5-7-2021

Augmented Reality Application 'Finder'

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by

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A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Fine Arts in Visual Communication Design

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May 07, 2021

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ABSTRACT

Children are always curious and excited about the world, but there are often accidents around them. According to some previous studies, each year in the United States, more than 2,200 children – or six kids a day – die from an injury at home. To deal with this situation, parents usually set simple life safety rules for their children and be consistent about enforcing them in a reasonable manner. At the same time, they try to reduce the possibility of psychological harm to children when correcting errors. As a result, parents desperately need a way to watch and improve their children's safety at home. However, how to use entertaining ways to make children recognize the danger, and be able to guide them correct behaviors to avoid harm? And how to notify their parents when the situation is bad? This is a big challenge for most parents and also applications that are out there right now. Therefore, I created an Augmented Reality (AR) interaction Application called ‘Finder’, which is a brand new application that can guide children to self-learning to avoid potential dangers in the house in a playful way, inform their parents of their real-time situation and promptly share a digital way to improve the safety awareness of children at home.

Keywords: AR App; Home Safety; Children Education; UX Research; Iteration

I. Introduction

Children are usually full of curiosity and exploration of this world, but there are often many dangers and accidents around them, especially children often encounter many dangerous situations at home for instance fire and burns, AC power plugs and sockets, dangerous appliances and sharp objects. According to the statistics from the Centers for Disease Control and Prevention, the National Safety Council and other sources, the children who are under 7 should not be left alone for any period of time, legally. But in this kind of situation, each year in the United States, more than 2,200 children – or six kids a day – die from an injury at home. In order to deal with this situation, on the one hand, parents always set simple life safety rules for their children and are consistent about enforcing them in a reasonable manner. And they got to begin early in the first, second and third grade before their youngsters began to experiment with these very, very dangerous substances. On the other hand, parents try to reduce the possibility of psychological harm to children when correcting errors. However, for the level of cognition most children have, they don't understand security warnings very well, and often feel that their parents' advice is boring. To address this problem, I am trying to figure out how to use a more fun, interesting and entertaining way to allow children to recognize the existence of danger, and be able to judge the correct behavior to perform to avoid harm. Therefore, I came up with the idea of creating an Augmented Reality (AR) interaction App called 'Finder' to solve the problem I mentioned above.

II. Context

2.1 Problem

2.1.1 The children who are under 7 should not be left alone for any period of time, legally. But in this kind of situation, each year in the United States, more than 2,200 children – or six kids a day – die from an injury at home.

2.1.2 Children are always curious and excited about the world, but there are often accidents around them. For the level of cognition they have, they don't understand security warnings very well, and often feel that their parents' advice is boring.

2.1.3 Parents need to set simple life safety rules for their children and be consistent about enforcing them in a reasonable manner. Reduce the possibility of psychological harm to children when correcting errors.

2.2 Challenge

How to use entertaining ways to make children recognize the danger, and be able to guide them correct behavior to avoid harm? And how can they notify their parents when the situation is bad?

2.3 Design Features and Approaches

2.3.1 Design Features

The design goal of my application is to create a fun and relaxing way to help children learn about the hazards in the family environment and avoid possible harm to the greatest extent. Therefore, my application has incorporated the following characteristics and features. First and foremost is the scan engine, which can scan all rooms as a whole, and be familiar with the relative space and location. Gamification and AR animation are both very important features, which can inspire children to notice and aware the danger in a more playful way and help them to independently learn by themselves. Last but not the least, the alert system is a very beneficial feature since it just adds an additional layer of protection for children and can better assist parents.

2.3.2 Scan Engine

This app can scan the real situation of home to find and report the danger. Just like the specific furniture and the placement of some facilities, because different families and children of different ages have different attitudes to dangerous goods and environments that need to be vigilant. And will store a series of spatial scan results in the application as well.Customize different dangerous goods lists by scanning to better meet the needs of users.

