the festivals of their homeland will be a great escape to put them back to their familiar cultural identity. To reduce their fear and depression caused by shifting to a new cultural environment and that fulfill their need to belong.

2.1.3 Related Design

(Source: https://bit.ly/3xSQSSl)

Figure 2.1 Advent Calendar

An Advent calendar is a special calendar used to count the days of Advent in anticipation of Christmas. [8] They come in a multitude of forms, from a simple paper calendar with flaps covering each of the days to fabric pockets on a background scene to painted wooden boxes with cubby holes for small items. [9]

2.2. Sensory-evoked Memory

2.2.1 Music

Music has a strong association with memories evoke. One of the most evocative and salient experiences of music is hearing a song that unexpectedly triggers a distant memory. For example, when you are lying in bed and hearing a familiar childhood song, it is easy to drag you back to childhood memories. Music and vivid autobiographical memories have an evident and strong association—music frequently reminds us of place, people, and specific events and experiences from our past. [10]

And this association has been proved effective in lifetime eras. In the experiment, College-age participants recalled a memory associated with a song from each of five lifetime periods and then described and rated the memories. Ratings for vividness, specificity, feeling brought back, and feeling connected with the memory were significantly different across lifetime eras. From the findings, music is a valuable cue to evoke autobiographical memory. [11]

2.2.2 Vision

Visual stimuli are a straightforward way for memory recall. When we see specific objects or images related to an event or scene, it is easy to evoke autobiographical memories of that scene or event. The picture-based teaching method has proven effective in acquiring written language and reading comprehension ability in the teaching and learning field. As memories recall cues, visual contents are more memorable than text. [12]

Even for a life-long period, visual cues effectively recall autobiographical memories in a comparison experiment on the qualities of autobiographical memories evoked by different sensory cues. Ninety-three older adults were offered one of

three cue types (word, picture, or odor) and were asked to conjure any autobiographical event for the given cue. After experiencing, 11 questions were proposed to rate the effectiveness of memories evoked. The results showed that visual cues are effective for memory recall, and memories associated with visible contents peaked in early adulthood (11–20 years). [13]

2.2.3 Odor

The way in which odors elicit mood and attitudinal states is by evoking memories of past experiences. [14] In research to study the hedonic congruence between odor pleasantness and the valence of memories evoked, the results showed that when subjects were in the presence of a pleasant ambient odor (almond), their memories that they recalled were significantly more positive than when in the exposure of an unpleasant ambient odor. [15] What is noticeable is that subjects' memories evoked did not directly relate to the ambient odors present. Instead, the ambient scent influenced the subject's overall mood, and then the subject's mood was affected to remember more good or bad life experiences.

Odor has been proved as an effective cue to memories. [16] What is more significant, such research showed that measured by increased heart-rate responses and self-report, the memories induced by odors have a strong emotional experience. [17] [18] And can even evoke more detailed and emotional memories than when the same memory item was presented in visual, verbal, or auditory format. [19]

Also, personal memories can be evoked by specific odors. In this field, Herz and CupchikIn experimented on 40 subjects(20 male, 20 female) to rate 20 different odors, attempted to name every odor, and then claimed whether this odor-evoked personal memory. When this odor evoked a memory, subjects wrote a description and rated it from different scales of pleasantness, familiarity, intensity, arousal, and degree of interest. The results showed that odor-evoked memories tended to be highly emotional, vivid, specific, rare, and relatively old. And the most familiar odors often can be named correctly and evoked the most significant number of memories. [17]

2.3. Memory and Mood

2.3.1 Memories associated with moods

Memory recall has been proposed as a standard and efficient method for mood regulation and shift. According to Gillihan, Kessler, and Farah [20], valenced memory recall has influences on mood. In the experiment, participants(N=314; 56% female) were asked to recall primarily positive, neutral, or negative memories. The results of the experiment indicated that the expected effect on mood (p¡.002). The reported mood is the worst in the negative memory state, reported better in the neutral state, and best in the positive state. These results reveal that valenced memory recall does affect mood, which could happen even without the individual's awareness.

Through the results, individuals' moods and valenced memory are consistent. These results indicated that individuals could get into a happy or relaxed mood when recalling pleasant memories and get into a stressful or sad mood when recalling unpleasant memories.

2.3.2 Positive memories regulate negative moods

Other researchers also gave evidence that specific memory recall input can regulate the mood of individuals. This mood regulation strategy is common in life. Boden and Baumeister [21] indicated the trend by some individuals to recall happier memories after watching a distressing film as a strategy to relieve their negative emotions. Josephson [22] conducted an experiment to prove that happy memories are effective in repairing a sad mood. A total of 106 undergraduates participated in this study. They first completed a measure of depression. And participants were assigned to either a sad or neutral mood induction two weeks later. After that, they recalled two memories. And the results show that participants who followed a negative memory and then recalled a positive one reported a more positive mood than participants who recalled two negative memories consecutively.

2.4. Smart Home Service

2.4.1 Smart home technology

The concept of "automated home/smart home" was first introduced over 80 years ago. [23] "Smart home is the integration of technology and services through home networking for a better quality of living." [24] It relies on IoT technology and realizes the central control of various smart devices connected to the system. "And has the potential to improve home comfort, convenience, security, and energy management." [24] Here are three main components to building a complete smart home.

Smart home network technology can be categorized into the wiring system and the wireless system. [25] Many home automation is connected through it in the wiring system, such as new wire (twisted pair, optical fiber), Powerline, Busline, etc. An example of prominent technology is X10, an open standard for home automation. For the wireless system, two main elements are sender and receiver. Many new appliances apply wireless technology to communicate with other devices. Examples of wireless communication systems are microwaves, Infrared (IR), radio frequency (RF), Wi-Fi, Bluetooth, IEEE 802.11, etc. Smart home control devices that applied for managing the systems by sending data or signals to control the actuators. The examples of the controllers are not only the remote control, but they can also be smartphones, tablets (iPad, Galaxy tab), web browsers, and Short Message Service (SMS). Lots of smart devices can be connected to the system and realize different functions. For instance, television, Audio for entertainment; Videophone, home calendar for communication; Light, air condition for the environment, all of these devices can be connected. Only those devices are connected to the smart home system; they can be a part of the system and control. [24]

2.4.2 Existing service

"Google Nest, previously named Google Home, is a line of smart speakers developed by Google under the Google Nest brand. The devices enable users to speak voice commands to interact with services through Google Assistant, the com-

pany's virtual assistant. Both in-house and third-party services are integrated, allowing users to listen to music, control playback of videos or photos, or receive news updates entirely by voice. Google Nest devices also have integrated support for home automation, letting users control smart home appliances with their voice command." [26] Through the application, users can manage and control their smart home devices, all family members can access the system to realize the true smart home experience.

(Source: Wikipedia)

Figure 2.2 Several products released under the original Google Home

Chapter 3
Design Concept

3.1. Design Concept

3.1.1 Overview

Festivals are an essential part of most people's daily life. Still, the pandemic has blocked the traditional way of celebrating activities outdoors. Meanwhile, people spent more time at home. There is a higher pursuit of the diversity of home lifestyle.

With the rapid development of smart technology, various smart home devices have integrated more and more convenience and innovative functions into our family life. The future family will be an interconnected smart family.

CELECAL is a smart home service that utilizes a series of smart appliances to create an enjoyable festival mood at home during the whole festival season. By stimulating the sense of sight, hearing, and smell, to trigger people's happy memories related to the festival and reduce the daily stress.

Similar to the advent calendar, users receive different surprises every day. There are three types of surprises: music, smell, and virtual decoration. Users can apply those gifts they receive by different smart home devices: speaker, aroma diffuser, and hologram device connected to the smart home system. Users can also manage their devices with an application.

3.1.2 Scenario

Scenario 1

Christmas is coming. Amy is an American student and is in her first year in Korea.She always decorated the Christmas tree with families every year. This

year, she can't do the same thing due to the distance. So she creates a virtual Christmas tree in the house. The audio plays Christmas songs and snow flowers fly on the window glass. She feels relaxed and enjoys the peace of the festival ambiance.

Scenario 2

Ann is a Chinese student who studies in Japan now. She wants to decorate your room to celebrate the coming spring festival. But the date is not the national holiday in Japan, so she does not have time for preparation or take a break, and it is troublesome and expensive to buy relevant items. So she opens the "Spring festival" mode with the app. The decoration and music emerge in your room. And she sets off the virtual firecracker to wish a good new year.

Scenario 3

It is the morning of the first day of the year. When Jack, an international student, gets up, he wants to take a shower to refresh. When stepping into the bathroom, something emerges in the mirror. It's a wish of the new year. He feels warm and becomes more confident and hopeful for the coming year.

3.1.3 Sketch

Just like the advent calendar, during the whole festival season, this service will provide users with different surprises every day until the big day comes. There are three types of surprises, decorations, music, and scent. In this mockup, I used Christmas as an example. So the decoration can be a Christmas tree, music is a Christmas song, and the scent is gingerbread. After receiving those surprises, users can choose to apply them to a real environment.

Figure 3.1 Daily Surprise: Virtual decoration

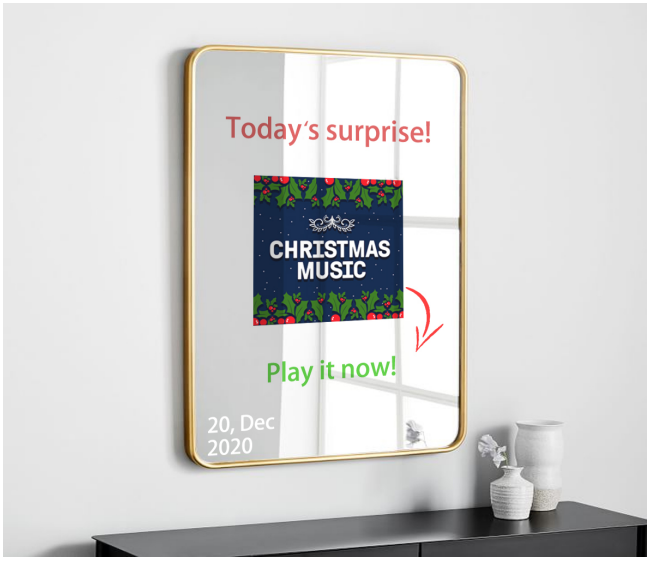


Figure 3.2 Daily Surprise: Music

Figure 3.3 Daily Surprise: Smell

The surprise will come true when relying on different types of smart devices that link to this system. In this way, to trigger users' festival happy memories through the sense of sight, hearing, and smell.

For the virtual decorations, users can choose to decorate the virtual items they got from the daily surprise and dress them in their house. This will be realized by hologram.

And for hearing, this function will be realized by an audio device connected to the smart home system, like smartphones and other digital devices.

This function will be realized by an aroma diffuser that connects to the smart home system for the smell. The scent will be the foods or plants related to the festival or that season.

Chapter 4
Prototype

4.1. Preliminary Research

4.1.1 Overview

To learn more about foreigners' current situation when they spend festivals abroad and their attitudes towards this issue. I conducted preliminary research. The research methodologies that I applied are questionnaires and interviews. Both of these methods are qualitative. The goals of the preliminary investigation are 1. Ascertain subjects' motivations and willingness on experiencing festivals abroad; 2. Define the problems subjects are currently meeting when experiencing festivals abroad; 3. The elements subjects think that can present a festival; 4. The idealized festival experience subjects expect when abroad. Using the preliminary research results, I can learn about the target users' needs and prove the value of this service. And then concrete the content design.

4.1.2 Questionnaire

The subjects of the survey are Chinese people with overseas experience. The form of the survey was an online questionnaire. Fifty-eight answer sheets were collected in three days. Fifty-five of them were valid. Those 55 subjects had living experience in 9 different countries from the answer sheets, and their average overseas living time was 3.19 years.

