

Title	Designing an audio-based mobile virtual pet game application
Sub Title	
Author	Pao, Jennie(Inakage, Masahiko) 稲蔭, 正彦
Publisher	慶應義塾大学大学院メディアデザイン研究科
Publication year	2012
Jtitle	
JaLC DOI	
Abstract	<p>Our project, ARound.hear aims to create innovative tools of communication that can provide social entertainment to its users through access of ambient sound. We noticed that most audio-based games that are available in the mobile game market are instrumental games. Few non-instrumental audio-based mobile games can be found. We thus began working on the design of audio-based mobile games. This thesis will discuss the preliminary design of Ambee Planet, an audio-based mobile virtual pet game application in detail and explore its future potential.</p> <p>Mobile games 'casual nature means that simple games are in demand, but a game that is too simple becomes boring. The goal of this thesis is to depict the design of an audio-based mobile virtual pet game that is simple, yet complicated enough to engage the mass market game users. The author of this thesis proposes to structure Ambee Planet's audio-based game design through three steps: first, creating an audio-based mobile virtual pet game through modifying the structure of a mobile typical virtual pet game, second, designing audio-based human-pet interactions and third, determining as well as implementing an appropriate level of challenge.</p> <p>An interactive prototype was created in order to test whether the mobile virtual pet game design constructed using the concepts above would be able to effectively engage mass market users. The prototype's basic structure and its underlying theme remained the same as a typical virtual pet game. Three types of audiobased interactions, sound database real sounds input, human voice input and paired random output were implemented in the prototype. The International Hobo audience model groups game players in four categories: Hardcore Gamers, Testosterone Gamers, Lifestyle Gamers and Family Gamers. Thirteen users, selected from the four gamer types participated in the user testing sessions. The research results indicate positive response to the Ambee Planet's audio-based design from participants of all four gamer-type groups, of both genders and of all age groups. The results also indicate that the female audience is more fitting than the male audience because the female audience is more likely to respond to a virtual pet's emotional feedbacks than the male audience. Although Ambee Planet's game design was predicted to be incapable of engaging Hardcore Gamers who frequently play complex games that only skillful players may advance to the next level, the female Hardcore Gamer who participated in the test expressed strong interest in the game. Furthermore, although the author set out to determine the appropriate level of challenge for the game, the results indicate that implementing an appropriate level of game complexity may be more important than implementing an appropriate level of game challenge in a virtual pet game, where the goal of the game is to establish a relationship between a virtual pet and its owner.</p> <p>Ambee Planet is an innovative tool of communication. It is a virtual pet game application that allows its users to interact with virtual pet characters through the use of sound. Though further developments are still needed, results of the research show that Ambee Planet's game design can effectively engage female mass market game users. It is a new tool of communication. It will make communication between a human and a virtual pet more enjoyable.</p>
Notes	修士学位論文. 2012年度メディアデザイン学 第249号
Genre	Thesis or Dissertation
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO40001001-00002012-0249

慶應義塾大学学術情報リポジトリ(KOARA)に掲載されているコンテンツの著作権は、それぞれの著作者、学会または出版社/発行者に帰属し、その権利は著作権法によって保護されています。引用にあたっては、著作権法を遵守してご利用ください。

The copyrights of content available on the KeiO Associated Repository of Academic resources (KOARA) belong to the respective authors, academic societies, or publishers/issuers, and these rights are protected by the Japanese Copyright Act. When quoting the content, please follow the Japanese copyright act.

Master's Thesis
Academic Year 2012

Designing an Audio-based Mobile Virtual Pet
Game Application

Graduate School of Media Design,
Keio University

Jennie C. Pao

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

Jennie C. Pao

Thesis Committee:

Professor Masa Inakage	(Supervisor)
Professor Akira Kato	(Sub Supervisor)
Project Senior Assistant Professor Atsuro Ueki	(Sub Supervisor)

Abstract of Master's Thesis of Academic Year 2012

Designing an Audio-based Mobile Virtual Pet Game Application

Summary

Our project, *ARound.hear* aims to create innovative tools of communication that can provide social entertainment to its users through access of ambient sound. We noticed that most audio-based games that are available in the mobile game market are instrumental games. Few non-instrumental audio-based mobile games can be found. We thus began working on the design of audio-based mobile games. This thesis will discuss the preliminary design of Ambee Planet, an audio-based mobile virtual pet game application in detail and explore its future potential.

Mobile games' casual nature means that simple games are in demand, but a game that is too simple becomes boring. The goal of this thesis is to depict the design of an audio-based mobile virtual pet game that is simple, yet complicated enough to engage the mass market game users. The author of this thesis proposes to structure Ambee Planet's audio-based game design through three steps: first, creating an audio-based mobile virtual pet game through modifying the structure of a mobile typical virtual pet game, second, designing audio-based human-pet interactions and third, determining as well as implementing an appropriate level of challenge.

An interactive prototype was created in order to test whether the mobile virtual pet game design constructed using the concepts above would be able to effectively engage mass market users. The prototype's basic structure and its underlying theme remained the same as a typical virtual pet game. Three types of audio-based interactions, sound database real sounds input, human voice input and paired random output were implemented in the prototype. The International

Hobo audience model groups game players in four categories: Hardcore Gamers, Testosterone Gamers, Lifestyle Gamers and Family Gamers. Thirteen users, selected from the four gamer types participated in the user testing sessions. The research results indicate positive response to the Ambee Planet's audio-based design from participants of all four gamer-type groups, of both genders and of all age groups. The results also indicate that the female audience is more fitting than the male audience because the female audience is more likely to respond to a virtual pet's emotional feedbacks than the male audience. Although Ambee Planet's game design was predicted to be incapable of engaging Hardcore Gamers who frequently play complex games that only skillful players may advance to the next level, the female Hardcore Gamer who participated in the test expressed strong interest in the game. Furthermore, although the author set out to determine the appropriate level of challenge for the game, the results indicate that implementing an appropriate level of game complexity may be more important than implementing an appropriate level of game challenge in a virtual pet game, where the goal of the game is to establish a relationship between a virtual pet and its owner.

Ambee Planet is an innovative tool of communication. It is a virtual pet game application that allows its users to interact with virtual pet characters through the use of sound. Though further developments are still needed, results of the research show that Ambee Planet's game design can effectively engage female mass market game users. It is a new tool of communication. It will make communication between a human and a virtual pet more enjoyable.

Keywords:

Virtual Pet Game, Mobile Game Design, Audio-based Game, Game Sounds, Smartphone Application, Demographic Game Design

Graduate School of Media Design, Keio University

Jennie C. Pao

Table of Contents

1.	Introduction	1
1.1.	Background and Motivations	1
1.2.	Flow of the Project	2
1.3.	Thesis Objectives	2
1.4.	Definitions	4
2.	Literature Review of Game Design	6
2.1.	Mechanics of Game Design	6
2.2.	Demographic Game Design	7
2.3.	Designing for Fun: Flow - The Psychology of Optimal Experience	10
3.	Existing Virtual Pet Games	12
3.1.	Owner-pet-play Games	12
3.2.	Task-completing Games	14
3.3.	Competition-with-other-pets Games	16
4.	Design Concepts of Ambee Planet	20
4.1.	Being Innovative	20
4.2.	Simplicity Design: Finding the Right Formula	20
5.	Implementations of Ambee Planet's Design Concepts	24
5.1.	Storytelling	24
5.2.	Character Design Workshop: Creativity Box	27
5.3.	Interactive Prototype	28
5.3.1	User Interface	28

5.3.2	Character Design	29
5.3.3	Audio-Based Interactions	33
5.3.4	Rule of the Game	37
6.	User Testing and Evaluation	42
6.1.	Scope, Methodology and Significance	42
6.2.	The Experiment	45
6.3.	Results	48
6.3.1	Hardcore Gamers	48
6.3.2	Testosterone Gamers	49
6.3.3	Lifestyle Gamers	50
6.3.4	Family Gamers	52
7.	Discussion	54
7.1.	Findings	54
7.2.	Limitations	56
7.3.	Significance	56
8.	Conclusion	57
8.1.	Ambee Planet, a Simple yet Engaging Audio-based Mobile Virtual Pet Game	57
8.2.	Future Works	58
	Acknowledgements	59
	References	60
	Appendix	62
9.	Content of User Testing and Evaluation Session - Hardcore Gamer, Testosterone Gamer and Lifestyle Gamer	63
A.	Interview - User Profile	63

A.1	Sound Database	63
A.2	Video Games	64
A.3	Mobile Games	64
B.	Prototype Evaluation - Map Feed	65
C.	Prototype Evaluation - Lullaby Feed	65
D.	Prototype Evaluation - Exercise	65
E.	Interview - Overall Evaluation	65
10.	Content of User Testing and Evaluation Session - Family	
	Gamer	68
A.	Interview - User Profile	68
A.1	Sound Database	68
A.2	Video Games	69
A.3	Mobile Games	70
B.	Prototype Evaluation - Map Feed	70
C.	Prototype Evaluation - Lullaby Feed	70
D.	Prototype Evaluation - Exercise	70
E.	Interview - Overall Evaluation	71

List of Figures

1.1	A Schematic Diagram of the Original Ideas in ARound.hear	3
1.2	Project Flow of ARound.hear	3
2.1	An Audience Model Used by Electronic Arts as Discussed by Richard Leinfellner at GPDC in 2003	8
2.2	The Audience Model Used by International Hobo from 2000-2003	9
2.3	Flow by Csikszentmihalyi	11
3.1	Interface of Virtual Pet Game Kimimon	14
3.2	Screenshot of Virtual Pet Game Nadenade Fuwamu	15
3.3	Interface of Pocket Frogs	16
3.4	Interface of Pets LIVE	17
3.5	Screenshot of Petdash	18
3.6	Representation of Derby Quest Horse Racing Game's Interface . .	18
3.7	Screen Shot from My Horse	19
3.8	Screen Shot from Race Horses Champions	19
4.1	Function Map of a Typical Virtual Pet Game	22
4.2	Modified Function Map, Function Map of An Audio-based Virtual Pet Game	23
5.1	Storyboard of Our Intended Animation Concept Video	26
5.2	Characters Designed by Participants of Creative Box Workshop .	27
5.3	Initial User Interface Design of Ambee Smartphone Pet Application	28
5.4	Image of Venusian Pepot, Original Character of Ambee Planet . .	29

5.5	Image of Jupiterian Kooookie, Original Character of Ambee Planet	30
5.6	Image of Mercurian Cuppa, Original Character of Ambee Planet .	31
5.7	Image of Martian Kizmak, Original Character of Ambee Planet .	32
5.8	Image of Saturnian Buddy, Original Character of Ambee Planet .	32
5.9	Function Map of Ambee Planet	33
5.10	Audio-Based Interactions Implemented in Ambee Planet’s Prototype	34
5.11	Sound Tags in The Free Sound Project Website	35
5.12	Freesound’s Geotagged Sound World Map	35
5.13	Using a Sound Map to Locate a Sound Energy Source for Kizmak in the Map Window	36
5.14	Kizmak Listens Attentively to Player’s Singing in the Lullaby Window	36
5.15	Kizmak Receives a Kiss from Another Virtual Pet in the Exercise Window	36
5.16	Kizmak’s Emotional Feedbacks Implemented in Ambee Planet’s Interactive Prototype	37
5.17	Character Selection Screen of Ambee Planet’s Interactive Prototype	38
5.18	Game Features of Ambee Planet’s Interactive Prototype	38
5.19	A Tumor Growing on Kizmak	39
5.20	Display of Ambee Character Collection and Contact Home Planet Button in the Contact Window	40
5.21	Visual Representation of the Relationship between the Dark Force and Good Ambees on Planet Sonas	41
6.1	Participant Profile Chart of Ambee Planet’s User Evaluation . . .	43
6.2	GO-Gulf.com’s Data on Smartphone Penetration Age Group . . .	44
6.3	A Baby Playing with Ambee Planet’s Interactive Prototype on MacBook Pro	44

1. Introduction

1.1. Background and Motivations

Working under Social Entertainment Project at Keio University Graduate School of Media Design, we have continuously sought ways to create new channels for communication. *ARound.hear* is a subproject, which aims to create a communication tool that provides social entertainment to its users through access of ambient sound. In *ARound.hear*, our members share an interest of exploring the possibility of audio usage. Because mobile phone is the one device that people carry at all times and to various locations, smartphone application naturally became the medium of our design. We noticed that audio is often featured in game applications, but it generally plays a small part in game design. We also noticed that the most commonly seen sound-interactive smartphone applications currently in the market are music players and instrumental applications. A music player is a practical device, which allows users to turn on music and make limited adjustment. An instrumental smartphone application provides users an interface that enables its user to use preset digital sounds to generate musical output. Other than those mentioned above, few sound-interactive smartphone applications could be found. Therefore, we began working on the idea of an audio-based form of entertainment.

We knew that we wanted to design an innovative audio-based media. Nevertheless, on top of making a smartphone application design, what we do in the project is admittedly shaped by the nature of the program. Each semester, a number of newly enrolled students join this project when a number of students depart due to graduation. Hence, a concern of length of the academic program and repeated

replacement of members leading to indefinite stagnation of the works done previously arises. In order to overcome such problem, we set our goal to developing a product with an external business corporation so that we could hatch a design, which will forego in the real market despite our members' departure from the project. Because partnership implementation appears to be as eloquent as product design implementation itself, the base of our design will be developing an idea that would help boost an external partner's business.