2.3.3 AR Animation

As I choose this topic and design my application, I also face a challenge: how to make children aware of the dangers through gamification and entertainment, and let them make the right judgments and perform the right behaviors to avoid potential harm. So I incorporated AR technology into my application to superimpose the information it wants to present on top of reality, and let children capture everything they are interested in through the lens of their mobile phone. Detect the size of the object on the screen through the lens, and judge the distance between the child and the danger. Through this method, the app can find the dangerous items through AR screens, grab children’s attention. Let children learn to actively avoid danger in a more straight and interesting way.

Cognition is the process by which we acquire knowledge, apply knowledge and information processing. It includes feeling, perception, memory, thinking, imagination and language. Attention is the first stage of the cognition process and also the basis of cognition. By letting children use apps to scan, I can easily attract

children’s attention through interesting and exaggerated AR animations. Research shows that people are more inclined to focus on dynamic, negative or conflicting information. So my application can solve this problem well. And concentration is also a very important aspect. Concentration is a continuous cognitive activity. Coupled with the gamified achievement experience, my app can improve the child's ability to maintain attention, so that the child becomes active in the process of focusing. This subjective experience plays a vital role in the formation of their subsequent safety awareness and learning to avoid dangerous behaviors. When an event attracts the children's attention, the children begin to recognize it. Thus, the application I designed played a very good role in the cognition process. Because once children’s curiosity is aroused, they begin to actively and autonomously explore the problem of what to do. At the same time, the application will popularize scientific protective measures and correct practices for children in an interesting way. The next stage of the cognitive path is decision-making. Children's cognitive abilities shape their perceptions of things and largely influence their decision-making and behavior. So the application helps children make the right decisions by attracting their attention and building a normal cognitive system thereby further deepening their memories.

2.3.4 Alert System

This application also adds a safety measure, that is, when children cannot stay away from danger, the system will automatically send out an alarm to remind parents to pay attention. The app can be linked to smart speakers, so that no matter how far the parent is from the phone, it will maximize the warning. In this way, I try to implement this application to achieve highly safety for children through parental intervention and assistance.

2.3.5 Gamification

In this app, achievement stars will appear every time you successfully avoid danger. After accumulating a certain number, children can ask their parents for rewards. Combining safe behaviors with encouragement, coupled with the dynamic effect of the mobile phone screen, gives children a feeling of playing games. Communicate safety knowledge in entertainment.

III. Design Methods

3.1 Literature Reviews

Literature reviews are the fundamental method of research to find the feasibility for my project. I searched, collected, discussed and summarized a lot of papers and researches related to my topic.

Because I cannot reach children of all ages in the survey, literature review can help me to narrow down the characteristics of the target audience.

Through my research and investigation, I have made the following important research findings: Firstly, in 2015, Psychological Science in the Public Interest, which is a unique academic journal covering comprehensive and convincing reviews of issues in psychology to the public, showed four factors to look for in an app for a more effective educational experience : active involvement, engagement, meaningfulness and social interaction. So I set these four factors as my guidelines when I conducted my entire design process. Especially when I analyze the market and competitors, I try to characterize my app with some unique features based on this. Secondly, toddlers can not learn from the screen. Children have the ability to read until they are 5 years old. So my target audience is children from the age of five to twelve which also called gradeschooler. Thirdly, in the United States, according to the Children's Online Privacy Protection Act (COPPA), collecting personal information from children is illegal without verifiable parental consent. For this reason, my app development will comply with COPPA, getting parent consent or creating in a “zero-data” environment. Furthermore, a nationally representative survey of parents found that 98% of families with children now have mobile devices such as tablets or smartphones, which has increased tremendously, nearly doubling compared to six years ago. Around 42% of children now have their own electronic devices. In addition to that, the average time that children use handheld electronic devices is also increasing rapidly: from only 5 minutes of use per day in 2011, to 48 minutes of use a day in 2017.[1] All of these new features are in line with my desire to create a new application to help parents improve their children’s safety awareness. Moreover, Augmented Reality (AR), a technology that ingeniously integrates virtual information with the real world, developed very fast during recent years. Generally speaking, AR is to let electronic devices understand the real world, and superimpose virtual information on the basis of the real world, so as to achieve the effect of augmented reality. Based on ARtillery Intelligence, a research arm from AR Insider publication, the total number of active AR users is 334 million in 2019, and the total number of active AR users is expected to be 125.9 million in the U.S. in 2022. Regarding the frequency, 76% or more of mobile AR users are very active monthly. Among all mobile AR users, 78% of them were satisfied or highly satisfied.[2] By the foregoing analysis, I decided to create my own AR interaction application aiming to guide children from five to twelve to learn to avoid potential hazards and reduce the rate of being hurt at home.