From the results, 79.31% of subjects want to celebrate festivals when living overseas(including traditional Chinese festivals and other big festivals like Christmas). Three main reasons you want to experience festivals abroad are: relax; meet with friends and families; relieve nostalgia; and enjoy festival traditions. For

the question "What difficulties do you meet when experiencing festivals abroad?" Over 70% of respondents said they could not spend the festivals with family; Over 50% of respondents thought they met the problems of purchasing festival items and no holiday to take a break because the festivals of their homeland might not be the national holidays in host countries.

In conclusion, from the questionnaire, most of the respondents showed their high motivations to experience festivals when they were living abroad. Festivals present four values for them: 1. Opportunity to escape from daily life and take a break; 2. Family plays an important role; 3. Relieve nostalgia;4. Experience interesting festival customs. And the barriers they meet can be concluded as below: Disconnected with the family on some level due to the distance and time difference; Can't have face-to-face celebration due to Covid-19; No holiday break for Chinese festivals in the countries they live; Have no time for the festival preparation; Inconvenient to buy festival-related items.

4.1.3 Interview

Compared to the survey, one-to-one interviews are a good method to know about respondents' oppoins and their personal experiences and stories. In the interview part, I interviewed three interviewees who have overseas experience. Questions are about their own opinion and experiences on spending Chinese festivals abroad. After that, I coded the information from the interview record and analysed it.

Based on the information from the interviews. Here are some findings;1. Interviewees all think there is no Chinese festival atmosphere abroad; 2. They all hope to spend Chinese festivals abroad; 3. They all meet with difficulties like hard to buy traditional Chinese food, no time for preparation, lack of festival atmosphere, and families. 4. For the elements of the spring festival, the essential elements include food(hotpot, Chinese dumplings), lucky money, setting off firecrackers, and the New Year's Eve Gala.

4.2. Virtual Experience Prototype

4.2.1 Concept

I designed a virtual experience as my first prototype. I made an RPG game to simulate the service experience. And in this prototype, I took the Chinese spring festival as an example. I had 5 Chinese students who are studying abroad as participants. The goals of the virtual experience are 1. Simulate the home festival experience. 2.Validate if the festival elements can trigger happy festival memories and make users feel a festival mood at home 3. Get feedback and comments from real testers for refining and iteration.

4.2.2 Contents Design

In the game, there were mainly four scenes to simulate the main functions of the service.

Scene 1

Scene 1 is the virtual decoration of the Spring Festival couplet on the door. Spring Festival couplets, also called Antithetical couplets, are used as a traditional New Year's decoration that expresses happiness and hopeful thoughts for the coming year in Chinese families. People always decorate it on the door before the Chinese New Year comes.

Scene 2

Scene 2 is the wishes on the mirror. When players step into the bathroom in the morning, users will see the new year's wish as a surprise. Here I used the virtual Chinese wish and traditional spring festival decoration on the mirror.

Scene 3

Scene 3 contains festival songs and virtual fireworks. Like many countries, Chinese people also set off fireworks to celebrate the spring festival. Also, the festival song "Gong Xi Fa Cai" has been popular in China for decades and is very representative.

Scene 4

Scene 4 contains the image, sounds, and smell of Hotpot. Hotpot is a regular but essential dish in the reunion dinner during Spring Festival. Because it is a

cuisine that many people can share, it implies a family reunion. Although users can not smell the odor of Hotpot in the game, by the instructions and sounds, it is easy to imagine.

Figure 4.1 Scene 1: Spring Festival Couplets

Figure 4.2 Scene 2: Wishes on the Mirror

Figure 4.3 Scene 3: Festival Songs and Virtual Fireworks

Figure 4.4 Scene 4: Hotpot

4.2.3 Make and Launch

The making process was realized by Unity, a game-making software. Firstly, I imported the 3D model of the house into the project and adjusted the light and texture for a better play experience. Then, I downloaded the free source from the Internet and imported them to the house model to simulate the real living environment. The sources were songs, animation of various virtual decorations, etc. The next step was to make instructions in the game, guide players on how to control the game and the meanings of each scene. After that, to set the triggers of each scene by coding, players could trigger different sounds and effects during playing. The final step was to import a role in this game, so players could control the role to walk in this game.

After setting up the game, the next part was to launch the game to access it. Simmer.io is a place for indie game developers to share their games to the web browser with a single drag and drop. After exporting the game package, I uploaded the game to Simmer.io as an open source for players to play.

4.2.4 Evaluation

I had 5 Chinese students who were studying abroad as players. After playing the game, I conducted interviews with them. Here is the feedback I concluded from the user test of this prototype. Some positive feedbacks are “The experience is interesting.” “I can feel the festival mood very much.” “The smell and sounds can bring a festival mood better than the visual one.” But I also got some negative feedback, like “The smell of food may not be a good idea, especially when you just smell it but can’t eat the food.” “I hope I can decide which function I want and where to put the virtual decorations.” Overall, the test users’ mood when experiencing was happy, surprising, and recalling the happy memories related to the spring festival.

4.3. User Interface Design

4.3.1 Concept

The terminals of this service are where user interactions happen. There are two terminals of this service, Smart mirror terminal and Smartphone terminal. With the smart mirror terminal, users can know when and how long the festival season's duration. And receive a surprise every day in the festival season; The smartphone terminal is where users can control and manage smart devices. Users can manage festival packages and gifts and select different festivals that they hope to experience with it.

4.3.2 Smart Mirror Terminal

I designed the smart mirror terminal because it's an item that we all use everyday at home, and the screen is bigger and more straightforward to create and receive daily surprises every day. Users can turn it off when users don't activate this service so that the smart mirror can be used as a normal mirror.

There is a calendar application built in to realize series functions. The smart mirror terminal has two main functions. The first is to act as a festival calendar so that users can check the date of the festival. In the mock-up, I took the Chinese Spring Festival as an example. The background picture creates a festival atmosphere. And the marked dates are the festival season, so users can know when the festival season starts and ends. The second function of the smart terminal is to show users daily surprises. By tapping the banner or the date, users will unlock the surprise of that day. And users can choose to apply the surprise into the real environment directly on this page.

Figure 4.5 User Interface: Festival Calendar

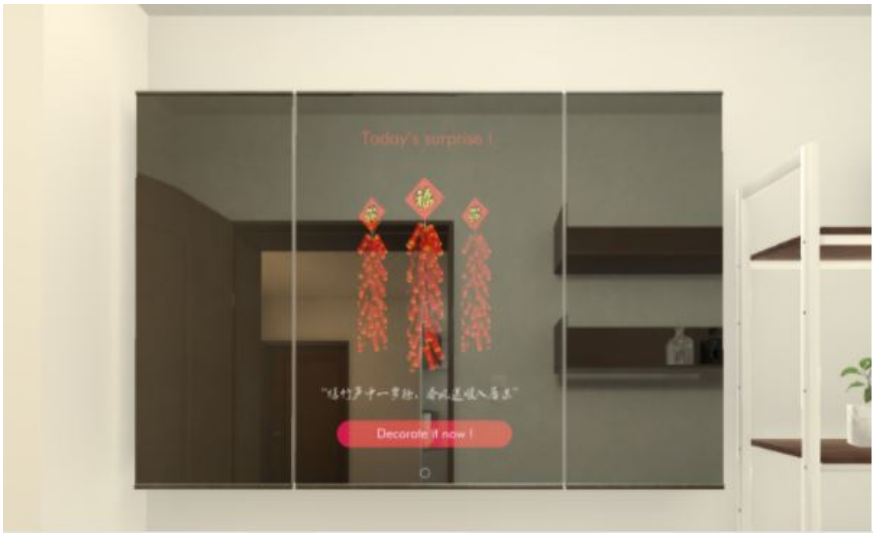


Figure 4.6 User Interface: Daily Surprise

4.3.3 Smartphone Terminal

Design

The UI design of the application is simply style. The background color of the pages is light grey to give users the feeling of clean and clear. The font color is black, so obvious and easy to recognize. The bottom menu realizes the page switching. There are three sub menus, Home, Gifts, and My. And each sub-menu has a logo and name for users to understand. When the submenu is active, the logo and name will turn to pink, the same theme color as the calendar in the smart mirror terminal. All the pictures and logos in the mock up are free to use and have no copyright infringement.

Functions

The smartphone terminal has four main functions, and the operation of the application realizes all the functions. One function is to control and manage smart devices. The Home page shows all the smart devices linked to the system and their current condition in the application. Each device has a logo so easy to recognize. From here, users can see if their devices are on and choose to turn their devices on or off remotely. Also, users can tap each device to see more information about it or change its name. The add symbol is for adding new devices.

The second function of the application is to browse and discover the festival packages and the gifts from daily surprise. There is a sub-menu called gifts from the bottom menu. On this page, users will see all the festival packages that they have now. Noticeably, if the festival is not coming yet, the corresponding festival package is fuzzy and locked to keep mystique. But on the banner, users can learn about when this festival package will be active, so users can expect it. When users slide this page to the bottom, they can add other festival packages that they like and also delete existing packages if they don't like them. The search bar at the top is to input keywords so users can search for the festival packages when they have a lot.

The third function of the application is to choose and apply the virtual gifts to different smart devices. After tapping the unlocked festival packages, users will be able to see all the daily surprise gifts. The same as the festival packages, the locked gifts will be fuzzy to keep mysterious. But on the banner, users can learn about when this gift will be active, so users can expect it. Users can not unlock it

or apply it until the day comes. So all the virtual gifts that users can operate are what they already received from daily surprise. Users will then see the page when tapping those gifts to choose which smart device they hope to run this virtual gift. Users can also delete the gifts which they don't like from the page. The search bar at the top is to input keywords to search for the gifts when there are a lot.