1.2. Flow of the Project

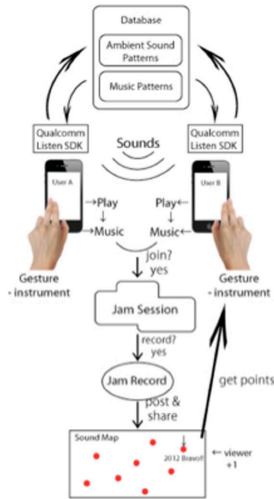
The name, Ambee is derived from the word, ambient. We chose this name because the use of ambient sound is a strong interest of our team members. Two separate ideas, Jambee and Ambee Planet(Figure1.1) are being developed in our project group. While both applications are meant to be virtual pet games, the main features of the two are different. Jambee is a smartphone pet game application that allows players to compete in a music jam session. And Ambee Planet is a smartphone virtual pet game application that allows players to explore sounds recorded from different parts of the real world.

Our project progresses in three major directions: business proposal, smartphone application design and researching and prototyping. While we meet periodically to pitch our ideas to potential sponsors, we continue to work on creating and finding ways to showcase our ideas. The flow of our project is explained in the diagram below (Figure1.2).

1.3. Thesis Objectives

Mobile games' casual nature means that simple games are in demand, but a game that is too simple becomes boring. This thesis proclaims that an audio-based mobile virtual pet game that is simple yet engaging enough to the mass market

Real-time Sound Jam Session



Pet Life & Mini Games



Figure 1.1: A Schematic Diagram of the Original Ideas in ARound.hear

Flow of the Project

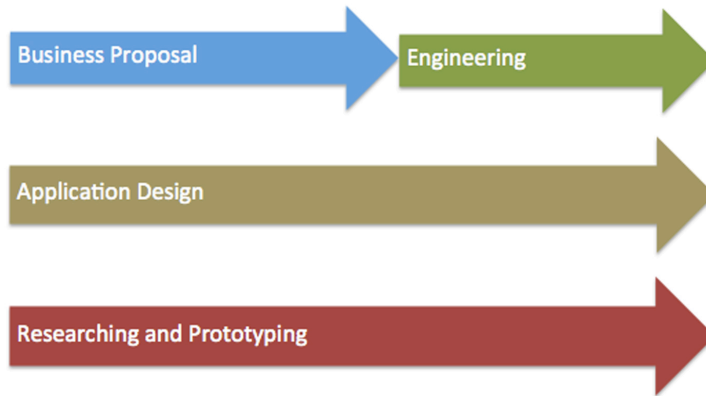


Figure 1.2: Project Flow of ARound.hear

gamers can be achieved through first, creating an audio-based mobile virtual pet game through modifying the structure of a mobile typical virtual pet game, second, designing audio-based human-pet interactions and third, determining as well as implementing the appropriate level of challenge.

Existing mobile virtual pet games have similar components. These components are examined in this thesis. The author first draws a model of typical mobile virtual pet games from making observation of existing mobile virtual pet games. Audio-based interactions are then incorporated into the model created. And because Csikszentmihalyi's Flow Theory implies that having an appropriate level of challenge is the key to creating an enjoyable experience, a basic level of challenge was implemented in an interactive prototype and evaluated by users as the core of the study.

This thesis describes the components of Ambee Planet's interactive prototype in detail. It assesses the concepts proposed above through user testing and evaluation sessions. The user testing and evaluation sessions carried out aimed to find out general responses from potential users: whether they felt comfortable with making interactions with a virtual pet character through the usage of sound, whether they enjoyed playing the audio-based game represented by the prototype, and whether they could see themselves playing the game when it is competed. Following the concept of demographic game design, the concept of achieving successful game design by satisfying the needs of the targeted audience, the user testing sessions also set out to identify the fitting audience group. It aimed to uncover the future direction of Ambee Planet, of how the application's preliminary design could be improved in the future.

1.4. Definitions

In this thesis, a "virtual pet game" is defined as "a digital game, in which one or more virtual characters require consistent nurturing actions from its players".

Although video games of almost all genres feature virtual characters, games that include graphic design of pet-like characters but do not require users' nurturing actions are not considered as virtual pet games in this thesis. An "audio-based game" is defined as "a digital game, in which human-computer interactions are primarily controlled by audio input or output". An audio-based game may include both visual and audio features. It should be segregated from an *audio game*, which originally started out as 'blind accessible'-games and tend to be audio-only games with no screens. "Level of challenge" is defined as "level of difficulty in an undertaking that is stimulating to one engaged in it". "Fun" and "enjoyable" have interchangeable meanings in this thesis. Both words are meant to reflect the nature of gameplay: "delight and pleasure".

2. Literature Review of Game Design

2.1. Mechanics of Game Design

Game design is a creative process that can be done in numberless ways. Though it is difficult to find one formula that can be applied to all types of games, this section will review components that are commonly present in game design: form of challenge and display of achievement.

The stimulation that we feel when we make an effort to overcome a challenge is one reason why a game is enjoyable. The presence of a challenge is essential in a game. Though there are various types of video games and it is difficult to list all types of challenges that appear in them, a pattern can still be found. An in-game challenge can broadly be divided into two categories, pathfinding and housekeeping. Pathfinding activities involve the player actively attempting to locate the fastest method of game progression. Housekeeping activities involve the player exploring in a more circular manner, becoming familiar with an area and its contents. The vast majority of games feature both housekeeping and pathfinding activities. The balance tends to be generated by level design philosophy and structural design. Pathfinding and housekeeping play styles give the game designer what is possibly their most powerful tool for game pacing (Bateman [1]).

A display of achievement is another essential element in game design. Achievement is a reflection of a player's time spent in the game; being recognized for an achievement is a core desire reflected in almost all humans. Point system is a great way to display player's in-game achievement. And it allows the game

designer to see how players are interacting with the system, design for outcomes and make appropriate adjustments. Achievement is often displayed in points, but it is often displayed in level and leaderboard in games. SASP, short for status, access, power, and stuff is what people compete for in a game. A reward system is also an useful tool that can be used to display achievement. It is a motivator. It adds depth to a game and makes the game more dynamics. There are many types of reward systems; common ones include gifting, collecting, pattern recognition, surprise and unexpected delight, flirtation and romance, being a hero, recognition of achievement, leading others, fame, getting attention, gaining status (Zichermann [10]). In a virtual pet game's case, one's achievement is often displayed in the pet's growth.

2.2. Demographic Game Design

In *21st Century Game Design*, Bateman talks about satisfying the needs of the targeted audience as a criteria for successful design. Demographic design is “the game design inherently targets an audience, and therefore the success criterion for a design is how effectively it satisfies the needs of that audience” [1]. When it comes to gamification design, like all other designs, it is important to know whom we are designing for so that we can *design for success*.

Bateman went on to explain two audience models: the Electronic Art's audience model classifies game players in three clusters: Hardcore gamers, Cool gamers and Mass Market Casual gamers (Figure2.1). Hardcore gamers read the specialist press, play demos, rents games before buying and can play as many as twenty-five games each year. Cool gamers tend to have Hardcore friends who are their primary source of advice about buying games. They are part of big peer group, are swayed in their buying decisions by the opinions of this play group, and tend to play the current top ten hits in the gaming charts. Mass Market Casual gamers consist of a huge market of people who are in general swayed in their opinions of games by

Cool gamer[s'] recommendation and TV advertising. They play predominantly the current top three hits in the gaming charts. The model alludes to the way in which game sales are propagated through the market, that is, Hardcore gamers influence the Cool gamers to buy games, and the Cool gamers influence the Casual gamers to buy games.

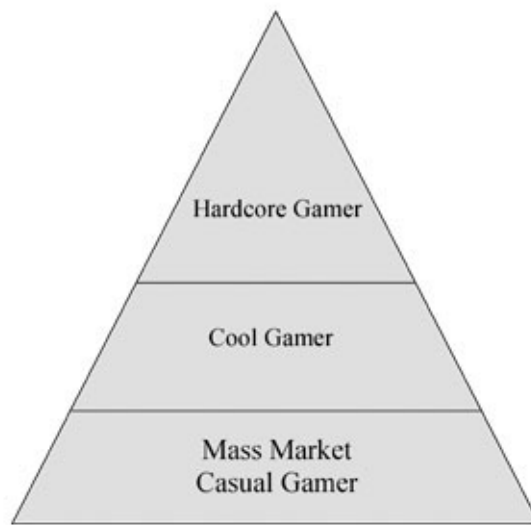


Figure 2.1: An Audience Model Used by Electronic Arts as Discussed by Richard Leinfellner at GPDC in 2003 Source: 21st Century Game Design by Chris Bateman and Richard Boon [1]

The International Hobo audience model makes a separation between Hardcore gamers and Mass Market Casual gamers. However, it proposes that there are four types of gamers, Hardcore gamers, Testosterone gamers, Lifestyle games and Family gamers. The four types of gamers fall under the two segments of Hardcore gamers and Mass Market Casual gamers. Hardcore gamers' primary concern is challenge, and they are in general looking for games to provide a satisfying level of difficulty. No control mechanism is too complex for [Hardcore gamers], provided they like the core game activity. Testosterone gamers are most interested in games that focus around cars and guns, and also in games built around player versus

player competition. Complex control mechanism can be tolerated, but not to the same degree as the Hardcore. Lifestyle gamers want fun, enjoyable activities in their game, and they don't in general want to be prevented from progressing through the games they play. Easy to grasp control mechanisms are essential. The large but disparate Family gamer [cluster] represents parents buying games for their children, which they might play with them or might play the same games alone in their spare time. They are primarily looking for entertainment, and control mechanism must be exceptionally simple. The Hardcore gamer is the primary source of influence for the Lifestyle and Family gamer. Lifestyle gamers can influence the Family gamers. The Testosterone market segment is a special case that straddles the Hardcore/Casual divide, but is highly pronounced and therefore worthy of attention [1].

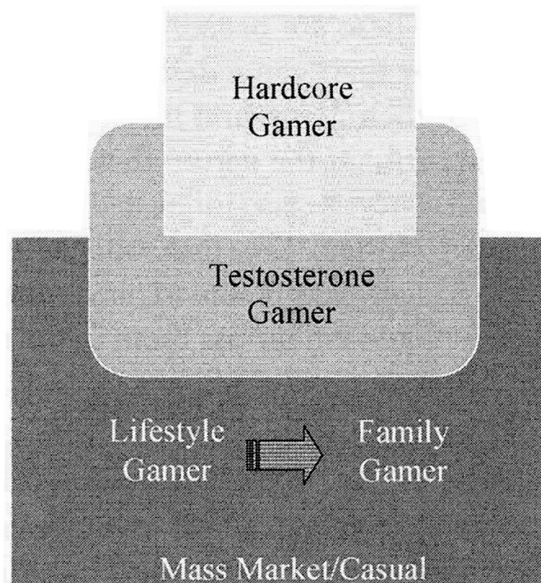


Figure 2.2: The Audience Model Used by International Hobo from 2000-2003 Source: 21st Century Game Design by Chris Bateman and Richard Boon [1]

2.3. Designing for Fun: Flow - The Psychology of Optimal Experience

People play games for many reasons: some play to improve learning, some play to socialize, some play to pass the time, but people participate in *activities* for the same reasons. What separates a game from an activity is the level of engagement. A game requires participants to engage in a level of challenge and enjoyment comes from overcoming the challenge. To put it simple, a game is an activity, which brings *fun* to its participants through a challenge. We play games for fun, we do not play games for boredom. No matter what type of game we are designing and who we are designing for, designing for fun is an essential part of any game design.

Mihaly Csikszentmihalyi 's Flow Theory is well studied in the game design industry. His theory explains how an enjoyable experience takes place. In *Flow: The Psychology of Optimal Experience*, he talks about how people experience the state of flow, a state when all a person 's relevant skills are needed to cope with the challenges of a situation, that person 's attention is completely absorbed by the activity. There is no excess psychic energy left over to process any information but what the activity offers. All the attention is concentrated on the relevant stimuli [...] As a result, one of the most universal and distinctive features of optimal experience takes place: people become so involved in what they are doing that the activity becomes spontaneous, almost automatic; they stop being aware of themselves as separate from the actions they are performing. Csikszentmihalyi goes on to explain the eight major components of the phenomenology of enjoyment: First, the experience usually occurs when we confront tasks we have a chance of completing. Second, we must be able to concentrate on what we are doing. Third and fourth, the concentration is usually possible because the task undertaken has clear goals and provides immediate feedback. Fifth, one acts with a deep but effortless involvement that removes from awareness the worries and

frustrations of everyday life. Sixth, enjoyable experiences allow people to exercise a sense of control over their actions. Seventh, concern for the self disappears, yet paradoxically the sense of self emerges stronger after the flow experience is over. Finally, the sense of the duration of time is altered; hour pass by in minutes, and minutes can stretch out to seem like hours. The combination of all these elements cause a sense of deep enjoyment that is so rewarding people feel that expending a great deal of energy is worthwhile simple to be able to feel it [6].