3.2 Interview

[1] *Kamenetz,‘’Young Children Are Spending Much More Time In Front Of Small Screens.”*
[2] *Boland,* “Where Are We in AR’s Lifecycle?”

Interview is a convenient and effective communication method, which allows me to pass information to children and their parents face to face, collect feedback from them, and adjust the interview progress in real time through observation. So I applied the interview method as one of my main design methods. Sometimes I went to the park near my home to practice skateboarding. At the same time, there are many children and their parents playing in this place. Some of them happen to be the target audience of this application. So I talked to some of them and finished the semi-structured interviews and tried to figure out and learn from their concerns and pains. I chose the semi-structured interviews because of the high flexibility and freedom, which is much easier to communicate with children and also expand and deepen my research. As a result, I interviewed a total of nine people, four of them were unwilling to be interviewed, so I finally interviewed the remaining five people. After the interview, I compiled the content of the interviews and finally found out the following main problems and concerns. Compared with outdoor activities, parents cannot always keep their eyes on their children at home. So it is very easy to neglect to take care of the child when there is something to be done right away. On the premise of safety, children should have the freedom to use various spaces and tools at home. And severe criticism will hurt children's feelings, but children without clear rules will make the same mistakes repeatedly.

3.3 Competitor Analysis

Competitor analysis is to identify the current direct and potential competitors, collect their relevant information and analyze the advantages and disadvantages, so as to develop unique design and selling points and make this application stand out.

Although the concept of AR has become very popular in recent years, it has even been hailed as a new model of future education. However, there are not many types of education. For the above reasons, I explored the existing educated or home experienced applications, and compared three of them to find out necessary factors for the next step of my design. As you can see in Figure 1, I analyzed three competitors, namely IKEA Place, Outside and Seek, in four dimensions. For the ‘Discover the Unknown’ dimension, all of them performed very well and have their own characteristics because this is a very important part for all these companies. For the ‘Children Mode/ Parents Control’ dimension, all of them did not have this feature because of the company's own considerations and product settings. Considering the ‘Encouraged Feedback’ dimension, currently only Seek has this character. The other two companies do not have any complete reminders and encouragement. Regarding the ‘Teach Knowledge’ dimension, Outside and Seek both consider this and can guide users. So in my own design, I try to use this competitor analysis to find out my own application positioning. It is an indoor education app, use the AR function and gamification way to communicate with children efficiently.