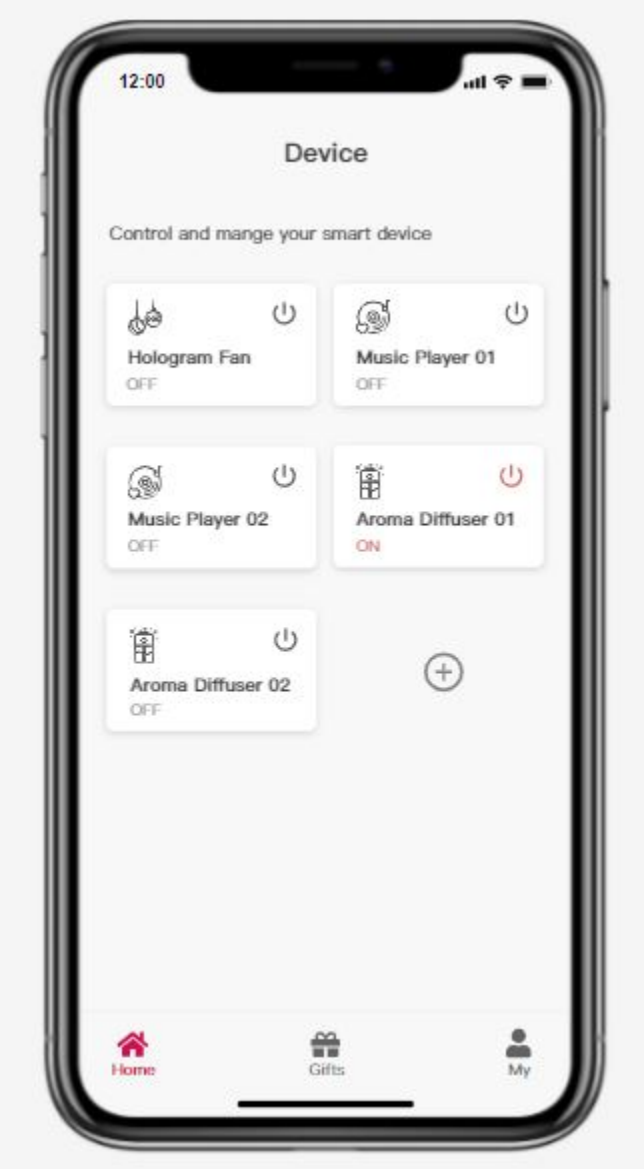


Figure 4.7 User Interface: Device 01

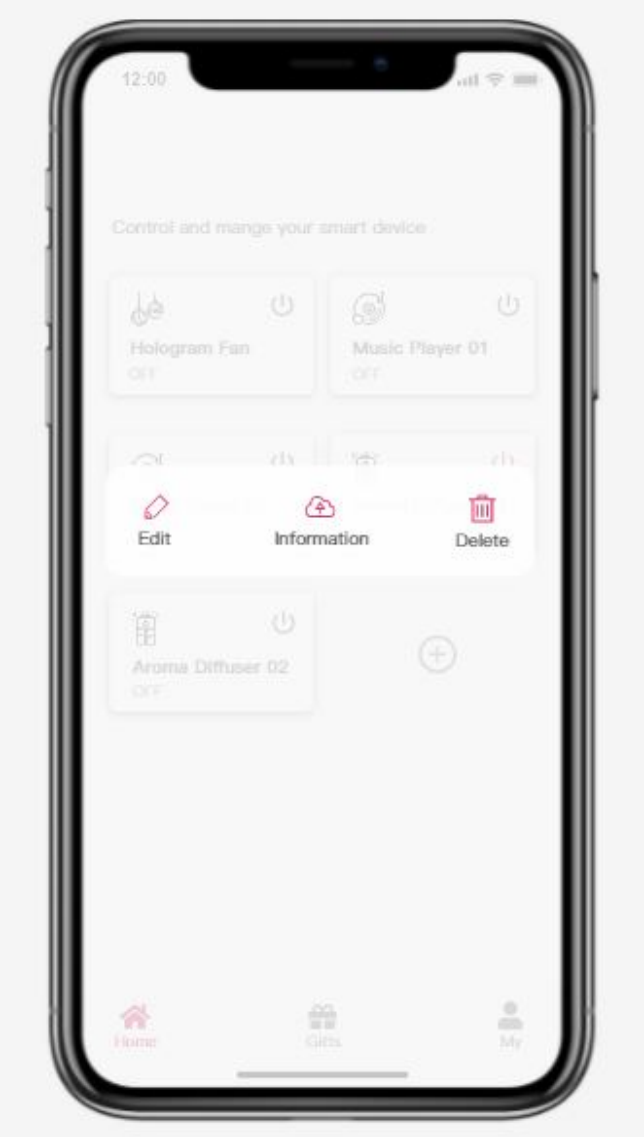


Figure 4.8 User Interface: Device 02

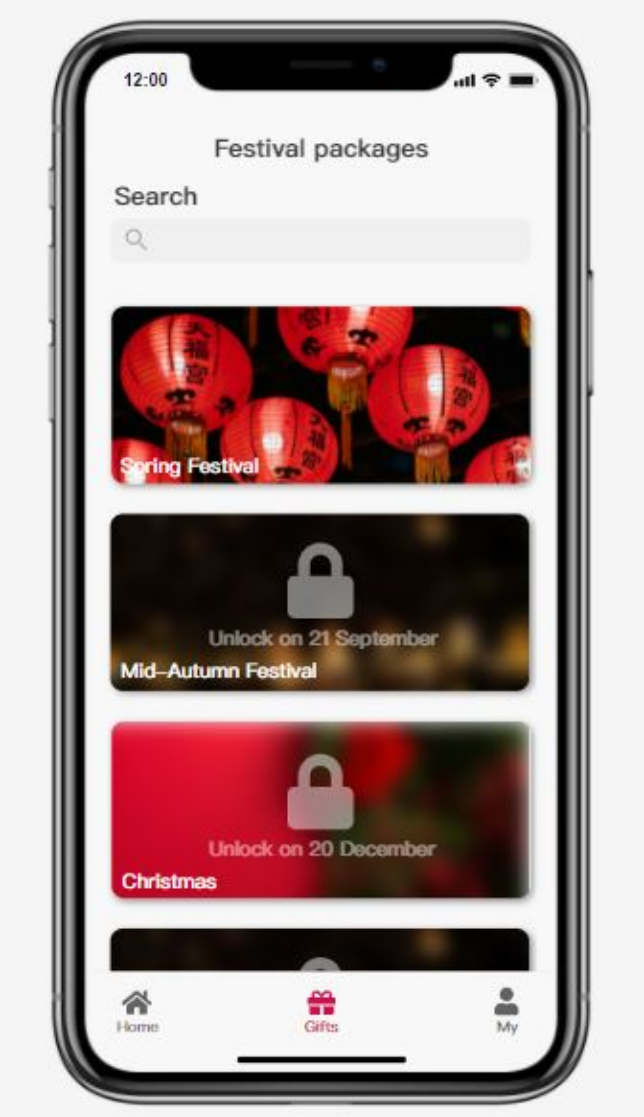


Figure 4.9 User Interface: Festival Packages 01

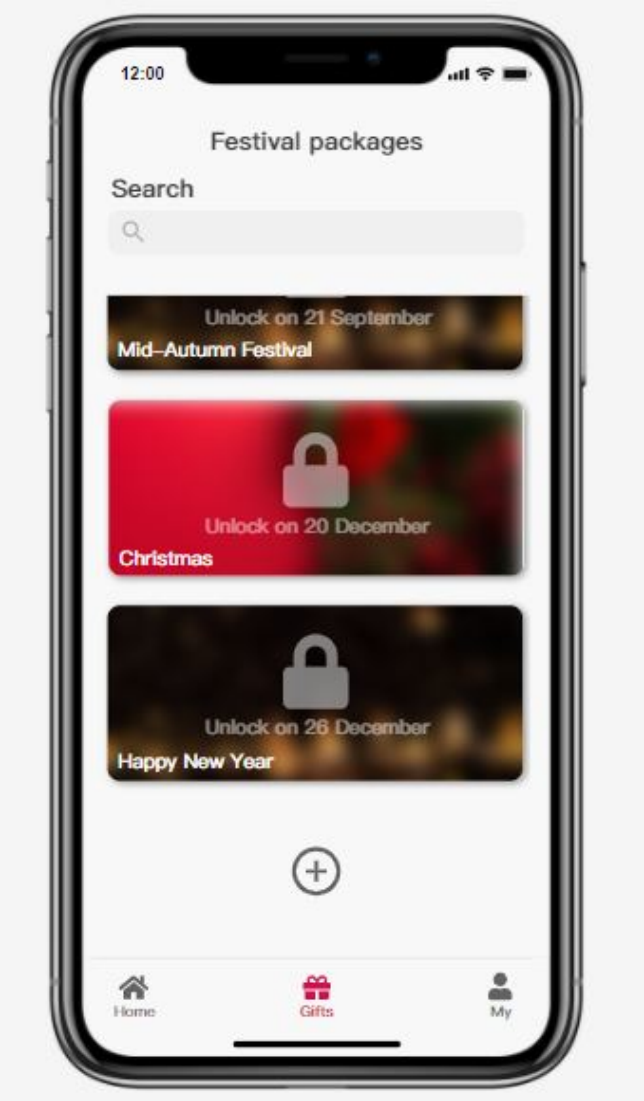


Figure 4.10 User Interface: Festival Packages 02

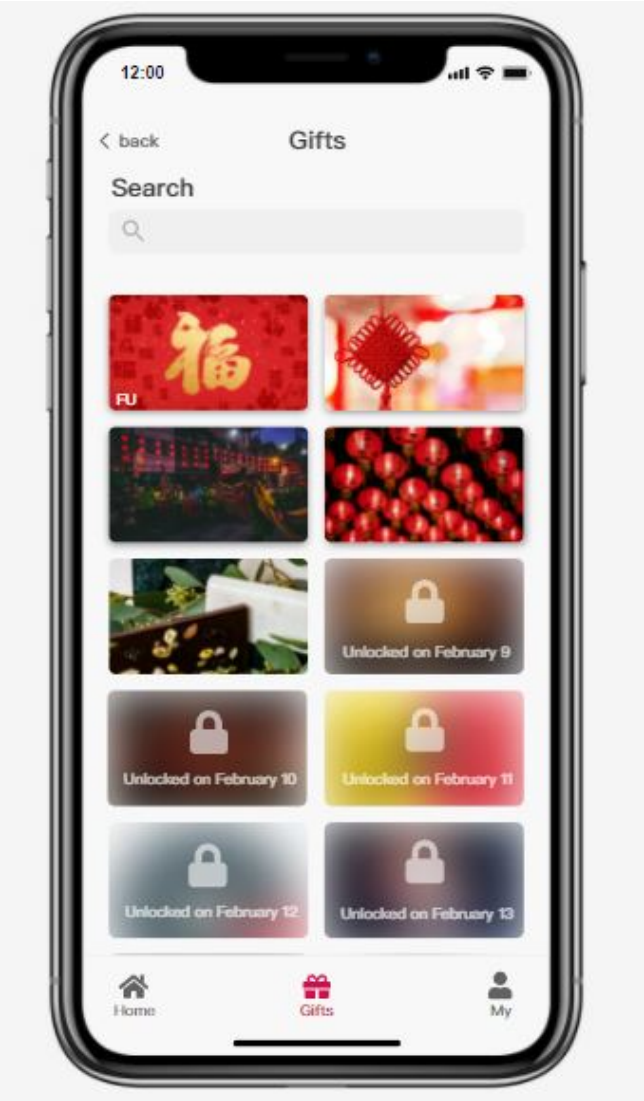


Figure 4.11 User Interface: Gifts 01

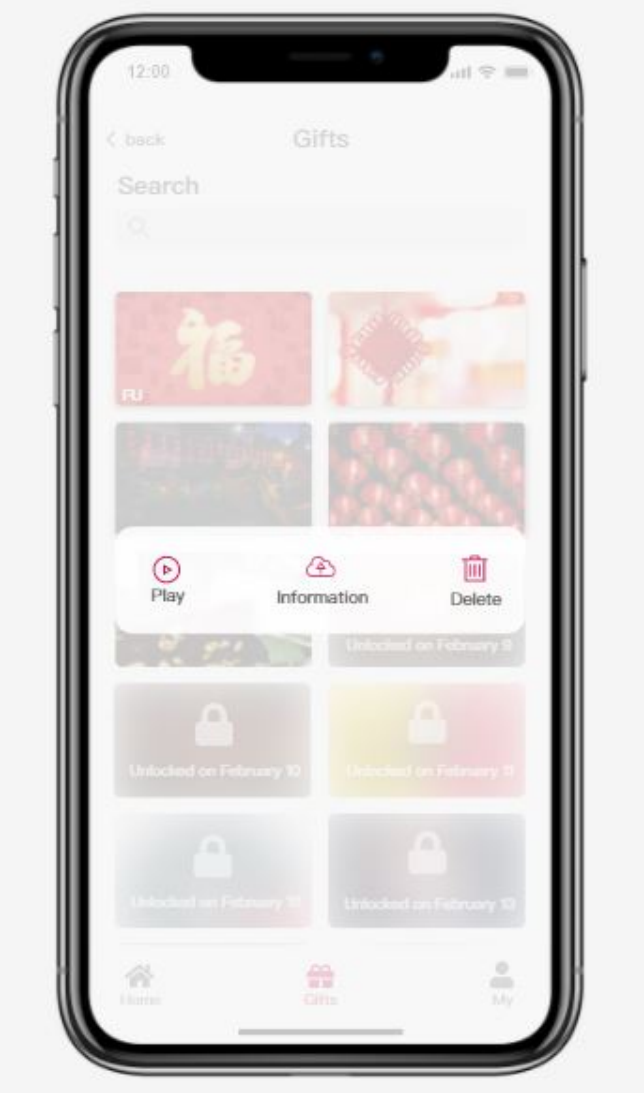


Figure 4.12 User Interface: Gifts 02

4.3.4 Launch

Photoshop and Modao[1] realize all the design and making processes of the mockup. And the launch process was not related to the coding. The launch of the application and the user interaction of the smart mirror terminal was realized by Modao too. Modao is an online user interface design platform. By uploading the pictures and adding different modules, designers can easily create a user interface mockup. By installing Modao in other intelligent devices (like smartphones), designers can run the interface design project on the smartphone directly. Thus the interface of the application can be operated and interacted as a true application without any coding.