Csikszentmihalyi asserts that enjoyment appears at the boundary between boredom and anxiety, when the challenges are just balanced with the person’s capacity to act (Figure2.3). He points out the important role of a challenge in one’s experience of pleasure and enjoyment: “what people enjoy is not the sense of being in control, but the sense of exercising control in difficult situation” [6]. “The flow experience is typically described as involving a sense of control — or, more precisely, as lacking the sense of worry about losing control that is typical in many situations of normal life” (Csikszentmihalyi [6]). When applied to game design, it can be said that in order to deliver enjoyable gameplay, the design of a game should allow players to exercise some form of control and the incorporation of an appropriate challenge is essential.

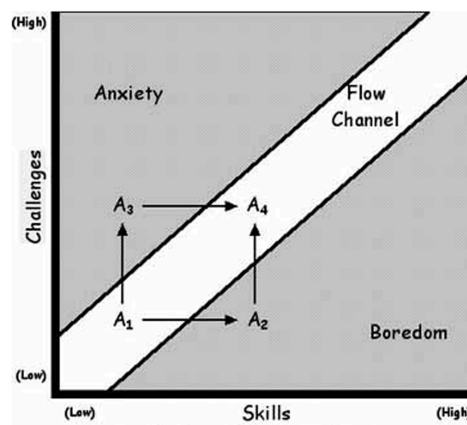


Figure 2.3: Flow by Csikszentmihalyi Source: Explorations in Learning <http://secondlanguagewriting.com/explorations/Archives/2007/January/EngagementandFlow.html>

3. Existing Virtual Pet Games

A virtual pet game is often referred as simulation video game, which is an enactment of interaction with real pets. Most virtual pet games falls under three categories: owner-pet-play, task-completion, and competition-with-other-pets. This chapter will review the components of those three types of virtual pet games.

3.1. Owner-pet-play Games

One arguably interacts with a virtual pet in an owner-pet-play type of the same way as how he or she interacts with a real animal in the real world. An owner-pet-play virtual pet game typically features functions that allow users to touch, dress, feed, play and clean the pet. In an owner-pet-play type of game, it is important to design the virtual pet as a ‘free creature’ to have ‘autonomous goals’ in order to ‘simulate autonomous feelings’ (Kaplan [8]). Kaplan explains the importance of a virtual pet’s “uselessness”: “[o]ne way of showing that the pet is a free creature is to allow it to refuse the order of its owner. The freedom of the pet, its apparent autonomy in the choice of its goals, seems a necessary feature for the development of an interesting relationship” [8]. Tamagotchi, one of Japan’s most famous inventions, is an example of an owner-pet-play game. Tamagotchi took the world by storm. It is not possible to talk about virtual pet game design without studying the case of Tamagotchi first. The first-generation Tamagotchis were designed to be in key-chain form with an egg-shaped computer housing a black-and-white LCD screen and three buttons on the front. The characters were simplistically designed. Though the exact layout varied from version to version,

functions such as health meter, food menu, play icon, toilet icon, discipline icon, medicine icon, light icon and attention icon typically appeared on the original toy. As mentioned previously, a certain level of unpredictability is important in an owner-pet-play game. The Tamagotchi is a fragile being, if its owner does not give it the proper feeding, cleaning, nursing and playing, the pet will quickly die. Yokoi, the creator of Tamagotchi, recalls his creation process: “because the player feels sorry for the pet if it becomes sick or dies, he or she will look after the pet with utmost effort. Maybe from such, a player will develop affection and emotional attachment to the character” [9]. In most commercially available pet games, repeated interactions are achieved because the owner feels responsible for his pet. “The trick is to create a positive feedback loop on the user investment in taking care of the pet. The more the user has spent time interacting with the pet the more it is crucial for him that the pet does not die or run away and matures properly” (Kaplan [8]).

Kimimon, a game for iPhone and iPod Touch designed by 3Lynx, is almost a smartphone version of Tamagotchi. It has the basic features of a Tamagotchi. Besides the basic features, there is a map feature that allows user to ‘visit’ stores and make purchase of items used for interacting with the virtual pet. Mobile touch screen technology shifted the focal point of pet owners’ interaction with a virtual pet from ‘feeding’ to ‘petting’. Touch screen allows a pet owner to ‘play’ with a virtual pet by tapping, stroking, pinching or blowing at the mobile phone screen. In Kimimon, a pet owner is able to wash the virtual pet by pressing on an image of a sponge and wipe it across the character or by shaking the phone (Figure3.1). A pet owner can also shake the mobile device to ‘discipline’ the pet. Kimimon’s character responds differently to different actions carried out by the pet owner though making sounds and ‘facial expressions’. Designed by Cyber-agent, Nadenade Fuwamu(なでなでフワムー in its original name in Japanese) is another popular owner-pet-play smartphone game application. Its basic features are similar to Kimimon’s. However, it has a social feature - a player can navigate

his or her pet to visit another player's pet (Figure 3.2). Nadenade Fuwamu's character is not sensitive to different touch screen commands. However, the character's appearance, its 'body movement' and the way its 'fur' responds to strokes are what make it a popular pet game. The game creates a "comforting" effect as described by its users [4].

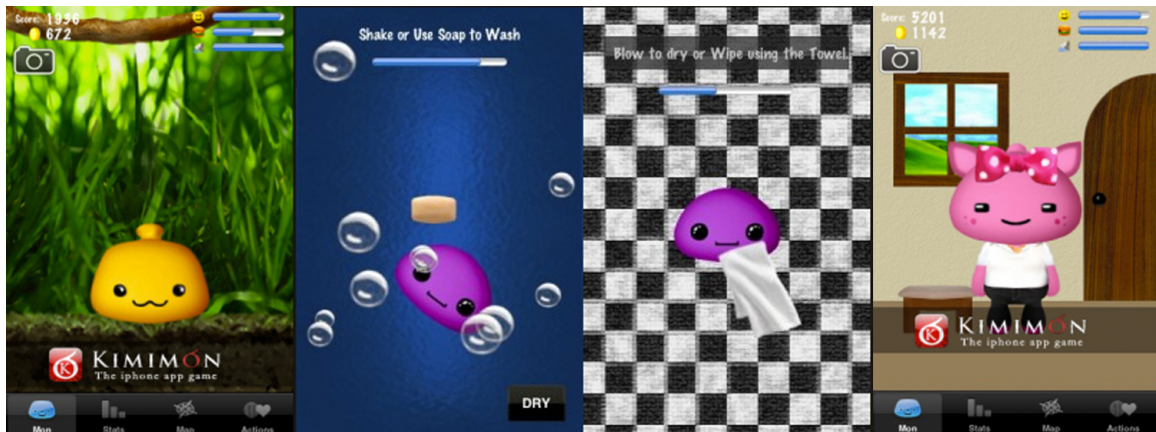


Figure 3.1: Interface of Virtual Pet Game Kimimon Source: Kimimon <http://blog.kimimon.com/>

3.2. Task-completing Games

A task-completing type of game may or may not feature the basic functions of an owner-pet-play game, but a clear task or challenge for player to complete is not to be without. In a task-completion game, it is important to have a score system. In a task-completing game, player generally receives means of virtual money and then is able to use the virtual money later on to exchange for something else that can be used in the game when a task is completed. Developed and published by NimbleBit, Pocket Frogs is a popular task-completing virtual pet game. "Pocket Frogs is perhaps the first 'freemium' game that I've played on the app store that lets you do something other than sit and wait for something to happen",



Figure 3.2: Screenshot of Virtual Pet Game Nadenade Fuwamu Source: HatenaFotolife <http://f.hatena.ne.jp/chie-chie-chan51/20120723140933>

says a reviewer on 148apps.com [7]. When the game begins, the player owns two frogs, a Cocos Bruna Anura and a Green Folium Anura, one regular habitat, a nursery habitat, and 1000 coins. In the pond view, players control their frog, eating flies to tame it, which makes it happy, breeding with other frogs players find, and finding presents. The task of the game is clear and simple, which is to breed and sell virtual frogs. The “Habitat” is where achievement of Pocket Frogs’ s player is displayed. Each Habitat houses eight frogs. In order to house more frogs, player has to purchase new Habitat when the existing ones are full. Different breeds become available as player levels up (Figure3.3). Among task-completing type of pet games, management or construction simulation pet games appear to be the most popular. Mobile games like Farm Ville and Pet Shop Story are management-style games that require players to complete multiple tasks such as growing, building, stocking and hiring. Achievement in such game is commonly displayed in score, virtual money system and the interior design of a virtual space.



Figure 3.3: Interface of Pocket Frogs Source: TUAW
<http://www.tuaw.com/2012/10/29/pocket-frogs-getting-a-big-update-this-week/>

3.3. Competition-with-other-pets Games

A competition-with-other-pets game is a task-completing game with an emphasis on the social aspect or a player's performance at a given time. Playing a competition-with-other-pets game means participating in a match with another human player although in some cases, a player is still playing against the computer. Desire to win in a competition is in our human nature. Instant winning feeling, as opposed to accumulated achievement in a task-completion game, can make a game that much more fun. World of Warcraft having 11+ million paying subscribers and games like FarmVille played on the social media site Facebook having 46 million monthly users. These games have made it clear that people like games and that it is typically much more fun and challenging to play games with or against other people. Pets Live and Pet Dash are examples of multiplayer mobile pet game. Pets Live is developed by Storm8. The same company also developed Pet Shop Story, a management-style pet game as mentioned in the pre-

vious section. To make it simple: the concept of Pets Lives is a lot like Pokmon, a world renowned Japanese animate series. In the game, a player is assigned the role as a pet trainer. He or she finds, train, care for and battle virtual pets (Figure3.4). In Pet Dash, a player is able to collect and race virtual pets with friends (Figure3.5).



Figure 3.4: Interface of Pets LIVE Source: Brotherssoft <http://mobile.brotherssoft.com/pets-live-81197.html>

Horse racing games are also examples of competition-with-other-pets games. Popular horse racing games include Derby Quest Horse Racing Game (Figure3.6), My Horse (Figure3.7) and Race Horses Champions (Figure3.8). In those games, players are generally assigned tasks such as cleaning the stable, feeding and training one or more horses and in order to reach a higher level, competing in a horse race is a must.



Figure 3.5: Screenshot of Petdash Source: 1Mobile <http://www.1mobile.com/pet-dash-361030.html>



Figure 3.6: Representation of Derby Quest Horse Racing Game's Interface Source: iTunes <https://itunes.apple.com/us/app/derby-quest-horse-racing-game/id480528407?mt=8>



Figure 3.7: Screen Shot from My Horse Source: iTunes <https://itunes.apple.com/us/app/my-horse/id421167112?mt=8>



Figure 3.8: Screen Shot from Race Horses Champions Source: iTunes <http://android.mob.org/game/race-horses-champions.html>

4. Design Concepts of Ambee Planet

4.1. Being Innovative

Ambee Planet is a smartphone game application, which enables its users to interact and collect virtual pet characters through the use of sounds from the real world. Though there are a number of virtual pet game applications in the market, the idea of “feeding sound to a virtual pet” has not been done before. Audio-based game design is yet a new concept to the game design world. Nokia’s guide to sound for phone games, for instance, warns, “The game should be playable without the sounds. Allow silent starting of games. If intro music is implemented, there must be a way to switch it off. Prompt for sound settings at the start of the game... Do not include loud or high-pitched sounds, have sounds on as the default, [or] use sounds that are similar to ring tones and alert tones” (Collins [5]). In contrast to Nokia’s guide to sound for phone games, sound usage is the center of Ambee Planet’s entire design. User evaluation in a latter chapter in this thesis will report the user testing results, of whether participants of Ambee Planet’s evaluation sessions felt comfortable with the concept of audio-based game design.

4.2. Simplicity Design: Finding the Right Formula

There are a number of reasons of keeping Ambee Planet’s design simple. In *Interface Design*, Bickford suggests that one of the secrets of making successful

games is to “hook your customers by getting them to lose themselves in the game”. He states that in order to make a player “lose himself” in a game, it is important that he can start playing as soon as possible. “Keep the rules simple, and make sure the overall goal is clear. Instead of making the users read instructions, let them start playing immediately, and then have the game teach them how to play” [2]. The casual nature of mobile games is another reason of keeping things simple: people playing mobile games are, at present, primarily using their phone to play games while they “kill time,” and games are secondary to the other functions of these machines (Collins [5]). Moreover, the author of this thesis would like to propose a formula for designing an audio-based virtual pet game smartphone application, which is simple yet engaging to the mass market game users. In other words, this thesis is about assembling functions that are essential to making an engaging virtual pet game application together and discarding the elements that have insufficient value. Ambee Planet’s game design is derived from first, creating an audio-based mobile virtual pet game through modifying the structure of a mobile typical virtual pet game, second, designing audio-based human-pet interactions and third, determining as well as implementing the appropriate level of challenge.