4.4. Functional Prototype

4.4.1 Concept

Corresponding to the design concept, the service will give users daily surprises from the sense of sight, hearing and smell. The functional prototype will realize the experience by different smart devices and provide users with a complete and smooth service experience.

The user interaction part I developed with the touch screen to simulate the operation on the smart mirror. And for the sight part, the hologram is a good solution for the display of visual decoration. There are already smart speakers and smart aroma diffusers that can be connected to the smart home system to achieve the function of hearing and smell.

4.4.2 Contents Design

Coincident with the virtual experience prototype, I took the Chinese Spring Festival as the theme to conduct content design. First, I defined the span of the festival season. I divided it into different phases to have the corresponding content design.

Take the Spring Festival (Chinese New Year) in 2021 as an example. The

1 https://modao.cc/

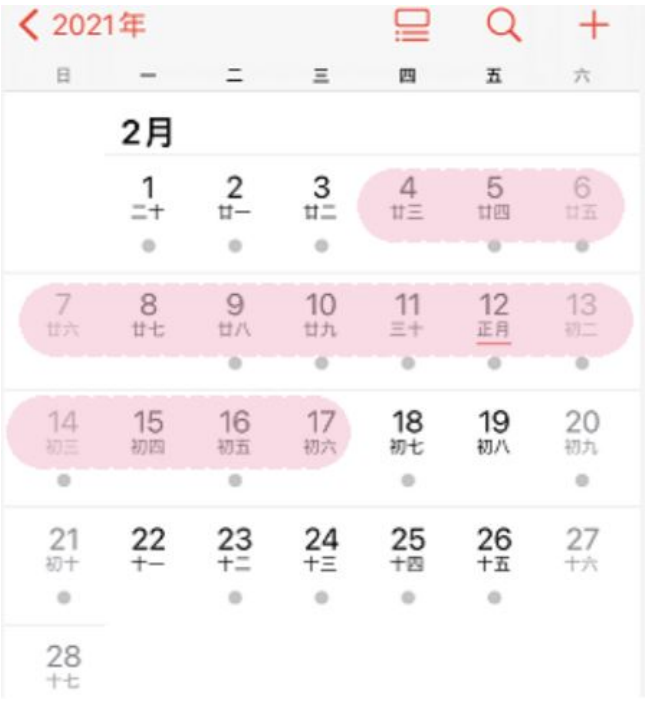


Figure 4.13 Dates of Spring Festival in 2020

national holiday started on 11th Feb and ended on 17th Feb. The traditional Spring festival season starts from the 4th. People call this day "Xiao Nian", which means the mini spring festival day. People usually begin to prepare for the festival from this day. The most important day during the whole festival period is the 12th. This day means the old year has passed, and the new year comes.

The whole festival season takes 14- days. It is a relatively long span, and the festival atmosphere changes during the entire season. Thus, I divided the festival season into three phases. The first phase is the run-up phase, and it is from the 4th to the 9th, which takes six days. And in phase one, the surprises are designed as some decorations used during the festival. And also aroma and songs to create the atmosphere that the festival is coming.

Day 1: "Fu" virtual decoration

"FU" is a normal and essential decoration in the Spring Festival. People always decorate it on the door backward because it is pronounced like "Lucky is coming." in Chinese.

Day 2: Chinese knot virtual decoration

Chinese knots are also important to holiday elements in the Spring Festival as a symbol of Chinese traditional culture. The Chinese knot has many beautiful meanings, so hanging the Chinese knot can also mean a happy reunion and good luck in the new year. [2]

Day 3: Festival song "Chun Jie Xu Qu"

It is music that almost all Chinese people have listened to, as it is the background music of the Spring Festival Gala.

Day 4: Narcissus aroma

The blooming period of narcissus coincides with the Spring Festival. Almost every family in China will buy daffodils before the Spring Festival. When the fragrance of daffodils blooms, everyone knows that the Spring Festival is here.

Day 5: Festival song "Hao Yun Lai"

The song is another popular Spring Festival song. This song is not only cheerful, festive and peaceful and beautiful in melody, but the lyrics are also catchy, cordial, and atmospheric. [3]

Day 6: Chinese lantern virtual decoration

Red lanterns are traditional Chinese festival supplies. Whenever major festivals and good days are celebrated, many cities and towns, streets, shops, parks, and even some large buildings and private houses will hang red lanterns. The lanterns were lit up at night, and the red light was radiant, making them grand, warm, and beaming. [4]

Phase two is called the peak of the festival. It is from the 10th to the 14th. Because these days, the festival is celebrated and relevant rituals and events are most frequent. People feel the peak of the festival in these five days. So for the content design in this phase, I picked elements related to the festival traditions and customs, which people will do and experience during these days.

Day 7: Festival song"Gong Xi Gong Xi"

"Congratulations" is a Chinese New Year song that has been sung thousands

2 https://m.qbaobei.com/mipa/709163.html

3 https://bit.ly/3j7YRGS

4 https://bit.ly/3gPifqq

of times and is well-known to Chinese worldwide. They all like this popular New Year song. [5]

Day 8: Hotpot aroma

New Year's Eve Dinner, also known as New Year's Dinner, Reunion Dinner, Reunion Dinner, etc., mainly refers to the family dinner at the end of the New Year's Eve (New Year's Eve). Those who work abroad will return to their hometowns to reunite with their families before New Year's Eve. The Chinese New Year's Eve dinner is a family reunion dinner. This is the most important dinner for the family at the end of the year. And hotpot is usually an important part of the dinner. [6]

Day 9: Firecracker virtual decoration

Setting off firecrackers during the Spring Festival has a long history as a custom for Chinese people to celebrate the Spring Festival. Every Spring Festival, the lanterns are shining, and the gongs and drums hum in unison. One after another, the sound of firecrackers played the New Year's song for the boiling earth. The sky streamed brilliantly, and a hundred flowers competed for beauty, writing a happy chapter for the festive season. [7]

Day 10: Festival song"Gong Xi Fa Cai"

The lyrics and melody of "Gong Xi Fa Cai" are very well matched, with strong and distinctive national characteristics. The sentences are easy to understand and interesting, suitable for word of mouth. Andy Lau put taboo words like "Gong Xi Fa Cai" into the song to sing praises. It sounds considerate and pleasant and shares the real joy of the New Year. [8]

Day 11: Dessert aroma

Eating sweets and various desserts are a tradition during the Spring Festival. When meeting with family and friends, sharing desserts and sweets and chatting together is a custom. Also, eating sweets means sweetness in life.

Phase three is the end of the festival. It is from the 15th to the 17th. During

5 https://bit.ly/3qkDmUJ

6 https://bit.ly/2T1WLNY

7 https://bit.ly/3xLox05

8 https://bit.ly/3xJCVFX

these days, the festival almost passes and people are ready to get into their daily life and the holidays also end. So for the content design in this phase, I choose some elements that can reflect the festival's goodness and hope, making users feel good about saying goodbye to this festival and becoming more hopeful and energetic in their daily lives.

Day 12: Festival song"Cai Shen Dao"

Picking up the God of Wealth is an ancient traditional Chinese folk festival custom. This song has lots of lyrics related to the God of Wealth.

Day 13: God of Wealth virtual decoration

According to Chinese folklore, the fifth day of the first lunar month is the birthday of the God of Wealth, so after the first day of the new year, the next most important activity is to pick up the God of Wealth. On the night before the birthday of the God of Wealth, each family will set up a banquet to celebrate the God of Wealth. [9]

Day14: Festival song"Zhu Fu Ni"

This song is another popular festival song in China. This song makes a good wish for the future life of people. I picked this song at the end of the festival to make users feel hopeful for their future life even when the festival ended.

4.4.3 Equipment Assemble

I utilized different devices and assembled them to realize serious functions.

Unidirectional membrane + iPad

The existing smart mirror has its own system and can hardly be developed. Thus, to realize the functionality and interaction of the smart mirror terminal, I used the unidirectional membrane, which can work as a one-way mirror. And the iPad was used as the touch screen. When putting the iPad under the unidirectional membrane, users can see and touch the screen under the mirror simultaneously.

9 `https://bit.ly/3gNkbjq`

Figure 4.14 Unidirectional membrane + iPad

3D Hologram LED FAN

I used a 3D hologram-led fan to realize the play of virtual decoration. The 3D holographic LED fan is similar to the fan, but it does not produce wind. His core principle is to image, video, or picture materials through the rotation of the luminescent LED lamp, decomposed into a realistic lattice by software processing, and then turn the dot matrix into visible video and pictures through the rotation of the LED. [10] The device I used is from the brand Ruyuan, and its size is 45 centimeters. All the operations can be realized by application. Users can upload the video through the App or to the SD card inside the fan. And all

10 `https://www.led-lights.com/what-is-3d-hologram-led-fan-a-77`

the virtual decoration resources that I implemented were downloaded from the Ruyuan database, which is open for consumers to download and use.

Figure 4.15 3D Hologram LED Fan

Google Nest Hub

I used a Google Nest Hub to realize the play of music. Google Nest, previously named Google Home, is a line of smart speakers developed by Google under the Google Nest brand. The devices enable users to speak voice commands to interact with services through Google Assistant, the virtual assistant. Both in-house and third-party services are integrated, allowing users to listen to music, control videos or photos, or receive news updates entirely by voice. [11] By giving commands to

11 `https://en.wikipedia.org/wiki/Google_Nest_(smart_speakers)`

this smart speaker, it can play music for users. Here the model I used is Google Nest Mini H2C, blue color.

Figure 4.16 Google Nest Hub

SwitchBot Smart Humidifier

SwitchBot is a company that develops a series of smart home appliances. It has a smart home system to realize central control. Meanwhile, it also supports other existing smart home systems (like Google Home, Siri). Users can control all their intelligent furniture even if they are from different brands and platforms. With the SwitchBot App, users can manage their smart appliances and connect to other smart home systems. The smart humidifier is a production of it. It can be integrated into the smart home system and can be controlled by an application. There is an aroma slot built-in so users can enjoy different odors. Here the model I used is SwitchBot smart humidifier W0801800.

Figure 4.17 SwitchBot Smart Humidifier

Chapter 5
Proof of concept

5.1. Overview

To prove the concept and value of CELECAL, I conducted a 14-days user test on the participant's house to simulate the real service experience. All the devices, festival theme, and user interface applied in the user test part are what I assembled and designed in the prototyping part. The goals of the user test are 1. Record and analyze the user's feelings when experiencing. 2. Find out if the festival elements evoked the user's happy festival memories. 3. User's satisfaction with CELECAL.

5.2. Methods

5.2.1 Journal

The uniqueness of this service is that it is an in-home service that lasts a long time. Users can experience it several times in the time. Therefore, observation or other device-based research methods are hardly conducted. Here I designed a journal record form containing different elements: experience time, experience elements, testimonials on this service, and feelings when experiencing. In this way, I can track user's overall feelings and opinions on CELECAL effectively and orderly.

Table 5.1 Journal Record Form

Date	Experience Time	Experience Content	Testimonial	Feeling during experience

5.2.2 Interview

Corresponding to the divisions of the festival season, I arranged four interviews. The first one is a preliminary investigation, which was conducted right before the experience. The preliminary research aims at making sure the tester is the target user of CELECAL, in other words, to make sure that the tester knows about the Chinese Spring festival and has the motivation to experience it. The second interview is conducted right after the run-up phase. The goals of the second interview and the third interview is to track user's feelings and motivations for using this service. After the 14-days experience ends, the fourth interview is conducted to ask user's overall satisfaction with this service and precious moments in 14 days.

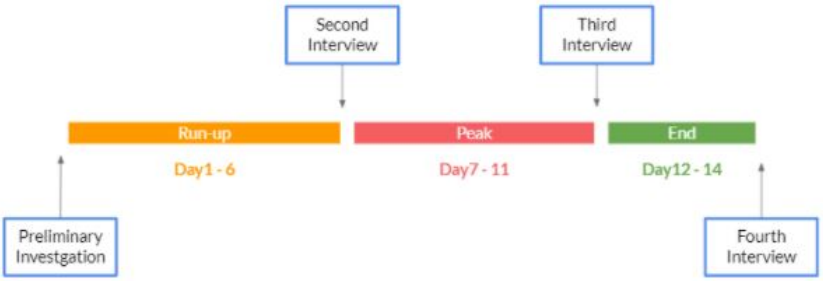


Figure 5.1 Interviews Flow

5.2.3 Survey

A survey is an excellent way to give visual assessments of this service, and it covers three dimensions. The first question is, "How satisfied were you with your experience of this service?" The answers range from 1 to 10. One means very unsatisfied, and ten means very satisfied. Question 2 is" Did you feel your stress reduced through the experience of this service?". The answers range from 1 to 10. One means not at all, and 10 means very much. Question 3 is "How likely are you to use this service in the future if possible?" The answers range from 1 to 10. One means impossible, and ten means very likely. The form of this survey is an online survey supported by Google.

5.3. Participant and Background

The participant is a Chinese who is living in Japan now. He used to live in the USA for four years and three years in Japan. Before the test began, I conducted a preliminary interview with him. He said he was interested in the festival experience and willing to join the test from the interview.

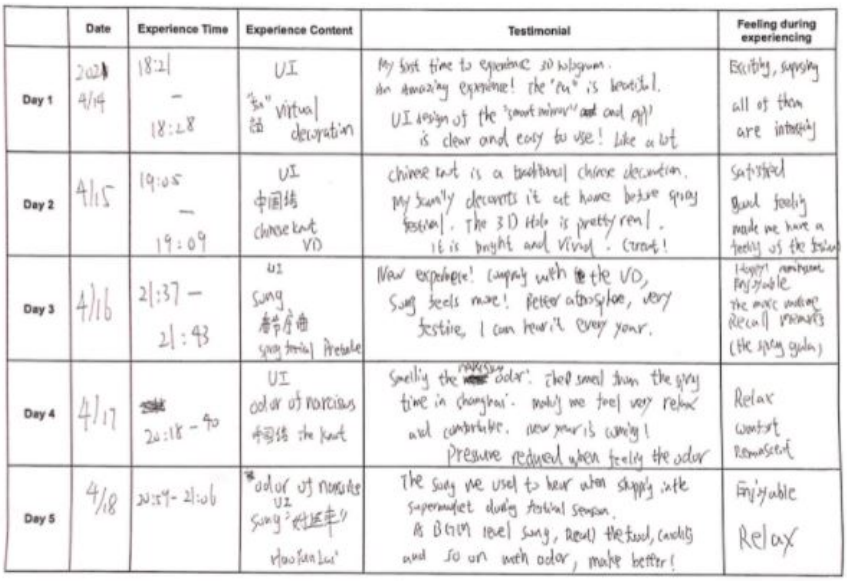
From the preliminary interview, the participant has festival experience before, and he likes to spend festivals. But when he was abroad, he didn't enjoy the festival because it was troublesome and he had no preparation time. Therefore, he thought that there will be a feeling of not passing on the tradition and will miss the motherland and family if he can not experience festivals abroad. And he is looking forward to spending festivals abroad because the festival atmosphere makes him happy.

Figure 5.2 Participant is testing the User Interface

Figure 5.3 Participant is experiencing the Virtual Decoration

5.4. Results

5.4.1 Journal



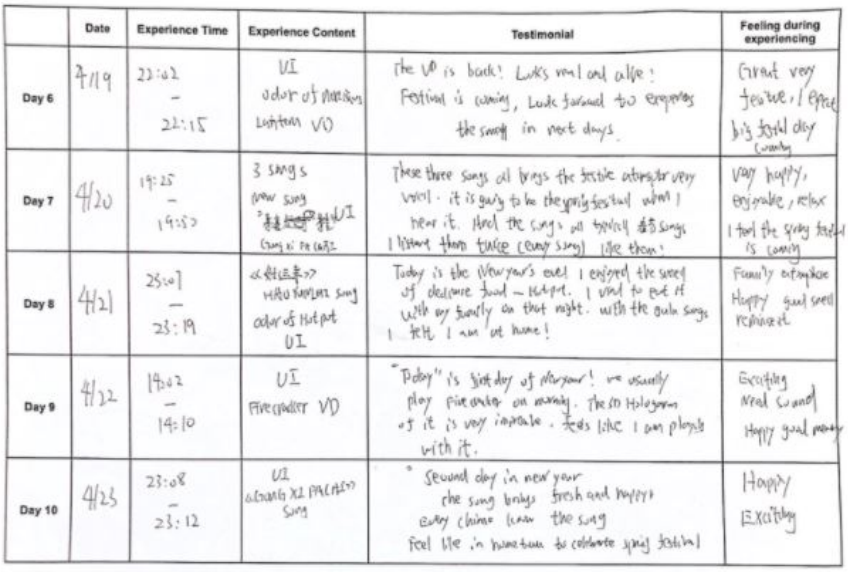
	Date	Experience Time	Experience Content	Testimonial	Feeling during experiencing
Day 1	2021 4/14	18:21 – 18:28	UI "Fu" Virtual 福 decoration	My first time to experience 3D hologram. An amazing experience! The "Fu" is beautiful. UI design of the "smart mirror" and end app is clear and easy to use! like a lot.	Exciting, surprising all of them are interesting
Day 2	4/15	19:05 – 19:09	UI 中国结 Chinese knot VD	Chinese knot is a traditional Chinese decoration. My family decorate it at home before spring festival. The 3D hole is pretty real. It is bright and vivid. Great!	Satisfied Good feeling make me have a feeling of the festival
Day 3	4/16	21:37 – 21:43	UI Sung 春节序曲 Sung festival Prelude	New experience! Company with the VD, Sung feels more! Better atmosphere, very festive, I can hear it every year.	Happy! Impressive. Enjoyable. The music making Recall memories (the spring festival)
Day 4	4/17	~~20:18~~ 20:18 – 40	UI odor of narcissus 中国结 the knot	Smelling the narcissus odor. The smell from the grey time in Shanghai. Really we feel very relax and comfortable. New year is coming! Pressure reduced when feeling the odor	Relax Comfort Reminiscent
Day 5	4/18	21:19 – 21:26	*odor of narcissus UI Sung? 财运来 Hua Sui Lai	The Sung we used to hear when shopping in the supermarket during festival season. A BIG real Sung, Real the food, candy and so on with odor, make better!	Enjoyable Relax

Figure 5.4 Journal: Day 1 to Day 5

The participant wrote about the date, experience time, testimonial, and feeling during the experience every day. Participant's experience contents changed every day, and so did the testimonial and feelings. From the experience contents recorded, the participant tried all the contents in 14 days, and he had a different testimonial every day.

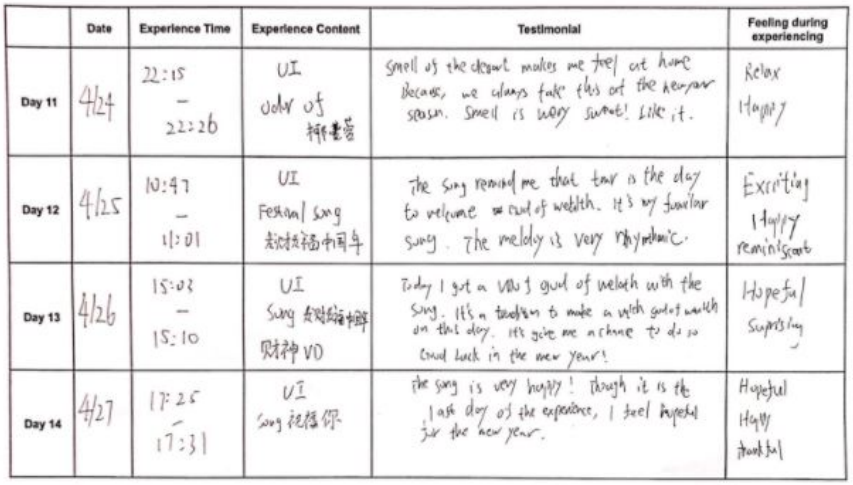
On day one, he experienced the user interface on the smart mirror terminal and the smartphone terminal, also the virtual decoration of "FU." From the testimonial, he said the 3D hologram is amazing, and he likes the user interface, which is clear and easy to use.

On day two, he experienced the user interface on the smart mirror terminal and the smartphone terminal, and the virtual decoration of the Chinese knot. From the testimonial, he said his family always decorated the Chinese knot at home during the festival, and the hologram is bright and vivid.



	Date	Experience Time	Experience Content	Testimonial	Feeling during experiencing
Day 6	4/19	22:02 – 22:15	UI odor of [illegible] Lantern VD	The VD is back! Looks real and alive! Festival is coming, Look forward to experiencing the smell in next days.	Great very festive, I expect big festival day coming
Day 7	4/20	19:25 – 19:50	3 songs New song [illegible] UI [illegible]	These three songs all brings the festive atmosphere very vivid. it is going to be the spring festival when I hear it. And the songs all typically [illegible] songs I listened them twice (every song) like them!	Very happy, enjoyable, relax I feel the spring festival is coming
Day 8	4/21	23:07 – 23:19	《[illegible]》 [illegible] song odor of Hotpot UI	Today is the New year's eve! I enjoyed the smell of delicious food – Hotpot. I wind to eat it with my family on that night. with the gala songs I felt I am at home!	Family atmosphere Happy good smell reminiscent
Day 9	4/22	14:02 – 14:10	UI Firecracker VD	"Today" is first day of New year! we usually play Firecracker on morning. The 3D Hologram of it is very impressive. feels like I am playing with it.	Exciting Need sound Happy good memory
Day 10	4/23	23:08 – 23:12	UI 《GUNG XI FACAI》 Song	Second day in new year the song brings fresh and happy every chime know the song feel like in hometown to celebrate spring festival	Happy Exciting

Figure 5.5 Journal: Day 6 to Day 10



	Date	Experience Time	Experience Content	Testimonial	Feeling during experiencing
Day 11	4/24	22:15 – 22:26	UI odor of [illegible]	Smell of the desert makes me feel at home Because, we always take this at the new year season. Smell is very sweet! Like it.	Relax Happy
Day 12	4/25	10:47 – 11:01	UI Festival song [illegible]	The song remind me that tour is the day to welcome [illegible] God of wealth. It's my familiar song. The melody is very rhythmic.	Exciting Happy reminiscent
Day 13	4/26	15:03 – 15:10	UI Song [illegible] 财神 VD	Today I got a VDO of god of wealth with the song. It's a tradition to make a wish god of wealth on that day. It's give me a chance to do so Good luck in the new year!	Hopeful Surprising
Day 14	4/27	17:25 – 17:31	UI Song [illegible]	The song is very happy! Though it is the last day of the experience, I feel hopeful for the new year.	Hopeful Happy thankful

Figure 5.6 Journal: Day 11 to Day 14

On day three, he experienced the user interface on the smart mirror terminal and the smartphone terminal. The song "Spring Festival Prelude". From the testimonial, he said he felt more and better atmosphere from the music. And the

song is one he can hear every year.