Referring back to the literature review chapter of this thesis, we know that appropriate level of challenge, access to certain level of control and display of achievement are three fundamental elements in game design. In a typical virtual pet game, the three fundamental elements are evident (Figure4.1). Human-pet interaction in a typical virtual pet game acts as a form of challenge. Without one’s nurture, his or her pet will not grow into adulthood or reach a certain goal. A player exerts control through interactions such as feeding, petting or playing with the pet. A point system keeps track of users achievement. The points can often be used to exchange for tools or accessories that can be used to further pet-owner interaction. Major reward of a basic virtual pet game is growth of the pet. While those three fundamental game design elements are also found in other types of

games, personalization is must-have feature in a virtual pet game. Such feature's presence is more significant in a virtual pet game than in other types of video games. Because the point of a pet game is to establish a relationship, creation of emotional attachment is significant. In most virtual pet games, a player can select, create, name, dress or accessorize his or her pet. While most games allow players to control their in-game actions, pet games tend to allow players to exert higher control over the main settings of the game — the digital pet. Making a virtual pet seem as similar to a real pet as possible is a prominent goal of virtual pet games' game designers. Thus, virtual pet characters in a pet game often "respond" to its owner's actions and "produce" both expected and random feedbacks.

TYPICAL VIRTUAL PET GAME FUNCTION MAP

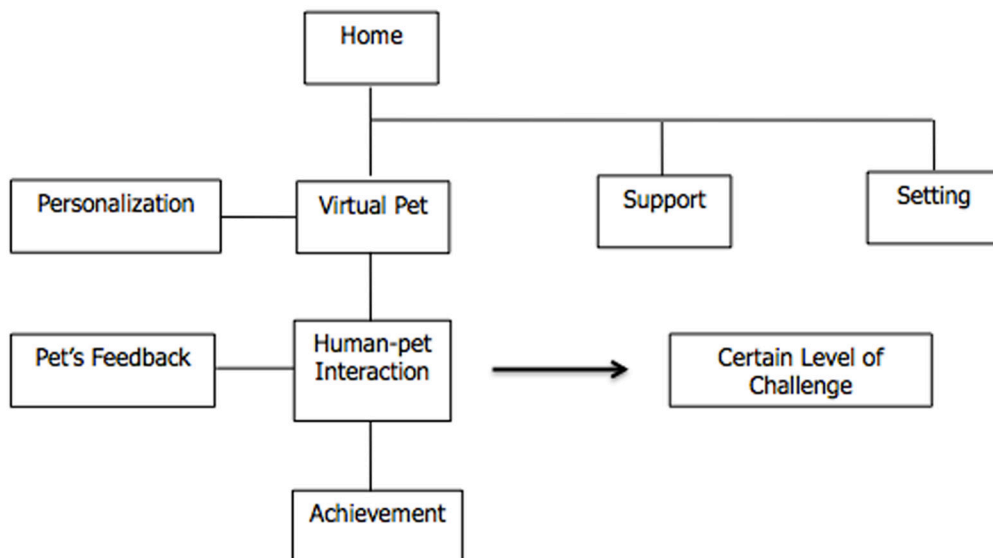


Figure 4.1: Function Map of a Typical Virtual Pet Game

What distinguishes Ambee Planet from other virtual pet game applications is

Ambee Planet’s method of interaction with virtual pet characters. The structure of Ambee Planet’s game design is formulated by replacing human-pet interactions in a typical virtual pet game such as tapping or stroking a virtual pet character to *audio-based human-pet interactions* (Figure4.2).

AUDIO-BASED MOBILE VIRTUAL PET GAME FUNCTION MAP

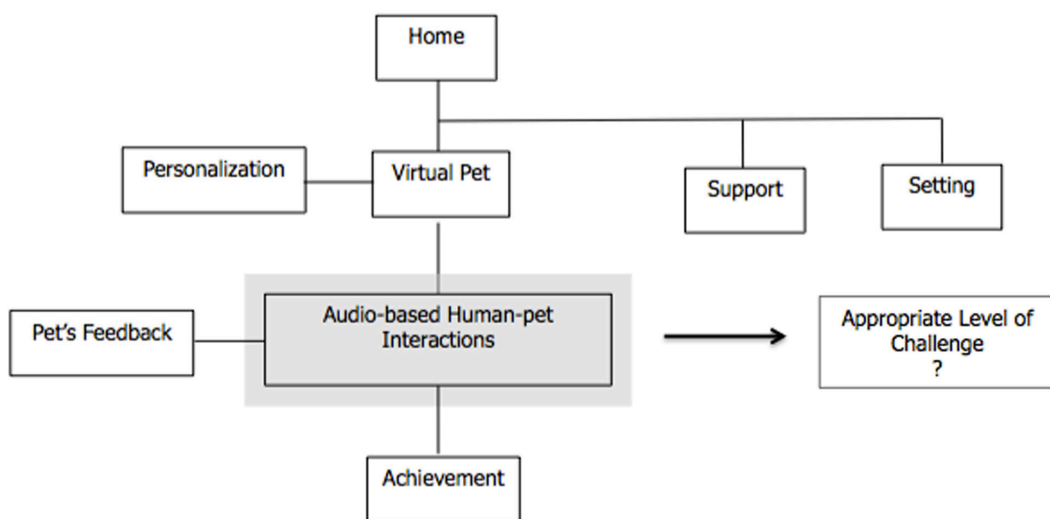


Figure 4.2: Modified Function Map, Function Map of An Audio-based Virtual Pet Game

Csikszentmihalyi’s Flow theory implies that having an appropriate level of challenge is key to creating an enjoyable experience. Following this theory, we can assume that without the appropriate level of challenge, a game will either create too much anxiety or boredom and therefore - unable to engage its users. Ambee Planet’s audio-based human-pet interactions will have to pose the appropriate level of challenge that can engage potential users. Because having the appropriate level of challenge is seen as the key to making successful game design, Ambee Planet’s user testing session will place an emphasis on locating the fitting audience and finding the appropriate level of challenge for the fitting audience.

5. Implementations of Ambee Planet's Design Concepts

5.1. Storytelling

“World design is the creation of the overall backstory, setting, and theme of the game. It often determines the scope of the other design tasks such as system design, content design, game writing, level design and user interface design” (Brathwaite [3]). In order to create unity of action, the following story was created (Figure5.1):

Ambees live on the planet of Sonas. Sound is their only energy source. Sonas is a planet that is far away from the sun and the moon, thus there is no changing from daylight to darkness. From Planet Sonas, only one star can be seen. The star is called Ryk Star. It is a star, which emits brightness that is similar to candlelight on Earth. Ryk Star everlastingly illuminates one side of Planet Sonas. Because Planet Sonas does not evolve like Earth does, one side of the planet is always dark. Ambees on one side of the planet live in cozy lighting all-year-round while Ambees on the other side live in everlasting darkness. Because there is no gravity on Planet Sonas, it is not easy to acquire sound. Ambees live on scarce energy source and they are almost hungry most of the time. For the same reason, whatever Ambees do on Planet Sonas, they do it in slow motion.

Princess Suara and her father used to live on the bright side of the planet. Hundreds years ago, Suara's father, a crazy scientist managed to invent a device which could transfer sound into becoming physical materials that used for various pur-

poses. His invention drastically improved Ambees' s standard of living. Cities were built. Princess Suara' s father gained the throne and became the king of Planet Sonas thereafter. A big plaza was constructed for celebrating the biggest event in their history. Planet Sonas is an unusual planet that bounces up and down five times a year. Since Suara' s father became the king, Ambees began to get together annually at the Plaza to make celebrations. With the planet's every bounce, they would jump as high up as they could. They would group into teams and run into each other's to see who can make the biggest sound.

Lord Zvuk used to live on the dark side of the planet. He wants to make a machine to take away all the sounds in the universe for his own use. Years ago, he kidnapped a group of Ambees from the bright side of the planet and put them in a forced labour camp to supply the energy need on the dark side. The king went to Lord Zvuk in attempt to save the kidnapped Ambees but ended up being captured. After Lord Zvuk imprisoned the king, he took over the entire planet and Ambees that used to live on the bright side of the planet became Lord Zvuk' s slaves.

Princess Suara fled before Lord Zvuk could capture her. Many Ambees fled with her, too. When they discovered Earth, they were overjoyed. Earth is full of sounds and lots of things that cannot be found on Planet Sonas. Princess Suara and her followers decided to stay on Earth to collect as many sounds as possible and transfer them back to the help the imprisoned innocent Ambees on Planet Sonas.

Many Ambees now live on Earth among us humans. They do not have their own voice like we humans do. They feed on sound and they communicate with each other in sounds that they capture. They are invisible through human eyes. However, by using the *sound feeder* (we mean your smartphone), we can establish relationship with those friendly creatures.



Figure 5.1: Storyboard of Our Intended Animation Concept Video

5.2. Character Design Workshop: Creativity Box

We invited a group of people to participate in a character design workshop. Participants were covered by a black cubicle and asked to create drawings while listening to ambient sounds. The following five tracks were played:

Track 1: Fast food restaurant Yokohama Bay Quarter

Track 2: Inside train of Toyoko line

Track 3: Party inside a family restaurant

Track 4: Yoyogi Park

Track 5: Coffee shop in Tsunashima Station

The purpose of the workshop was to use ambient sounds inspire participants to create original characters. Because Ambees are set to be alien creature that feed on sound energy, it is important that people are able to see connection between Ambees' image and sound. Also, when people are asked to create a drawing of a character, they often do not know what to draw if no direction is given. The Creative Box was a blue-sky character design workshop, which marked our first step into the prototyping stage. Some of the characters created by the participants are displayed in the image below (Figure5.2).



Figure 5.2: Characters Designed by Participants of Creative Box Workshop

5.3. Interactive Prototype

5.3.1 User Interface

Our team used Adobe Photoshop to create graphics for Ambee Planet’s user interface. In the beginning of our prototyping stage, we had an interesting idea of making player navigate the smartphone application through audio guidance only. Since in the setting, it is said that Ambees are invisible to humans, we had an idea of having only a dark screen as part of our interface design. Along with the nothing-but-darkness-UI idea, we also felt that it would be great if we could design a user interface of innovative audio guidance that even the visually impaired can navigate. Even though the idea of a user interface, which has only audio guidance was not chosen to be included in the implementation of Ambee Planet afterwards, the idea led to an original idea — placing the main menus on the four corners of the screen for easy access (Figure5.3). When main menus are placed on the four corners of the mobile phone, a player would be able to maneuver a game without having to look at the screen.



Figure 5.3: Initial User Interface Design of Ambee Smartphone Pet Application

5.3.2 Character Design

We would like to allow each player to create a unique Ambee collection. Therefore, the game is set to have unlimited number of characters. Ambees are set to be aliens that come from Planet Sonas, a distant planet where sound is the only energy source. When they left their home planet and came to Earth, their appearance changed depending on what object they first came in contact with. There are five different Ambee species. Ancestors of those five different species originated from five different planets, Venus, Jupiter, Mercury, Mars and Saturn. Though unlimited new characters can be unlocked, player is expected to choose from one of the five following characters to begin the game:

Venusian Pepot: Pepot's is a pet robot. It loves people. Its dream is to become a real human one day. It longs for having real human emotions. Pepot wishes to be able to laugh like a human, move and dance like a human. And that is why copying human gestures is Pepot's favourite pastime. Pepot especially likes to dance with people. However, not being able to move like a real human being frustrates Pepot. No matter how hard it tries, it can never move as fast as it wants to. And that is why Pepot hates fast music.



Figure 5.4: Image of Venusian Pepot, Original Character of Ambee Planet

Jupiterian Kooookie: Kooookie's shape represents a maltose biscuit, which is a snack commonly found in Southern China. Kooookie is of timid nature and gets scared easily. Kooookie's best friend used to be Gingerbread Man. Gingerbread Man was one fast runner. It was able to run so fast that no one could catch it. However, Gingerbread Man was deceived and got eaten by a sly fox. Kooookie was devastated when it found out about the terrible news. And ever since the tragedy, Kooookie became terrified of wild animals, particularly foxes. Kooookie is drawn to alarm sounds because every time when an alarm sounds, it wonders if it is comes from an oven. It keeps hoping that one day, when the door of an oven opens, its old friend, Gingerbread Man would jump out and they would meet again.

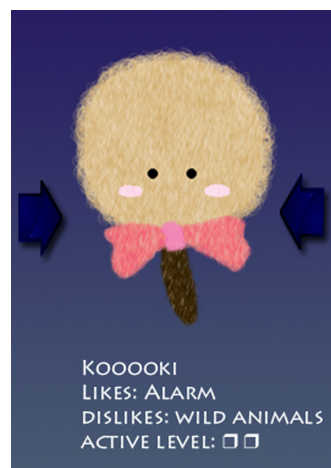


Figure 5.5: Image of Jupiterian Kooookie, Original Character of Ambee Planet

Mercurian Cuppa: Cuppa is a representation of a mysterious creature found in Japanese folk story. Cuppa likes sounds of vegetables, particularly the sound of cucumber. The sound of cucumber makes Cuppa happy because it naturally thinks that it will be getting one. Cuppa lives in water but it is able to walk on land as long as it holds a pool of water in the crown of its head. Cuppas hates the sound of coins because Cuppa heard that they are lethal. It was told

that if someone dropped a coin to the ground, it would not be able to resist the temptation of picking it up. Cuppa could lose the water stored in its crown and die. The possibility of dying from picking up a coin is a myth to Cuppa; it does not know if it is actually true. However, whether true or not, the thought of dying terrifies it.