On day four, he experienced the user interface on the smart mirror terminal and the smartphone terminal, also the odor of narcissus and the virtual decoration of Chinese knot. From the testimonial, he said the smell of narcissus reminded him of spring in Shanghai, and it made him relax and comfortable. He felt the festival was coming, and his pressure also reduced.

On day five, he experienced the user interface on the smart mirror terminal and the smartphone terminal, also the odor of narcissus and the song "Hao Yun Lai". He said he used to hear this song in the shopping mall during the festival from the testimonial.

On day six, he experienced the user interface on the smart mirror terminal and the smartphone terminal, also the virtual decoration of Chinese lanterns. From the testimonial, he said he really expected to experience the smell in the next few days.

On day seven, he experienced the user interface on the smart mirror terminal and the smartphone terminal, also the song "Gong Xi Gong Xi". He said songs could bring the festival atmosphere very well from the testimonial, and he liked it.

On day eight, he experienced the user interface on the smart mirror terminal and the smartphone terminal, also the song "Hao Yun Lai"and the smell of Hot Pot. He said he felt at home from the testimonial because he used to eat hot pot with family on New Year's eve.

He experienced the user interface on the smart mirror terminal and the smartphone terminal on day eight and the firecracker's virtual decoration. From the testimonial, he said the firecracker was very impressive. He always plays the firecracker on the first day of New Year's morning. It felt like he was playing with it.

On day ten, he experienced the user interface on the smart mirror terminal and the smartphone terminal, also the song "Gong Xi Fa Cai". From the testimonial, he said the song brings happiness and freshness. He felt like he was in his hometown to celebrate the spring festival.

On day eleven, he experienced the user interface on the smart mirror terminal and the smartphone terminal, also the odor of dessert. From the testimonial, he

said the smell is very sweet and makes him feel at home.

On day twelve, he experienced the user interface on the smart mirror terminal and the smartphone terminal, also the festival song "Fa Cai Fa Fu Zhong Guo Nian". From the testimonial, he said this song reminded him the next day is the day to welcome the god of wealth. And the melody is very rhythmic.

On day thirteen, he experienced the user interface on the smart mirror terminal and the smartphone terminal, also the festival song "Fa Cai Fa Fu Zhong Guo Nian"and the virtual decoration of the god of wealth. From the testimonial, he said it is a tradition to make a wish for good fortune on this day. And this service gave him the chance to do so.

On day fourteen, he experienced the user interface on the smart mirror terminal and the smartphone terminal, also the song "Zhu Fu Ni". From the testimonial, he said this song is very cheerful. Although it was the last day of the whole festival season, he felt hopeful for the new year.

5.4.2 Memories Recalled

Also, the participant mentioned that he recalled happy festival memories during the experience. From the testimonial of Day 2, he noted that "Chinese knot is a traditional Chinese decoration. My family decorates it at home before the spring festival." From the testimonial of Day 4, he mentioned that "Smelling the narcissus, I feel like the springtime in Shanghai, which makes me feel very relaxed and comfortable." From the testimonial of Day 5 and 7, he mentioned that "The songs are which I used to hear when shopping in the supermarket during festival season, and recall me the memories of buying foods, candies; Songs bring the festival atmosphere very well." From the testimonial of Day 8, he mentioned that "I enjoyed the Smell of delicious food - Hotpot. I used to eat it with my family that night. With gala songs, I felt like I was at home! " From the testimonial of Day 9, "We usually play with firecrackers in the morning. The 3D hologram of it is very impressive; I feel like I am playing with it." From the testimonial of Day 11, he mentioned that "Smell of the dessert makes me feel at home because we usually take this at the new year season. The Smell is very sweet! Like it."

5.4.3 Emotions

Figure 5.7 Emotions Keywords Map

During the 14-days experience, the participant recorded everyday emotions during the experience by writing about the journey. Then, by analyzing the frequency of the appearance of specific words, I can learn about the representative feelings of the participant when experiencing. Word Art[1] is software that can present the terms into the visible keywords map. The more the word appears, the bigger the word appears. I inputted all the words describing the emotion from the journey into Work Art and then got a keyword map. According to the statistics, Happy appears eight times; Reminiscent appears five times; Relax, and exciting appears four times; Enjoyable appears three times; Surprised, Hopeful, and Festive appears twice; Then, Interesting, Satisfied, Good, Comfortable, Family Atmosphere; Thankful appears once.

1 https://wordart.com/

5.4.4 Results Based on Interviews

Comments on the User Interaction

From the second and final interview, the participant thought the app's design is clean and tidy, and it is easy to control everything. In addition, the smart mirror interaction is very interesting. It will remind him he has a surprise every day. It also acts as a digital calendar and mirror at the same time, so save space.

About Festival Mood

The participant said he could feel the festival mood very well through the experience from the final interview. All the elements are very representative, so when he sees/hears/ smells them, he feels like the festivals and festival memories emerge.

Improvement of Festival Experience

From the final interview, the participant said compared with before. This service helped him to improve the whole festival experience. The projection is also lifelike. He doesn't need to spend money to buy decorations. The smell is particularly novel. The entire experience is very convenient and time-saving. Compared to his previous advent calendar, this service can also add non-physical items, which is very interesting and does not take up space. As a home service, it is efficient, especially in the pandemic situation. His home happiness has also increased a lot.

Remarkable Episode

The participant said the most remarkable episode for him during the 14-days experience in the god of wealth from the final interview. He thought it is not just a decoration, it allows him to complete a ritual, and through my wishes, he feels hopeful. It makes him think that this service is not just for him to see or hear something. Still, as a member, he participates in the celebration and experience of the festival. He felt very heartwarming. Even Being so lonely abroad, he can still join in the festivals of the motherland and nation.

Stress Reduction

From the final interview, the participant also admitted this service helps reduce stress. It feels like playing a game. The festive atmosphere can make him forget his current troubles. Sometimes he even thinks that the atmosphere at home, including the festival itself, is very relaxing and pleasant. He will also think of many happy memories of the previous holidays. All of this makes him feel

comfortable and relaxed and immediately feel less pressure.

5.4.5 Results of Survey

From the question “How satisfied were you with your experience of this service?” The participant answered 10, which means very satisfied. From the question “Did you feel your stress reduced through the experience of this service?” The participant answered 7. From the question “How likely are you to use this service in the future if possible?” The participant answered 9.

5.5. Conclusion

The 14-days user test on the participant’s house to simulate the real service experience. With the methods of interviews, journal and survey, to valid the concept. From the user test results,participants said the service experience is helpful to create an enjoyable festival mood at home and showed high satisfaction with this service, which proves the concept of design.

Chapter 6
Conclusion and Discussion

6.1. Conclusion

This thesis gives a relatively complete design and user test flow to CELCAL. From the literature review and related works, point out the possibility and values of this service. From the scenario and sketches, clarify the design concept and detailed functions of this service. Through the iterations of prototypes, I realized the functionality and interactions of this service. From the user test results, participants said the service experience is helpful to create an enjoyable festival mood at home and showed high satisfaction with this service, which proves the concept of design.

Firstly, festival decoration, music and aroma are effective to trigger festival memories by stimulating the sense of sight, hearing and smell; Secondly, it is effective to create festival mood by invoking festival memories; Thirdly, CELCAL is effective to create festival mood at home and make user feel happy and relaxed.

6.2. Discussion

6.2.1 Limitations

There are limitations from two aspects. One is the prototype contents. I only have one festival theme that is used for prototype and user test. Thus, I did not test other festivals from different cultures to support my concept. The other limitation is in the thesis. I just designed and tested the function experience part but hardly realized the whole user experience and business strategy, like promotion, purchase, and service support.

6.2.2 Business Opportunities

The smart home related service is a big market, especially the pandemic which pushes the growth of this industry. For the business opportunities of CELECAL, I Would like to discuss following points:

First one is the promotion of related smart home devices. There could be an online shopping mall built in the app to provide various devices that can be used in the service. Utilize this channel, to cooperate with other smart home devices manufacturers, or develop the service's own brand.

The second business chance is the promotion of related physical goods. All the gifts that users experience in this service are not physical. Thus, it is a good chance to cooperate with product manufactures by promoting the virtual image of their goods. For example, decorations and perfume. If users show interest in those goods by the service experience, they can purchase real goods online or in the offline store.

The third business chance is the variety of themes. In this thesis I designed and tested the possibility of a festival theme, but there are still lots of moods that can be developed; like seasons theme, animal theme, entertainment theme, nature theme, etc. All of this can be designed and developed as a brand new home experience to fit different occasions and needs at home.

6.2.3 Future Work

For the user purchase part, I proposed different plans to meet the needs of different groups of people.

For the people who want to experience specific festival packages, they can purchase the festival package at a fixed price;

For the people who are happy with the experience of various interesting festivals worldwide, CELCAL will provide them with monthly and yearly subscription plans.

For those who want to integrate this service into their house and make it a daily experience, CELCAL will provide them all the devices and customized smart home systems development plans when they build or decorate their house from the very beginning—also, life-long support.

As for the future values and possible target groups of CELCAL, it not just provides people with the chance to enjoy festival mood at home easily and safely under pandemic conditions. But even after the pandemic, it is also valuable for different groups of people. For disabled people, they can enjoy the festival at home even when it's hard for them to go out.; And for foreigners living abroad, they can enjoy the celebrations of their hometown without going back; Also, this service provides the possibility for people to learn about different cultures by experiencing their interesting festivals without going abroad.

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Appendices

A. Survey on the Attitudes to Festivals

Question 1:

In which country you have stayed and how long?

Question 2:

What do you think of the traditional Chinese festival atmosphere in the country where you stayed (such as Spring Festival, Mid-Autumn Festival)?

1. The atmosphere is better than the domestic holiday atmosphere.(5.17%)
2. The atmosphere is similar to the domestic holiday atmosphere.(8.62%)
3. The atmosphere is somewhat lacking compared to domestic.(56.9%)
4. There is no such festive atmosphere at all.(29.31%)

Question 3:

Proceed only from personal wishes, without considering practical factors. What do you think about traditional Chinese festivals (such as Spring Festival, Mid-Autumn Festival, etc.) when you are abroad?

1. Want to celebrate the festival very much.(37.93%)
2. Have some thoughts about the.(41.38%)
3. It doesn't matter too much.(18.97%)
4. Not really thinking about the festival.(1.72%)
5. Don't want to spend the holidays at all.(0%)

Question 4:

Proceed only from personal wishes, without considering practical factors. The reasons why you want to spend traditional Chinese festivals abroad are

1. Feel the inheritance of traditional culture.(24.14%)

2. Relieve one's homesickness through the holidays.(62.07%)

3. Festival-related customs (making dumplings, eating moon cakes, etc.) make you feel very interesting.(50%)

4. Relaxation and joy brought by the festive atmosphere.(70.69%)

5. A good opportunity to get together with family and friends.(65.52%)

6. Other(1.72%)

Question 5:

When you spend festivals abroad, you think the difficulties you encounter are?