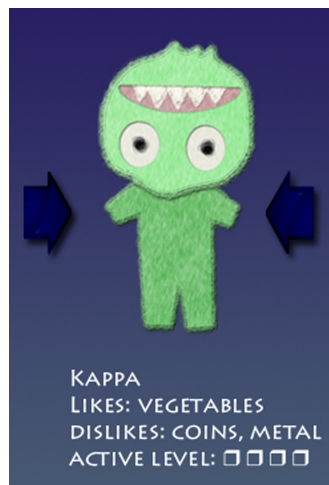


Figure 5.6: Image of Mercurian Cuppa, Original Character of Ambee Planet

Martian Kizmak: Kizmak is how we imagine a Martian would look. While other Ambees' appearance changed when they came in contact with objects on Earth, Kizmak's appearance stayed the same. The reason why its appearance stayed the same is unknown though it is possible that martians come from a different genetic pool. Kizmak loves urban city lifestyle. When it arrived in Earth for the first time, it quickly fell in love with all the sounds it never encountered on Planet Sonas. Kizmak is extremely social and passionate and wants to be in the presence of others at all times or it gets lonely. For this reason, Kizmak doesn't like the sound of nature. To Kizmak, nature is associated with boredom and emptiness.

Saturnian Buddy: Buddy is a representation of a shadow. Just like a real shadow, it is able to reflect the shape of any object when it is near. It likes the sound

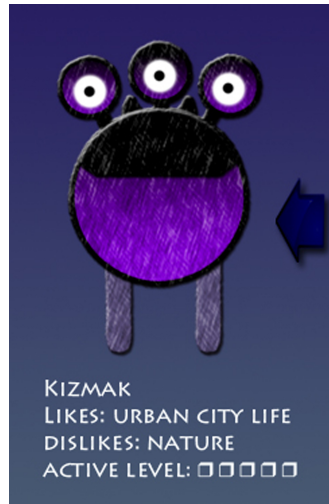


Figure 5.7: Image of Martian Kizmak, Original Character of Ambee Planet

of machines for a few reasons. Because shadow does not exist when there is no light, light source is extremely important to Buddy's survival. Buddy notices that humans almost never operate machines in the dark so by staying near machines, it feels safe. Also, the fact that many machines tend to stay in one place makes Buddy feel at ease. Machines made for transportation such as airplanes and rockets are Buddy's enemies because they run so fast that Buddy can never catch up.

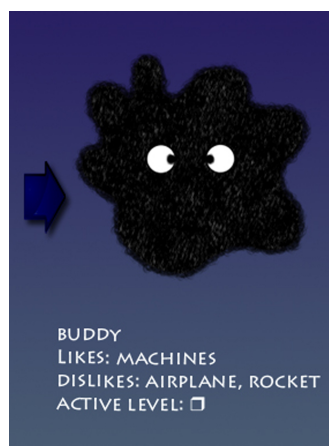


Figure 5.8: Image of Saturnian Buddy, Original Character of Ambee Planet

5.3.3 Audio-Based Interactions

Three types of audio-based interactions, sound database real sounds input, human voice input and paired random output were implemented in an interactive prototype using Adobe Dreamweaver (Figure5.9) (Figure5.10). In the user testing sessions, the prototype was displayed in a Safari browser on a Mac computer and the participants were asked to navigate the game using the trackpad on the same computer.

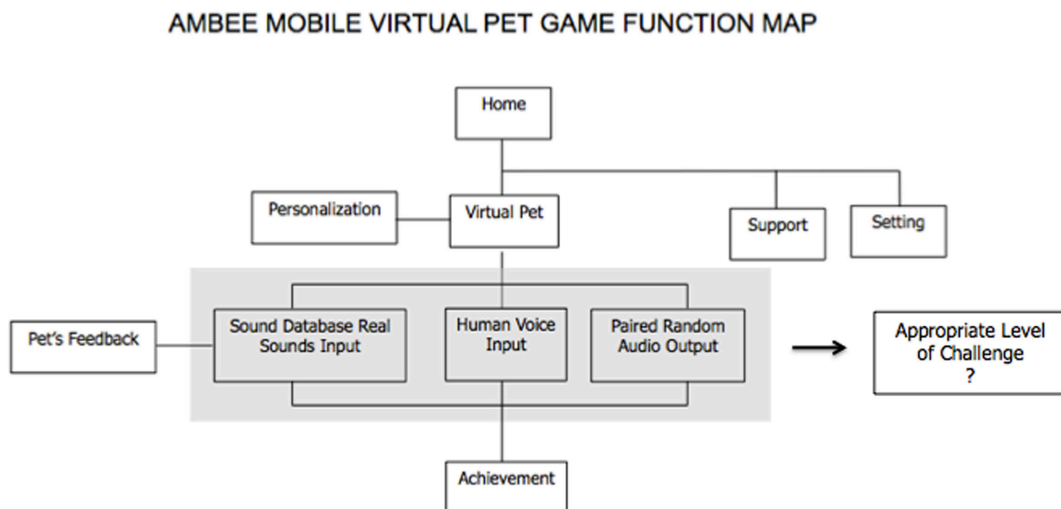


Figure 5.9: Function Map of Ambee Planet

In the Map window, a player is expected to locate a sound from a *sound map* and *feed* it to a virtual pet character. Freesound is a sound database site that allows users to freely tag the sounds they upload. The site's sound tags (Figure5.11) enable users to make search using a wide variety of keywords. Its geotagged sound map (Figure5.12) is incorporated in Ambee Planet's prototype as a game feature. When a player locates a specific sound on the sound map and clicks the play button (Figure5.13), he or she inputs tagged information of the sound selected

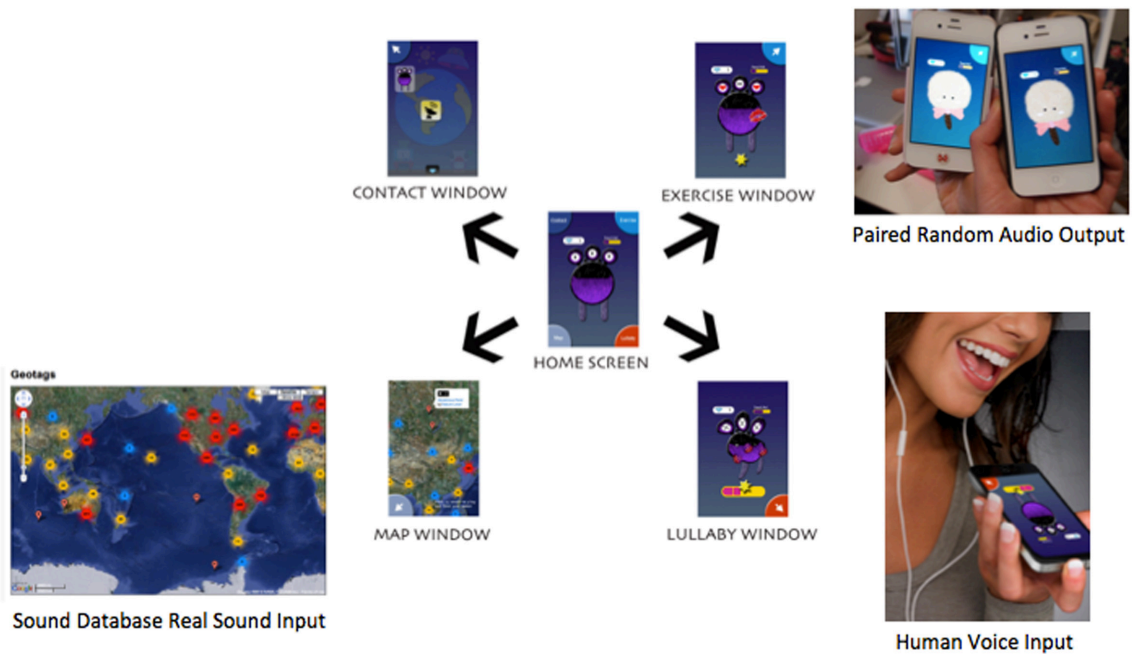


Figure 5.10: Audio-Based Interactions Implemented in Ambee Planet's Prototype

into Ambee Planet's system and hence stimulates his or her pet's emotional feedbacks.

In the Lullaby window, a player is expected to make voice input to stimulate his or her pet's feedbacks (Figure 5.10). An Ambee displays emotional feedbacks through both visual and audio outputs. For example, when a player opens the Lullaby window, he or she will see that Kizmak is waiting to hear a song (Figure 5.14). If Kizmak enjoys the song it hears, heart shapes will be shown in its eyes and it will make baby-like laughters.

In the Exercise window, spontaneous visual and audio outputs can be generated by placing two or more mobile devices together. For example, when two Ambee Planet's players place their mobile phones next to each other's, their virtual pet characters may greet each other, sing or dance at the same time (Figure 5.15).

Five types of emotional feedbacks from virtual pet are implemented in the interactive prototype. Although all characters are meant to give out various types of emotional feedbacks, due to the time constrain, Ambee Planet's features are only represented by one character in the interactive prototype. Kizmak, the chosen

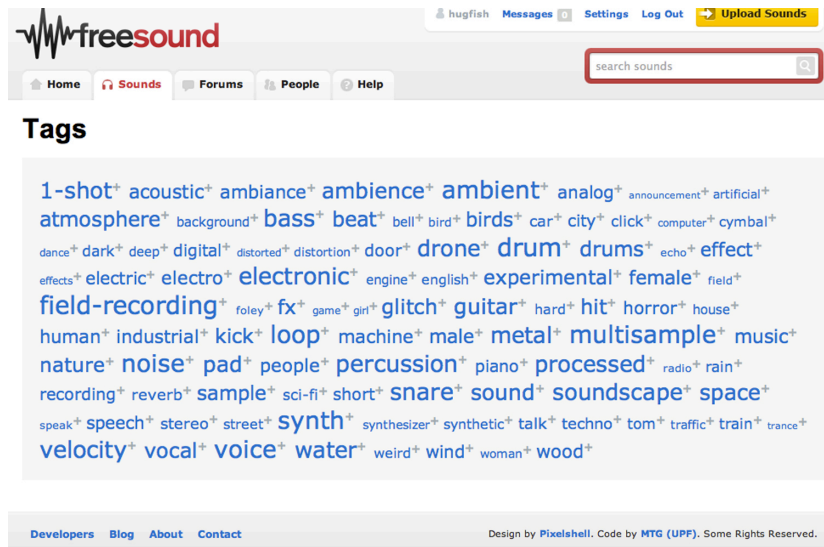


Figure 5.11: Sound Tags in The Free Sound Project Website Source: Freesound <http://www.freesound.org/browse/tags/>

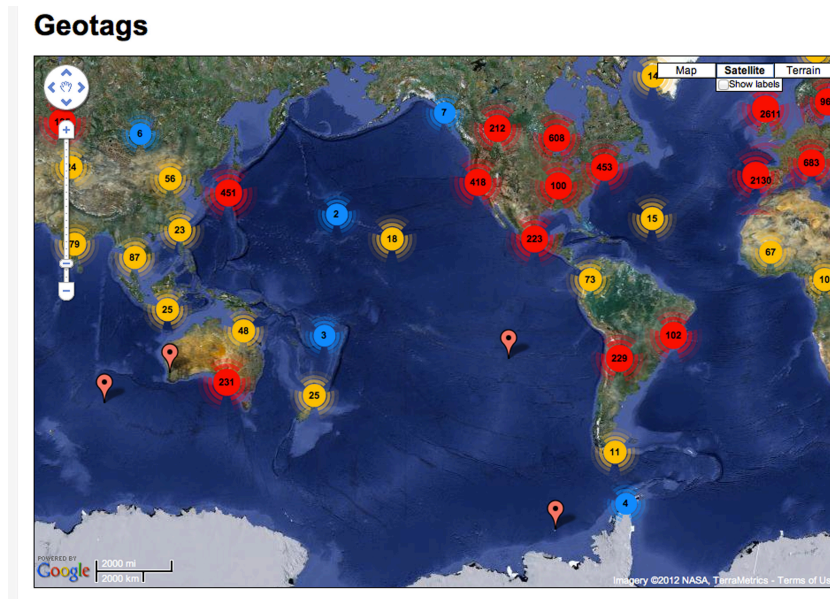


Figure 5.12: Freesound's Geotagged Sound World Map Source: <http://www.freesound.org/browse/geotags/>



Figure 5.13: Using a Sound Map to Locate a Sound Energy Source for Kizmak in the Map Window

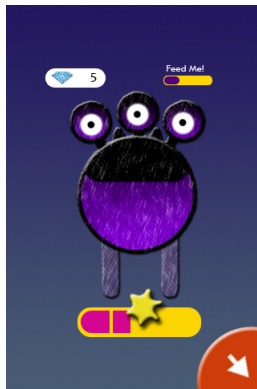


Figure 5.14: Kizmak Listens Attentively to Player's Singing in the Lullaby Window

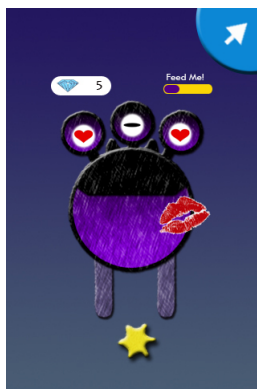


Figure 5.15: Kizmak Receives a Kiss from Another Virtual Pet in the Exercise Window

character displays curiosity, joy, nonchalance, exhaustion and sickness through its ‘voice’ and ‘facial expressions’ (Figure5.16).

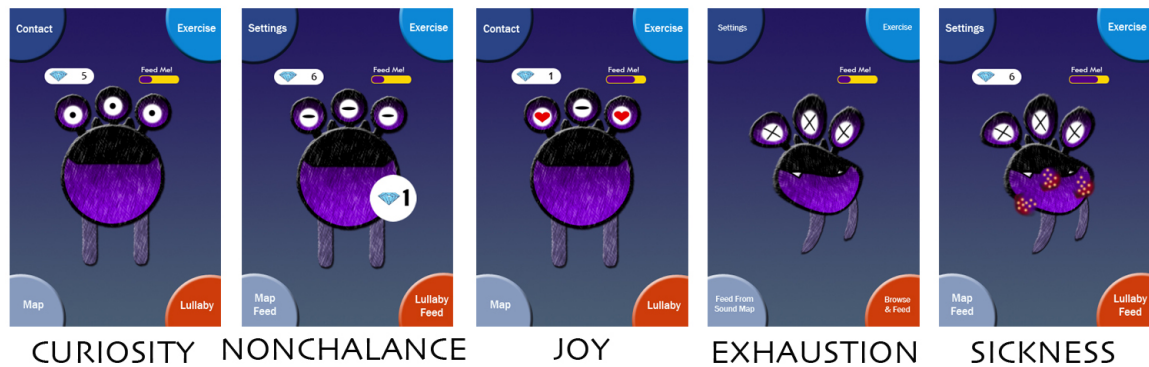


Figure 5.16: Kizmak’s Emotional Feedbacks Implemented in Ambee Planet’s Interactive Prototype

5.3.4 Rule of the Game

The game starts with the character selection screen (Figure5.17). A player is asked to select one out of five Ambee Characters to start the game. The five characters represent the five basic elements found on earth to begin the game. Each Ambee character has likes and dislikes; the player is expected to *feed* the character according to its profile. Once a character is chosen, player can start making interactions with his or her pet character using the menus.

The home screen of the game places the player’s chosen pet character in the center of the screen with four different menus located on the four corners of the device. The four menus are: Exercise, Map, Lullaby and Contact (Figure5.18). The Exercise feature is a social feature, which poses a minimum level of challenge. In the Exercise window, the player can place his or her mobile phone next to another player’s to generate a conversation between two Ambees. Two or more Ambees can also sing and dance at the same time; they can give each other kisses



Figure 5.17: Character Selection Screen of Ambee Planet's Interactive Prototype



Figure 5.18: Game Features of Ambee Planet's Interactive Prototype

(Figure5.15). The player can use both the Map menu and the Lullaby menu to feed an Ambee. In the Map window, the player's task is to locate the right sound energy source for his or her Ambee (Figure5.13). An Ambee displays various *emotions*, depending on what type of sound it takes in (Figure5.16). An Ambee will display emotion of joy if it is fed the sounds it likes; the player will receive diamonds when that happens. If the player feeds his or her pet sounds that it does not like, it will show dismay. When an Ambee takes in sounds that discomforting more than three times, it will become sick and *grow* a tumor (Figure5.19). More tumors will grow if it continuously take in the *wrong* sounds. In order to remove a tumor, the player would have to sing his or her pet a song. If the player is uncomfortable with singing a song to his or her pet, a healing portion can be purchased to cure the tumors. The Lullaby menu allows the player to feed an Ambee through singing (Figure5.14).

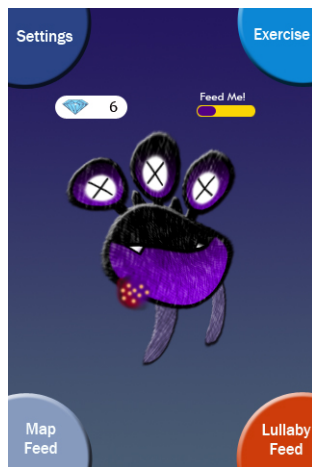


Figure 5.19: A Tumor Growing on Kizmak

An Ambee will display happy emotions and *laugh* when the *singing meter* reaches the top. Besides the three main features, the energy level of the character is indicated in a bar located on top of the character. The player will receive diamonds when he or she feeds an Ambee sounds that match its liking. Diamonds

can be used in exchange for new pets or accessories that can be used to make further interactions with characters in the game. The Contact window is where the player receives and manages his or her Ambees, keeps track of in-game achievement and *launches* energy transmission to Ambees' home planet (Figure 5.20).

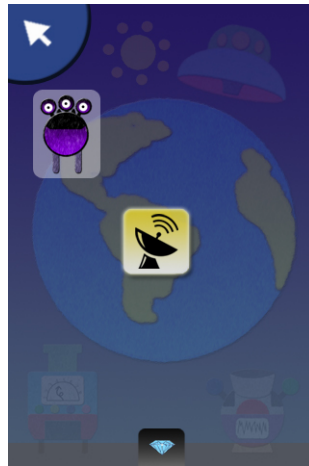


Figure 5.20: Display of Ambee Character Collection and Contact Home Planet Button in the Contact Window

The main goal of the game is to help the good Ambees defeat Lord Zvuk, the dark force that took over Planet Sonas, where Ambees come from. When an Ambee absorbs enough sound energy and reaches a full state, it is able to *transmit* the energy to back to Planet Sonas. When Ambees that are on Planet Sonas receive energy from Ambees that are on Earth, they will be able to use the energy to riot against Lord Zvuk and his army. The secret to defeating Lord Zvuk is teamwork. Although the player can choose to transmit energy at any point, when multiple numbers of Ambees *work together* - the energy that they are able to transmit becomes more powerful. As the player gathers more Ambee characters, he or she can advance to the next level by transmit energy to Planet Sonas and help defeat one enemy after another. A short animation will reveal whether targeted enemy is defeated or not at the end of each transmission.



Figure 5.21: Visual Representation of the Relationship between the Dark Force and Good Ambees on Planet Sonas

Same as keeping a real pet, establishing and strengthening the relationship between an owner and the pet is the essence in a virtual pet game. At any point of the game, the player can choose to send an Ambee back to Planet Sonas. A short animation will be played to display the character's state of misfortune when the player chooses to send it back to its home planet. Because Planet Sonas is occupied by Lord Zvuk, an evil force when an Ambee is sent back to its home planet, it will end up being captured and forced to work in Lord Zvuk's labour camp. The Contact window is set to have limited storage. Thus, in order to house new characters, the player will have to give up his or her least favourite character. This feature is designed to make the game more engaging by giving the player a greater form of control and also strengthening the player's ownership of his or her favorite pets.

6. User Testing and Evaluation

6.1. Scope, Methodology and Significance

13 users were tested in total. Four sets of users, Hardcore Gamers, Testosterone Gamers, Lifestyle Gamers and Family Gamers, described by the IHOBO Audience Model were tested in order to locate a fitting audience group as well as making a successful demographic game design. “The concept of demographic game design is that game design inherently targets an audience, and therefore the success criterion for a design is how effectively it satisfies the needs of that audience. This factor is not directly related to sales figures and is not intended as a means by which to consider the success of the game as a whole—only the success of the design. If the target audience is satisfied by the game (which can be determined by appropriate sampling techniques), the design can be considered a success” [1]. Each participant is labeled by his or her gamer type, gender and age. For example, a male Hardcore Gamer who is 37 years old is labeled as Participant H-M37 (Figure6.1).

Because a participant can represent more than one type of gamer, a participant’s gamer type can be represented by double letters. Participant HT-M29 is a Hardcore Testosterone Gamer male who is 29 years old whereas Participant LF-F35 is a Lifestyle Family Gamer female who is 35 years old. The selection of participants is influenced by smartphone’s market segmentation data. While more than half of the people who are between the ages of 18 to 44 in the world are smartphone users, people that are below the age of 17 and above the age of 55 take up much smaller percentage of the world’s smartphone users (Figure6.2).

Participant Profile Chart of Ambee Planet's User Evaluation

	Hardcore Gamer		Mass Market/Casual		
Age Gap	Hardcore Gamer	Testosterone Gamer		Lifestyle Gamer	Family Gamer
		Hardcore Gamer	Lifestyle Gamer		
Under 18				Participant L-M5*	
18 ~ 24			Participant LT-M21	Participant L-F18	
				Participant L-F22	
25 ~ 34	Participant H-F27	Participant HT-M29		Participant LF-M28	
	Participant H-M24			Participant L-F29	
35 ~ 44				Participant LF-F35	
				Participant L-M36	
45 ~ 54				Participant L-F45	
Over 55				Participant L-F65	

Figure 6.1: Participant Profile Chart of Ambee Planet's User Evaluation

Although five types of gamer are studied in the experiment, the goal of the research is to create a gamification design, which can successfully engage the *mass market*. Therefore, 10 out of 13 participants are chosen because they are either Lifestyle or Family Gamers and they represent 6 main age groups in smartphone's market segmentation.

Participants of four gamer types were asked to perform a number of tasks using the multi-touch trackpad on a MacBook Pro computer. The interactive prototype is displayed in a Safari browser (Figure 6.3). Users were explained that the prototype was a brief representation of a smartphone game application's structure. Because the purpose of the experiment was not to test if users were capable of using a Mac computer to operate a program, participants who were not familiar with a MacBook Pro computer were offered guidance. Participants were interviewed both prior and after performing the tasks assigned. All participants were asked the same questions and assigned the same tasks except Participant-LF-M28, Participant-LF-F35 and Participant-L-M5. The three participants were interviewed as representation of the Family Gamers' group. Participant-LF-M28 and Participant-LF-F35 were asked to answer questions on their child, Participant-L-M5's behalf. They were asked questions such as whether they could see their

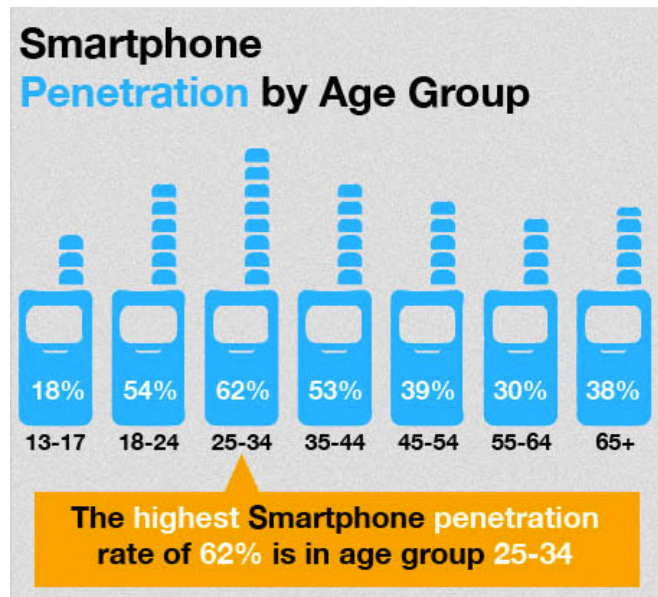


Figure 6.2: IGO-Gulf.com’s Data on Smartphone Penetration Age Group Source: <http://www.go-gulf.com/blog/smartphone/>

child playing the game and whether they could see themselves playing Ambee Planet with their child. Moreover, rather than asking Participant-L-M5 to make direct verbal response, his actions were observed and recorded. Besides his interaction with Ambee Planet’s prototype, Participant-L-M5 was asked to test a number of virtual pet games that are in the market.

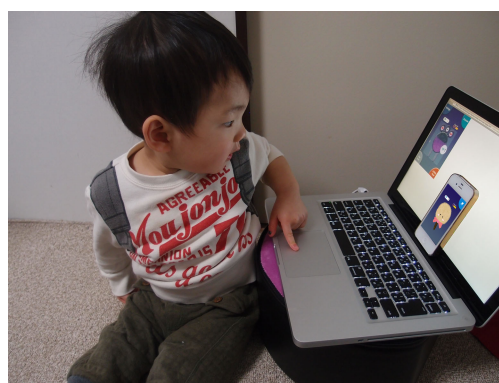


Figure 6.3: A Baby Playing with Ambee Planet’s Interactive Prototype on MacBook Pro

6.2. The Experiment

There are five parts to the research. In Part A and Part E, participants were interviewed; in Part B, C and D, participants were asked to perform specific tasks and their responses were observed.