1.There are difficulties in purchasing festival-related items (decorations, food materials, etc.) with high prices and fewer varieties. (50%)

2. (Because of time difference and geographical distance, etc.) Unable to spend the festive season with family in China. (74.41%)

3. Unable to meet with friends for the holidays due to the impact of the epidemic. (48.28%)

4. I don't have much time and energy to make holiday-related preparations. (41.38%)

5. Traditional Chinese festivals are not legal holidays in the country where you study abroad, and you cannot rest and enjoy the festivals. (53.45%)

6. Worried about holiday customs affecting others (such as setting off fireworks). (15.52%)

7. Worried about being discriminated against. (12.07%)

8. Other(1.27%)

B. Interviews on the Attitudes to Festivals

Interviewee A

Who has overseas study experience for nine years. Six years in America and three years in Japan.

1. Will you celebrate traditional Chinese festivals abroad and which ones?

Answer: Yes, but I just celebrated them symbolically, like Spring Festival, Mid-Autumn Festival.

2. How do you celebrate those festivals abroad?

Answer: Have a meal with friends (like Chinese food, hot pot); and eat moon cakes in the Mid-Autumn Festival; watch a Spring Festival Gala in spring festival. I will go to the Chinese supermarket to prepare ingredients; WeChat transfers, and red packets

3. What do you do to celebrate festivals in China?

Answer: Also eat with friends and family; more domestic activities, fireworks, cooking, stringing relatives, receiving red envelopes (physic); playing mahjong.

4. Compared to celebrating festivals in China, what are the difficulties of celebrating festivals abroad?

Answer: Sometimes there is too much socializing in the country, not enough socializing abroad, and it is inconvenient to prepare food. Some traditional Chinese food is not available abroad. Even though I bought it, it's not conventional and the same as in China, often expensive, lousy quality (such as crab).

5. Do you feel there is a Chinese holiday atmosphere abroad? Where is it reflected?

Answer: Basically, no.

6. What Elements of the Spring Festival you experienced?

Answer: There are more hot pots when you eat Chinese food; there is no decoration; watching fireworks is like a lively atmosphere; just let it go. I will watch The Spring Festival Gala only when going to a friend's house to kill time; playing mahjong with family members: mainly for the elderly at home, other activities may not be possible, you can put down your phone. New Year's Eve will be held until midnight on the night of New Year's Eve. Taking the physical lucky money is very festive, and the money is also consecutive. It gives people a very festive and new hope. Some red envelope designs are also very beautiful.

Interviewee B

Who has half a year's overseas study experience in Japan.

1. Will you celebrate traditional Chinese festivals abroad and which ones?
Answer: Yes, like Mid-Autumn Festival, Spring Festival.

2. How do you celebrate those festivals abroad?
Answer: I lack lots of elements of the celebration abroad. So I have a meal with friends, chat with them for a celebration.

3. What do you do to celebrate festivals in China?
Answer: Spring Festival: It is a tradition, a celebration, and a childhood. You can't set off firecrackers. The Spring Festival Gala is not as attractive as it used to be, because the programs you watch from familiar TV series are also very good. Northern temple fairs have been demolished in some places and are gone, so the festivals are not as complete as a child.

4. Compared to celebrating festivals in China, what are the difficulties of celebrating festivals abroad?
Answer: No holidays, no atmosphere on the streets, and a different social atmosphere. Hard to buy the decorations, spring festival couplets, food, dumplings, and other materials. My family is not around, and most Chinese holidays are celebrated with my family. Lack of activities: there is no series of celebration ceremonies

5. Do you feel there is a Chinese holiday atmosphere abroad? Where is it reflected?
Answer: No.

6. What Elements of the Spring Festival you experienced?
Answer: Watching the Spring Festival Gala with your loved ones on the big screen; eating Chinese dumplings; holidays; setting off firecrackers (watching fireworks); giving cash: the envelopes of lucky money have auspicious patterns and are festive; the unpacking experience is very good, and I feel like grabbing the

money I'm in my hands; but it's also fun to grab red envelopes online, and it's also a reflection of the taste of the year, which can trigger discussions and bring people closer together.

Interviewee C

Who has 2 year's overseas study experience in Japan.

1. Will you celebrate traditional Chinese festivals abroad and which ones?

Answer: Yes, Spring Festival, New Year's Day.

2. How do you celebrate those festivals abroad?

Answer: Eat at home with classmates, buy and cook at home, eat Chinese food.

3. What do you do to celebrate festivals in China?

Answer: During the Spring Festival, I went back to my hometown because the old (like grandfather and mother) are in the hometown, and visited relatives.

4. Compared to celebrating festivals in China, what are the difficulties of celebrating festivals abroad?

Answer: It is not convenient to eat Chinese food. There is no holiday. During the Dragon Boat Festival, I would like to eat zongzi, but it is troublesome to buy ingredients. Meanwhile, the price is high, and I can't usually buy it. The holiday will have a sense of ceremony. If you live alone, it's troublesome to spend the festival with other people. It doesn't matter to celebrate or not if you live alone. I am always too busy and lazy to prepare.

5. Do you feel there is a Chinese holiday atmosphere abroad? Where is it reflected?

Answer: Not as well as domestic

6. What Elements of the Spring Festival you experienced?

Answer: Hot pot; dumplings hand-made by the family; playing mahjong (sometimes I play); set off firecrackers (I want to set it up by myself); couplets, New

Year's Eve Gala; lucky money(physical and intangible); Visit relatives.

C. Interviews during 14-days Testing

Preliminary Interview

1: Have you ever had a holiday experience?

Answer: Yes, such as Spring Festival, Mid-Autumn Festival, National Day.

2: Do you like festivals? Why?

Answer: I like it, because I can rest at home during vacation and thus very happy.

3: So when you are abroad, do you celebrate those festivals?

Answer: No. The festivals need time to prepare decorations and food, etc. If there are no holidays, there is no time to prepare. So it's very troublesome and can't experience the festival abroad.

4: What's the impact if you can't experience it?

Answer: If not, there will be a feeling of not being able to pass on the tradition, and will miss the motherland and family.

5: Do you want to experience the festive atmosphere abroad? why?

Answer: Yes, because the festive atmosphere makes me happy. And I think that Chinese festival should be celebrated no matter where I am. This is my identity as a Chinese.

Second Interview

1. Can you feel the atmosphere of upcoming festival through these days' experience?

Answer: When I see, hear, smell, there is a festive atmosphere.

2. What's your feeling after receiving and experience those surprises these days?

Answer: Very surprised and happy.

3. Are you going to decorate them at home after receiving them?

Answer: 100% I will continue to decorate them after they are received, because they are very representative of festival elements.

Third Interview

1. Can you feel the peak of the festival's atmosphere through those days' experience?

Answer: I feel that the festival has reached its peak, because I usually see it during the New Year, and the songs I hear have been experienced in different forms. Songs such as Congratulations and Fat Choi, firecrackers are set off on New Year's Day. This tradition is the climax of the festival. It will be there, so it makes me feel that the festival has reached its climax.

2. Any other comments?

Answer: Although the climax of the festival has passed, I still look forward to what surprises I will receive in the next few days.

Fourth Interview

1. Commonts on the User interaction

Answer: The interface design of the app is very clean and tidy. I think it's easy to control everything, and I like it very well. The smart mirror interaction is very interesting. It will remind me I have a surprise every day. If all the things are on the phone. I think I will forget. And the smart mirror is cool. It acts as a digital calendar and mirror at same time, so save space. I like it.

2. Through these days' experience, did you feel festival mood?

Answer: Yes, I can feel the festival mood very well. The virtual decorations, songs, and the smells, all the elements are very representative, because they are all indispensable thing in Chinese New Year. So when I see/hear/ smell them, I feel like it's the festivals, and festival memories emerges.

3. What episode you think is most precious?

Answer: The God of Wealth. This is a very surprising point for me because welcome and make a wish to the God of Wealth a tradition during the spring festival. Through the 3D projection and songs of the God of Wealth, it is not just a decoration, it allows me to complete a ritual, and through my wishes, I feel hopeful. It makes me feel that this service is not just for me to see or hear something, but as a member, I really participate in the celebration and experience of the festival. This experience is very real and makes me feel very heartwarming, even Being so lonely abroad, I can still participate in the festivals of the motherland and nation.

4. Do you think this service helps you to improve your festival experience, compared with before? and in which aspect?

Answer: Yes, in terms of atmosphere, I don't need to search and select the background music by myself, and the projection is also lifelike. I don't need to spend money to buy decorations. The smell is particularly novel. I never thought that this way can bring me a festive atmosphere. The whole experience is very convenient and time-saving, I don't need to prepare. The way of daily surprise brings new surprises every day, which are unexpected things, and I look forward to them every day. Compared to my previous advent calendar, this service can also add non-physical items, which is very interesting and does not take up space. As a home service, it is very practical, especially in the pandemic situation, so that my home happiness has also increased a lot.

5. Do you think this service helps you to reduce your stress? And why?

Answer: Yes, It feels like playing a game. The festive atmosphere can make me forget my current troubles. Sometimes I even think that the atmosphere at home, including the festival itself, is very relaxing and pleasant. I will also think of many happy memories of the previous holidays. All of this makes me feel happy and relaxed, and immediately feel less pressure.

6. Are there some points that dissatisfied you with this service?

Answer: No, I like it very much.

D. Surprises of 14-days

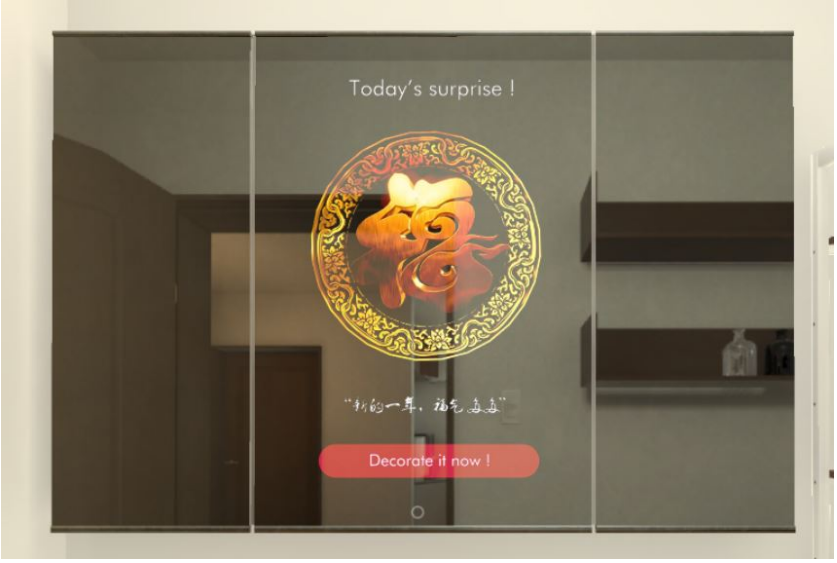

Figure D.1 Day 1: "Fu" virtual decoration

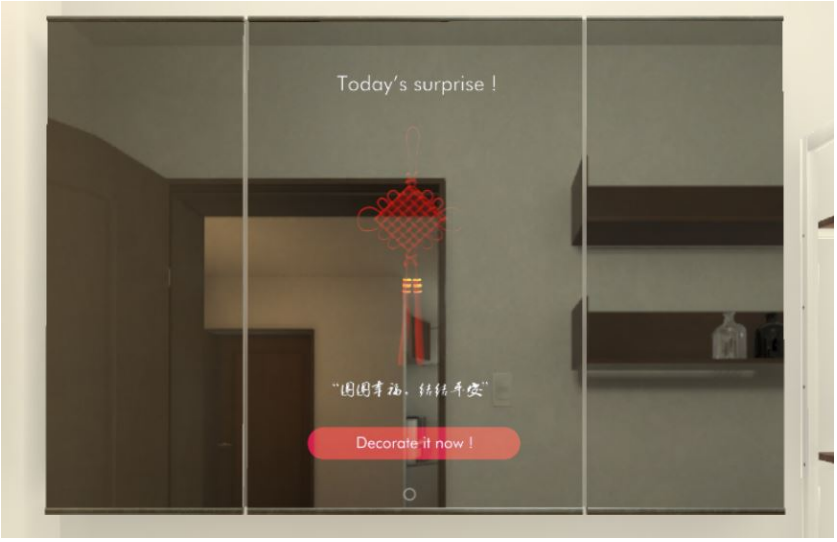

Figure D.2 Day 2: Chinese knot virtual decoration

Figure D.3 Day 3: Festival song "Chun Jie Xu Qu"