Part A of the research experiment was designed to understand each participant's background and his or her "video gamer lifestyle". There are three sections in Part A: Sound Database, Video Games and Mobile Games. In the first section of Part A, participants were asked if they had had previous exposure to sound database sites. Each participant was asked to freely navigate through Freedsound's geotagged sound map for three minutes and evaluate how much "fun" he or she had using it on a scale of ten, one being "no fun at all" and ten being "some of the best time in one's life". In the second section of Part A, participants were asked to name the types of video games that they played in general and how often they played them. They were asked again to evaluate how much fun they had playing those video games using the same scale. Each participant was asked to name and describe his or her favourite video game and why he or she enjoyed playing it. Again, participants were asked to evaluate their favourite video games using the same *fun* scale. Participants were then asked if they played digital pet games, what types of digital pet games they played and how often they played those games. At the end of the second section, they were asked to state their view of digital pet games in general. In the third section, participants were asked to name the types of mobile games that they played in general and how often they played them. They were asked to explain when during the day they played games on their mobile phones and the reasons why they played them.

Part B, C and D were designed to find out if participants would have any difficulty grasping the concept of the design and/or problem using the user interface. After answering the last question from Part A, each participant is asked to click on the initial screen to begin user evaluation. Even though five characters appeared to be available for selection, all participants were asked to select Kizmak

by default. In Part B of the experiment, participants were asked to complete three tasks in the Map window:

1. Follow instruction given by the interviewer to find a sound to feed Kizmak in Map window.
2. Follow instruction given by the interviewer to receive eight diamonds to exchange for new character
3. Find a sound to feed Kizmak without instruction.

Participants' response time was observed and whether they were able to carry out the task assigned or not was recorded.

In Part C of the experiment, participants were asked to complete two tasks in the Lullaby window:

1. Follow instruction given by the interviewer to find sounds to feed Kizmak until it becomes sick.
2. Follow instruction given by the interviewer to heal Kizmak by singing a song.

Participants' response time was observed and whether they were able to carry out the task assigned or not was recorded. Because voice recognition was not programmed into the prototype, participants were asked to sing a short song and then the interviewer clicked on the screen to initiate Kizmak's *feedback*. Kizmak displayed two types of feedbacks; it "recovered from sickness" and "laughed like a baby".

In Part D of the experiment, participants were asked to complete one task in the Exercise window:

1. The image of Kooookie, another virtual pet character from Ambee Planet was displayed on a mobile phone. Hold the mobile phone next to the computer screen where user interface of the prototype is displayed.

Because no programming was used to sync the two devices, participants were asked to hold a mobile phone next to the computer screen and then the interviewer clicked on the screen to initiate Kizmak's *feedback*. Kizmak displayed three types of feedbacks; it "greeted Kooookie", "received a kiss from Kooookie" and "sang a song with Kooookie".

Part E of the research experiment was designed to find out whether Ambee Planet's preliminary design was fitting for each user tested. Participants were asked to briefly describe the prototype for the purpose to see if the prototype was able to properly convey Ambee Planet's game design concept. Participants were asked to evaluate how much fun they think they would have playing such game when the design is completed. They were asked if they could see themselves playing the mobile game in the future, under what scenario and how often they could see themselves playing it. They were asked if they would play the mobile game if their friends were playing the same game. Each participant was asked to identify the part of the prototype that he or she enjoyed the most and also the part that he or she struggled with. Since Csikszentmihalyi argued that appropriate level of challenge was the key component in the creation of enjoyment, participants were asked if they would prefer the game to be more challenging. They were asked if being able to advance to the next level was important. Participants were asked to evaluate the game's audio feature; they were asked if they would be interested in the idea of using the game application to explore sounds from different parts of the real world. Two questions were included to see how important being able to *personalize* a virtual pet was for each user. At the end of the research experiment, participants were asked to freely state any comments and/or suggestions.

6.3. Results

6.3.1 Hardcore Gamers

Participant-H-F27 plays all sorts of video games and wants to try out “every new game that comes out”. “Whenever I have time, I want to play games. Whenever I don’t have time, I still want to play games”, said Participant-H-F27. When asked to name a favourite video game, she pondered. Parasite Eve 1 is Participant-H-F27’s favourite name because the music, characters and background of the game are great — “I especially like the game because you can make weapons from the weapons you collected. You can enter multiple scenarios instead of just going straight in the single storyline.” She plays Facebook pet games and enjoys naming her pets after her friends and sharing that information on SNS. When asked if she could see herself playing Ambee Planet, she said that it would depend on the setting, quality and story of the game. She is especially interested in the singing feature of the game because “it has not been done before” and would recommend the game to a friend if the final product were good. She stated that instead of making the game more challenging, she would like to see more complexity.

Participant-H-M24 plays all sorts of video games such as fighting, R.P.G. and sports simulation. His favourite game is Street Fighter. He enjoys using his skill to defeat others online players. He plays Pokmon games and plays for about thirty minutes each time. He does not play mobile phone games because he feels that the mobile screen is too small to properly play a game. Before asked to select a character, he studied each pet’s profile carefully. While he found the game prototype to be amusing, he felt that as a male, it would be hard for him to play Ambee Planet with a friend because others may judge him. When asked if he would prefer the Ambee Planet to be more challenging, he said that he would prefer it to be “more dynamic”.

6.3.2 Testosterone Gamers

Participant-HT-M29 plays video games for about sixteen hours a week on average; he identifies himself as a Hardcore Gamer. When asked to freely navigate FreeSound 's sound map, he played sounds from his hometown. He is interested in all sorts of games, but he is especially into first-person shooter games. His favourite game is "Call of Duty Black Ops 2". When asked why he liked the game, he answered: "it is a very competitive game, the gameplay is excellent. It is dynamic. There are fifty weapons to choose from and you can customize new weapons". Participant-HT-M29 has played pet games but he tends not to play pet games because they "do not excite him very much and do not stimulate him the way he wanted to be stimulated". In Part B, C and D of the experiment, he felt that the guidance on how to use the UI and was important because he did not want to "make the wrong move". He is not likely going to play a game like Ambee Planet because it "would not hold his attention". Although not likely to play Ambee Planet himself, he said that he would definitely recommend it to a friend. The audio features of Ambee Planet draw his attention because "it is new and hasn't been done before."

Participant-LT-M21 used to play first-person shooter games, adventure games about six days a week when he was in High School. His favourite game is Assassin's Creed because "its historical components are really cool, action and characters are great." Participant-LT-M21 played Tamagotchi when he was young; he sees pet games as "a good way to keep kids happy if they really wanted pets". He does not play video games as much nowadays because he "gets tired fast". He mostly plays games to socialize with friends. When he was asked to use the Map function to find a sound to feed Kizmak, he also stated that he "did not want to make the wrong move". When asked if he could see himself playing Ambee Planet, he said that he could see himself playing Ambee Planet only if he "needed something to do on a long trip".

6.3.3 Lifestyle Gamers

Participant-L-F18 owns a DS but does not currently own any games. She felt that Freesound's sound map looked a lot like Google Map; she did not expect Freesound's map to have any features that were different from Google Map. Her favourite game is Mario Car. She enjoys the part of the game where she "grabs something and suddenly speed to the finish line". She likes digital pet games because she is able to "change her pets" in a video game. She could see herself playing Ambee Planet every time when she is in the train and possibly also three times a week, thirty minutes each time at random places. She stated that she would feel completely comfortable with singing to a virtual pet. Participant-L-F22 played PlayStation games everyday when she was in High School although "she could never finish a game". Her favourite video game is the Final Fantasy series because "they had good story and were pretty to look at" and she enjoys their plot. Participant-L-F22 is particularly drawn by pretty graphic design — "if it's ugly, I don't wanna play". She does not play games on her mobile phone for no particular reason — "I usually just listen to music". In Part B of the experiment, she felt that she "could not see any logic in Kizmak's liking". In Part C, she responded to Kizmak's singing and gasped: "so cute". Participant-L-F22 stated that she would not feel comfortable singing a song to a mobile phone. To Participant-L-F22, the pet's appearance would make all the difference; she mentioned that she did not want to choose Kizmak as a pet and if she were able to choose "the other character", which appeared to be the girlie one.

Participant-L-F29 had positive feedback on Freesound's web page. She quickly set her own directions and visited places that she wanted to go to on Freesound's sound map. She mentioned that the site would have been useful if she had known about it when she was a travel agent. Final Fantasy series are her favourite video games because their storyline and character development — "I am all about story." Participant is fond of the idea of exploring different sounds from the real world but felt that if she had to sing to the pet, it would make her not want to

play the game in public.

Participant-L-M36 is a Japanese language teacher who uses sound effect database sites to download sound effect to aid his teaching. He sound-traveled the world when he was asked to freely navigate Freesound 's web page. His favourite video game is Nethack, a difficult game in which he “always died and always had to start over”. He enjoys the “fresh start” in Nethack. He played virtual dog games, but found them to be “too much trouble”. He describes pet games as being “suitable for people who are lonely”. He could not see the purpose of the pet in the game when asked to find sounds to feed Kizmak. He felt that the application design would “have a real purpose” if it were to provide useful audio and geographical information on different locations of the world — “I would like to see photos of the place when I hear the sound”.

Participant-L-F45 enjoyed Freesound 's world map: “if I had free time, I would be doing (playing different sounds from the map) it for a long time.” She plays lots of games but mostly role playing games. Mother 2 is her favourite video game because it has cute characters and it “has one story only but it is a very touching story”. She has played many pet games such as virtual dogs, monsters and Tamagotchi games. She plays simulation games on her mobile phone and she plays them everyday. Participant-L-F45 could see herself playing Ambee Planet on a computer more than on a mobile phone because of its audio features. She said that she has many friends who she plays games with on the Internet and she thinks that they would really like a game like Ambee Planet. She suggested that the game would be more enjoyable if a player is able to collect pet accessories while finding sounds to feed his or her pet.

Participant-L-F65 was not able to find the purpose of Freesound 's map. She used to play video games downloaded by her son on her iPad for three hours a day. Her favourite game is Angry Birds, but she stopped playing when it became difficult for her to advance to the next level. She has never played any virtual pet games — “I have a real pet, which I can hug and physically play with”.

In Part C and Part D of the experiment, she felt especially drawn by Kizmak 's reactions. She felt that she could see herself playing the game but she would worry about not knowing how to play the game without someone showing her how. Participant-L-F65 stated that she would like to see more variety of music in Ambee Planet 's design. She thinks this game 's audio-based concept is especially attractive for one who has bad eyesight.

6.3.4 Family Gamers

Participant-LF-M28 and Participant-LF-F35 are parents of Participant-L-M5. All three participants play video games - Participant-L-M5 plays video games three hours a day. Participant-LF-M28 and Participant-LF-F35 describe playing video games as Participant-L-M5 's " favourite thing to do ". Participant-L-M5 said that his favourite part of Kirby 's Return to Dreamland, his favourite game is where his character " transforms ". When asked if Participant-L-M5 played pet games, Participant-LF-F35 said: " he has never had a pet game. He might play if he had one. But I think girls would like pet games more than boys ". Participant-LF-M28 feels that when it comes to buying a game for his child, he would prefer to buy a game that has an educational purpose. " At the moment, this prototype seems a bit too difficult for my child. Games that involve jumping and shooting enemies are easier to understand ", said Participant-LF-F35. However, Participant-LF-F35 said that she liked pet-to-pet interaction and she could easily see herself play Ambee Planet with a friend or if she had a daughter to play with. She stated that she would definitely recommend this game to her friends. Participant-LF-M28 said that he would neither play a pet game by himself nor with Participant-L-M5 due to lack of interest. Participant-L-M5 is not capable of reading language-based description at the moment. When he was asked to play three types of mobile phone pet games, he did not know how to begin playing. Nevertheless, once when he was shown how to feed a *niblet* to Kimimon or how to pet a horse, he could easily remember the pattern and repeat the same action.

Each virtual pet game held his attention for about less than two minutes. One observation to be noted is that even at such young age, Participant-L-M5's showed little interest in games that lacked action.

7. Discussion

7.1. Findings

When music and video database sites are excluded from the definition of “sound database”, only two out of thirteen participants said that they had used sound database sites prior to the interview. Compared to meaningfully assembled audio contents such as music and videos, “sounds” provide low entertainment value. Hence, contents of sound database sites do not engage the mainstream users as music sites. Although the difference is not drastic, when Freesound’s geotagged sound map is incorporated in Ambee Planet’s game design, the byproduct appears to become more enjoyable for the users.

Eight out of thirteen participants said that they could see themselves play Ambee Planet once it is completed — six of them being female. Results of this research indicate that pet game design is more fitting for the female audience than the male audience. The male audience has a tendency of seeking “a purpose” when making a move in a game and tends to be concerned with “making the right move”, even in a pet game design where the goal of the game is *cultivating a pet-owner relationship*. The female audience can see “cuteness” or “prettiness” as a purpose of a game; such behavior is unlikely found in the male audience. In the user testing sessions, the female participants responded to a virtual pet’s *emotions* more than the male participants. If all game functions aim to lead to a virtual pet’s emotional feedbacks, male audience may lose attention or interest quickly. Such behavior was observed in a male participant who was only five years old.

All participants were able to grasp the concept of making interaction with a virtual pet through the use of sound. Thirteen out of thirteen participants reported positively to Ambee Planet's audio-based game design. The results show that the concept of a game that is not playable without sounds is likely to be well accepted. However, two participants said that they would not feel comfortable with singing to a virtual pet at all.