Figure D.4 Day 4: Narcissus aroma

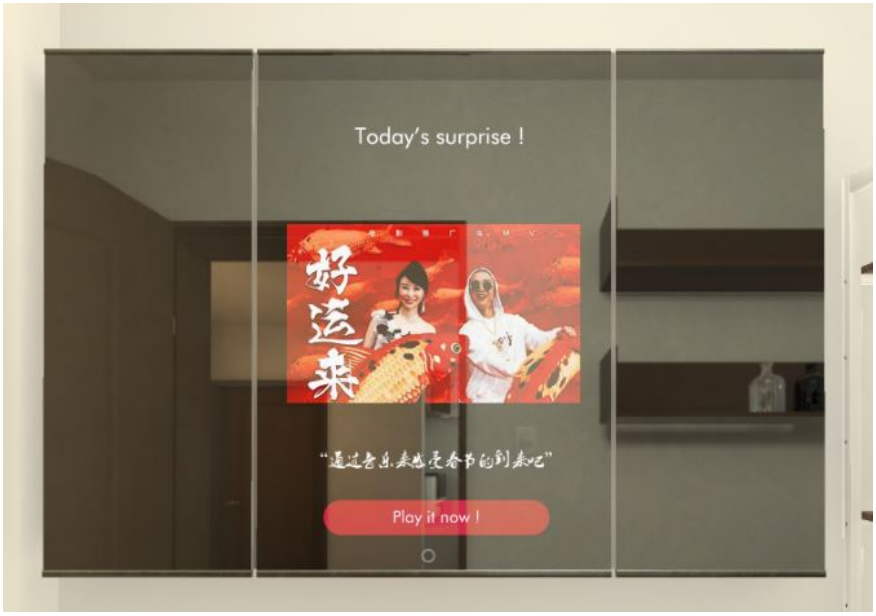

Figure D.5 Day 5: Festival song "Hao Yun Lai"

Figure D.6 Day 6: Chinese lantern virtual decoration

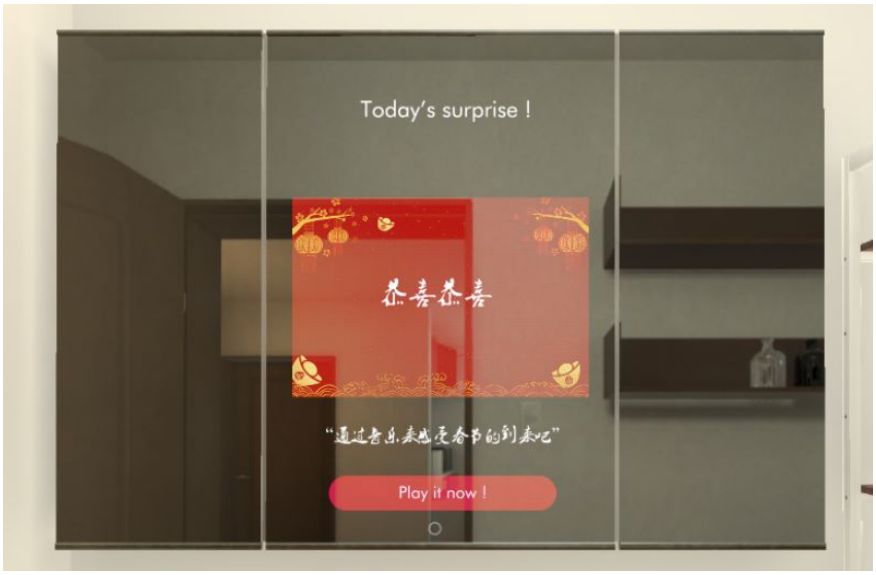

Figure D.7 Day 7: Festival song"Gong Xi Gong Xi"

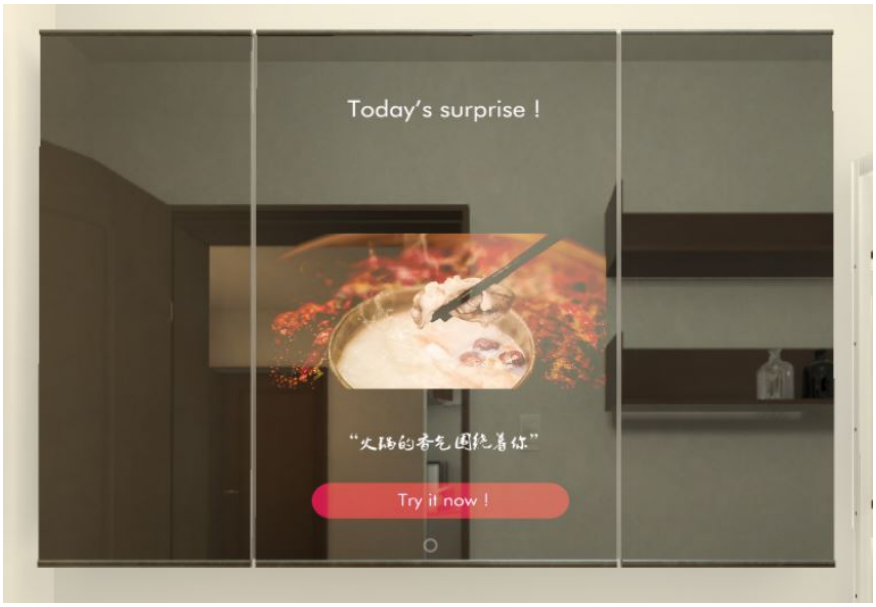

Figure D.8 Day 8: Hotpot aroma

Figure D.9 Day 9: Firecracker virtual decoration

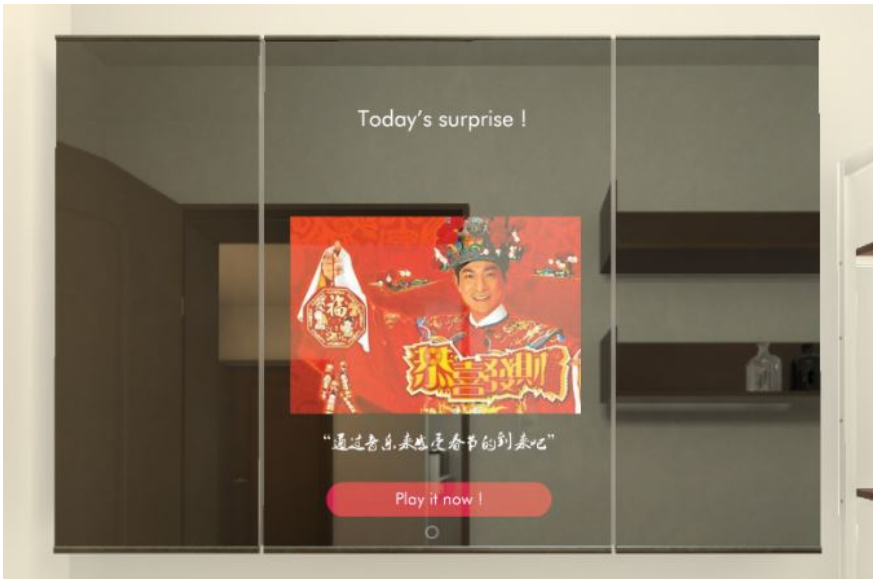

Figure D.10 Day 10: Festival song"Gong Xi Fa Cai"

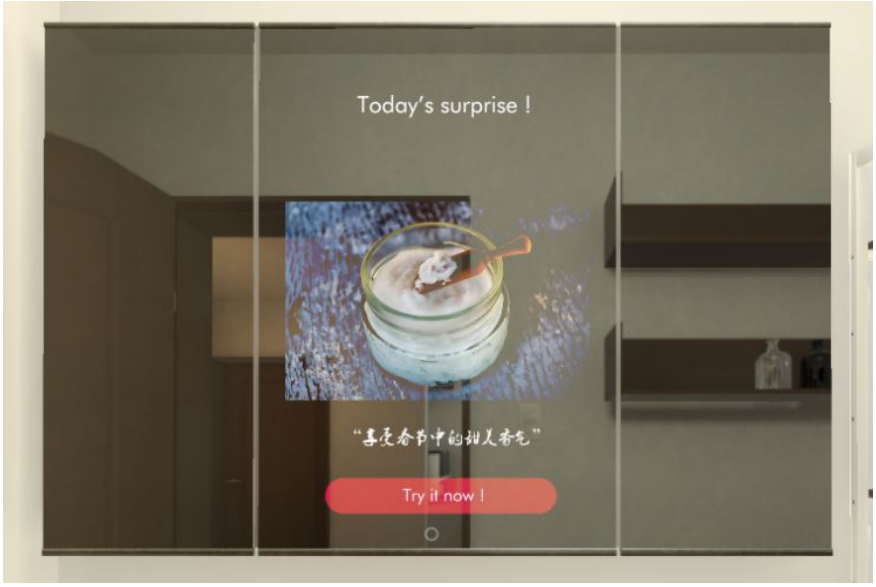

Figure D.11 Day 11: Dessert aroma

Figure D.12 Day 12: Festival song"Cai Shen Dao"

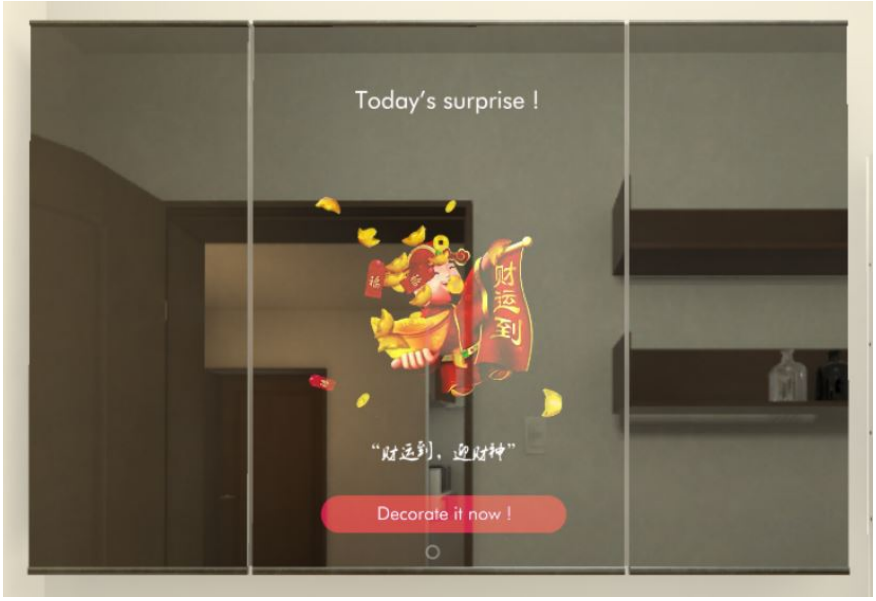

Figure D.13 Day 13:God of Wealth virtual decoration

Figure D.14 Day 14: Festival song"Zhu Fu Ni"