Csikszentmihalyi asserts that one's experience of pleasure and enjoyment come from exercising control in difficult situation [6]. While his theory may still apply to a virtual pet game application, the Hardcore gamers who participated in the user testing mentioned that instead of increasing the level of difficulty of in-game challenges, they would like to see the game become more *dynamic*. Three participants reported that the level of challenge implemented in the prototype was fitting for their needs. If the level of challenge progresses, it is possible that some users may feel frustrated and lose interest of the game. After all, achievement in a virtual pet game is displayed in pet's growth and not in a player's mastery of a particular skill. Also, the nature of mobile device plays a part in determining the level difficulty in designing a game for mobile device. The results show that people do not have a high tendency of using their mobile devices to play video games — not even the Hardcore gamers who reported that they would like to be playing video games “at all times”. People who play mobile games tend to play them when they are “waiting for something” or have “extra time”. In order to fit into people's lifestyle of our time, mobile games may be more suitable to be designed for casual play rather than for full engagement. When the participants were asked to name and describe their favorite games, storyline appeared to play an important role in determining what a great game was. Therefore, instead of implementing an appropriate level of game challenge, implementing a satisfying level of game complexity such developing more possible scenarios of owner-pet interactions may be more suitable in a virtual pet game where the goal of the game is to establish a relationship between a virtual pet and its owner.

7.2. Limitations

Ambee Planet's audio-based game design makes it difficult for its users to play the game in a crowded place such as in a train or in a bus. This nature of the game may contradict to mobile game's primary function - many people play mobile games when they commute in order to kill time. Headphones will have to be in place if one would like to use the application in a train. Also, singing or making voice comment may be difficult or inappropriate in a crowded place such as a train or a bus. The Lullaby feature's functionality in such locations is questionable.

7.3. Significance

Ambee Planet is an innovative tool of communication. It is a virtual pet game application that allows its users to interact with virtual pet characters through the use of sound. Though further developments are still needed, results of the research show that Ambee Planet's game design can effectively engage female mass market game users. It is a new tool of communication. It will make communication between a human and a virtual pet more enjoyable.

8. Conclusion

8.1. Ambee Planet, a Simple yet Engaging Audio-based Mobile Virtual Pet Game

Our project, *ARound.hear* aims to create a communication tool that can provide social entertainment to its users through access of ambient sound. Although further developments are still needed, through implementation of audio-based interactions into the model of a typical mobile virtual pet game, we managed to create a audio-based mobile virtual pet game that is simple yet engaging to the mass market game users.

User evaluation indicates positive response to Ambee Planet's audio-based game design. Results of the experiment show that Ambee Planet's audio-based game design can effectively engage the mass market game users — the female audience in particular. The female audience of all ages is identified as the fitting audience for Ambee Planet because the nature of pet games. Females are likely to respond to a virtual character's display of emotions as long as it is cute or pretty. In order to properly engage female audience, it is important to develop a game that can stimulate the female audience's imagination. Personalization of a virtual pet character is extremely important. All female participants of our experiment expressed interest in collecting accessories to decorate the virtual pet. While increasing level of challenge in this game may be a way to make the game fun for its users, increasing the complexity of the game such as increasing the number of virtual pet's possible emotional feedbacks or strengthening the storyline may be more fitting than increasing the game's level of difficulty. Also, by creating more

functions that allow users to “personalize” a virtual pet, we would be able to make Ambee Planet more dynamic and thus more engaging.

8.2. Future Works

In order to improve the game design, three adjustments should be made. First, virtual pet character ’ s image should appear in the Map window, where players are expected to find sounds to feed the pet. It would help players make relation between locating a sound and feeding the pet. Second, location information such as the image of a certain street should be displayed in the home screen behind the image of a virtual pet as a background to indicate where a player has traveled with his or her pet to maximize the use of a map. A map is typically used to provide its users with geographical information. Freedsound’s geotagged sound map that is incorporated in Ambee Planet does not provide location-based information. Location-based items for collection may be a plus. Third, more in-game guidance or support for first-timers will have to be implemented. During our experiment, the interviewer provided voice guidance to show the participants how to play the game for the first time. Even when the user interface is designed to be simple and easy to understand, guidance is needed when a player enters the learning curve of a new or unfamiliar game.

Acknowledgements

I would like to dedicate this thesis to my parents - you made this possible. I feel privileged to have been able to continue my education in a number of countries and live an enriched life. Thank you for your love and support along the way. I would like say thank you to my loved one - you know who you are, thank you for coming into my life and make my world a better place. I would like to thank my sister for supporting me during past couple of months. I would like to thank all the wonderful friends whom I met through Keio Media Design. You guys made life inside and outside school worth looking forward to. I would also like to thank those lifelong friends of mine who are so precious to me. Thank you for always being there when I am in doubt. You are all angels sent by God.

I am so blessed to have you, all of you in my life. The past two years have not exactly been easy. Thank you all for your encouragement and support. Special thanks to the Professor Inakage, Professor Kato and Project Senior Assistant Professor Ueki. Thanks to you, I now get to embark on my next journey.

With Love,

Jennie Chih i Pao

References

- [1] Bateman, C., and Boon, R. *21st Century Game Design*. CHARLES RIVER MEDIA, INC, Massachusetts, USA, 2006.
- [2] Bickford, P. *Interface Design: The Art of Developing Easy-to-Use Software*. Academic Press, 1997.
- [3] Brathwaite, B., and Schreiber, I. *Challenges for Game Designers*, 1 ed. Charles River Media, Inc., Rockland, MA, USA, 2008.
- [4] Collective Reviewers on iTunes. なでなでフワムー — iTunes Preview, 2012. [Online; accessed 17-December-2012].
- [5] Collins, K. *Game Sound: An Introduction to the History, Theory, and Practice of Video Game Music and Sound Design*. The MIT Press, 2008.
- [6] Csikszentmihalyi, M. *Flow: The Psychology of Optimal Experience*. Harper & Row, 1990.
- [7] Hall, C. Pocket Frogs Review— 148apps, 2010. [Online; accessed 17-December-2012].
- [8] Kaplan, F. Free creatures: The role of uselessness in the design of artificial pets. In *Proceedings of the 1st Edutainment Robotics Workshop*, T. Christaller, G. Indiveri, and A. Poigne, Eds., GMD-AiS (September 2000).
- [9] Yokoi, A. たまごっち誕生記. KK ベストセラーズ, Shinjuku, Tokyo, Japan, 1997.

- [10] Zichermann, G., and Cunningham, C. *Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps*. O'Reilly Media, Inc., Sebastopol, CA, USA, 2011.

Appendix

9. Content of User Testing and Evaluation Session - Hardcore Gamer, Testosterone Gamer and Lifestyle Gamer

A. Interview - User Profile

A.1 Sound Database

A.1.1. Do you use sound database sites? When and why do you use sound database sites?

A.1.2. Have you heard of The FreeSound Project prior to this interview? And if so, when do you use it and for what purpose do you use it?

A.1.3. User who had not encountered The FreeSound Project's website is asked to navigate through the website for 5 to 10 minutes before answering the following question. On a scale of 10, please evaluate how much fun you have when you use The Free Sound Project's site.

No Fun At All 1 2 3 4 5 6 7 8 9 10 Some of Best Time in My Life

A.2 Video Games

A.2.1. Do you play video games? And if so, what types of video games do you play and how often do you play them?

A.2.2 On a scale of 10, please evaluate how much fun you have when you play video games in general.

No Fun At All 1 2 3 4 5 6 7 8 9 10 Some of Best Time in My Life

A.2.3. If you do play video games, please describe your favorite video game. Why do you like it?

A.2.4. On a scale of 10, please evaluate how much fun you have when you play your favorite video game.

No Fun At All 1 2 3 4 5 6 7 8 9 10 Some of Best Time in My Life

A.2.5. Have you played any digital pet games? And if so, what digital pet games have you played and how often do you play them?

A.2.6. What do you think of digital pet games?

A.3 Mobile Games

A.3.1 Do you play games on your mobile phone? And if so, what types of mobile games do you play and how often do you play them?

A.3.2 When and why do you play games on your mobile phone?

B. Prototype Evaluation - Map Feed

Tasks:

- Follow instruction to find a sound to feed Kizmak in Map Feed window (451:3:play 6:lower:play)
- Follow instruction to receive 8 diamonds to exchange for new character
- Find a sound to feed Kizmak without instruction

C. Prototype Evaluation - Lullaby Feed

Tasks:

- Follow instruction to find a sound to feed Kizmak in Map Feed window until Kizmak becomes sick (lower:play 6:upper:play lower:play lower:play)
- Follow instruction to heal Kizmak by singing a song

D. Prototype Evaluation - Exercise

Tasks:

- Follow instruction to go to the Exercise window
- Hold a mobile phone beside Kizmak to start a conversation

E. Interview - Overall Evaluation

E.1. Please briefly describe what this mobile game is about.

E.2. On a scale of 10, please evaluate how much fun you had playing this game.

No Fun At All 1 2 3 4 5 6 7 8 9 10 Some of Best Time in My Life

E.3. Can you see yourself playing this mobile game? If so, in what scenario can you see yourself playing this mobile game and how often? If not, why not?

E.4. Would you play this game if your friends play it?

E.5. Would you recommend this game to your friend?

E.6. Which part of this prototype did you enjoy the most? And which part of this prototype did you struggle with?

E.7. Would you prefer this game to be more difficult?

E.8. What do you think of the audio features of the game?

E.9. Are you interested in using this game to explore sounds from different parts of the world?

E.10. In this game, is being able to name the pet important to you?

E.11. In this game, is being able to change the pet ' s appearance important to you?

E.12. In this game, is being able to level up important to you?

E.13. What do you think of this mobile game? Please feel free to make any comments and suggestions.

10. Content of User Testing and Evaluation Session - Family Gamer

A. Interview - User Profile

A.1 Sound Database

A.1.1. Does your child use sound database sites? When and why does he or she use sound database sites?

A.1.2. Has your child visited The FreeSound Project's webpage? And if so, when and for what reason?

A.1.3. Participants who had not encountered The FreeSound Project's website is asked to navigate through the website for 5 to 10 minutes before answering the following question. On a scale of 10, please evaluate how much fun you think your child would have using The Free Sound Project's site.

No Fun At All 1 2 3 4 5 6 7 8 9 10 Nothing Else Would Make Him or Her Happier

A.2 Video Games

A.2.1. Does your child play video games? And if so, what types of video games does he or she play and how often does he or she play them?

A.2.2 On a scale of 10, please evaluate how much fun you think he or she has when he or she is playing video games in general.

No Fun At All 1 2 3 4 5 6 7 8 9 10 Nothing Else Would Make Him or Her Happier

A.2.3. If your child plays video games, please describe his or her favorite video game. Why do you think he or she likes the game?

A.2.4. On a scale of 10, please evaluate how much fun you think he or she has when he or she is playing his or her favourite video game.

No Fun At All 1 2 3 4 5 6 7 8 9 10 Nothing Else Would Make Him or Her Happier

A.2.5. Has your child played any digital pet games? And if so, what digital pet games has he or she played and how often does he or she play them?

A.2.6. What influences your decision when it comes to choosing a digital game for your child?

A.2.7. What do you think of digital pet games?

A.3 Mobile Games

A.3.1 3.1 Do you let your child play games on your mobile device? And if so, what types of mobile games does your child play on mobile device and how often does he or she play them?

A.3.2 When and why does your child play games on your mobile phone?

B. Prototype Evaluation - Map Feed

Tasks:

- Follow instruction to find a sound to feed Kizmak in Map Feed window (451:3:play 6:lower:play)
- Follow instruction to receive 8 diamonds to exchange for new character
- Find a sound to feed Kizmak without instruction

C. Prototype Evaluation - Lullaby Feed

Tasks:

- Follow instruction to find a sound to feed Kizmak in Map Feed window until Kizmak becomes sick (lower:play 6:upper:play lower:play lower:play)
- Follow instruction to heal Kizmak by singing a song

D. Prototype Evaluation - Exercise

Tasks:

- Follow instruction to go to the Exercise window
- Hold a mobile phone beside Kizmak to start a conversation

E. Interview - Overall Evaluation

E.1. Please briefly describe what this mobile game is about.

E.2. On a scale of 10, please evaluate how much fun your child would have playing this game.

No Fun At All 1 2 3 4 5 6 7 8 9 10 Nothing Else Would Make Him or Her Happier

E.3. Can you see your child playing this mobile game? If so, in what scenario can you see your child playing this mobile game and how often? If not, why not?

E.4. Can you see yourself playing this mobile game with your child? If so, in what scenario can you see yourself playing this mobile game with your child and how often? If not, why not?

E5. Can you see yourself purchase this game for your child? If not, why not

E.6. Would you purchase this game if your child's friend has it?

E.7. Would you recommend this game to another parent?

E.8. Which part of this prototype do you think your child would enjoy the most? And which part of this prototype do you think your child will struggle with?

E.9. Do you think the game should be more difficult?

E.10. What do you think of the audio features of the game?

E.11. Are you interested in using this game to help your child learn about world geography and etc.?

E.12. Do you think being able to name the pet is important to your child in this game?

E.13. Do you think being able to change the pet's appearance is important to your child in this game?

E.14. Do you think being able to level up is important to your child in this game?

E.15. What do you think of this mobile game as a parent? Please feel free to make any comments and suggestions.