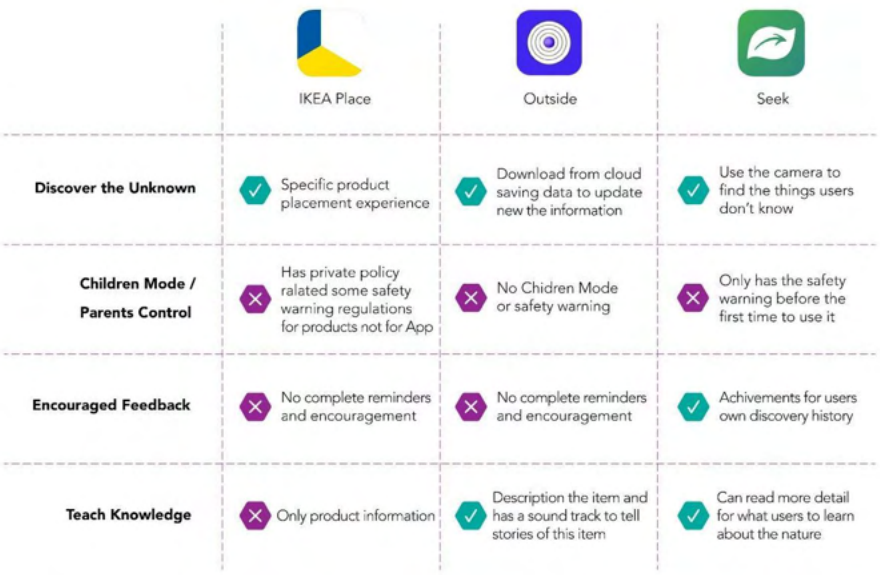

Figure 1 Competitor Analysis

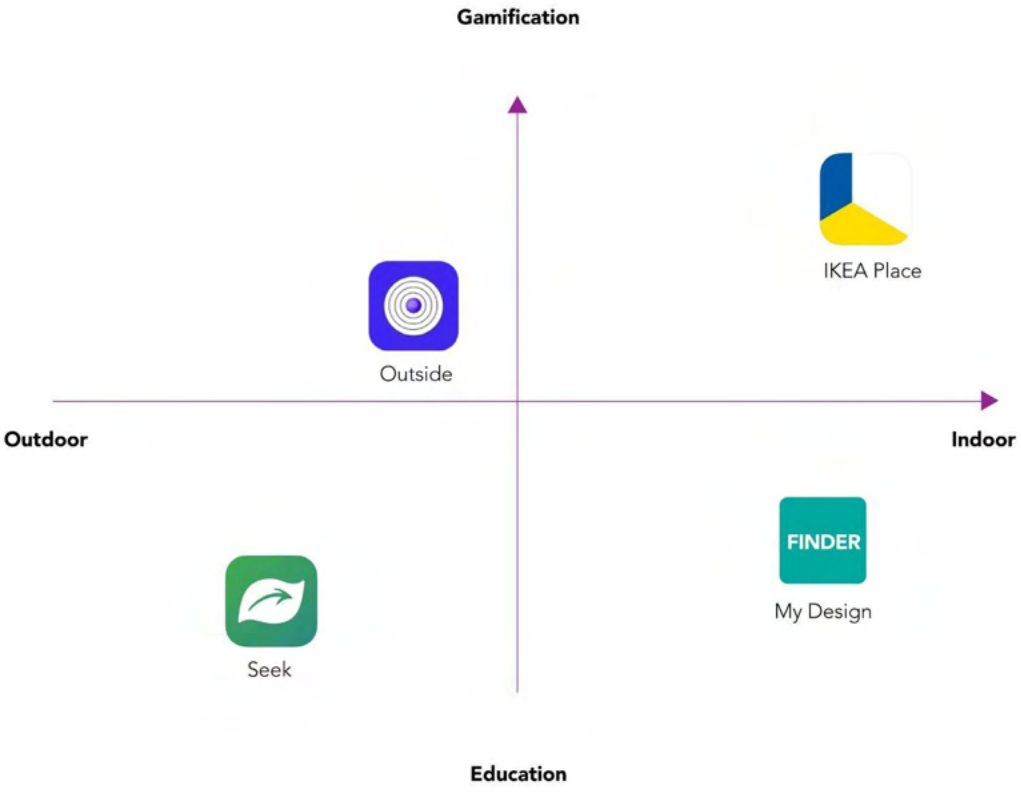

Figure 2 Feature Comparison Matrix

3.4 Persona

As Alan Cooper, "the father of Visual Basic", mentioned:" A persona is a fictitious, specific and concrete representation of target users."[3]Through interviews, I obtained the basic information and behavioral characteristics of target users. According to the differences between users, I estimated and understood their diverse needs, and imagined their usage scenarios, so as to design my application more accurately to meet the needs of them. The target user can be divided into two parts, the first one is the child user and the second is the parent user. They are all involved in the prevention and control of dangers in the environment. Then with all the research above, I built up two personas and a user storyboard to focus on the target users' needs. This will expand on the detailed description as Figure 2 and Figure 3 shows below.

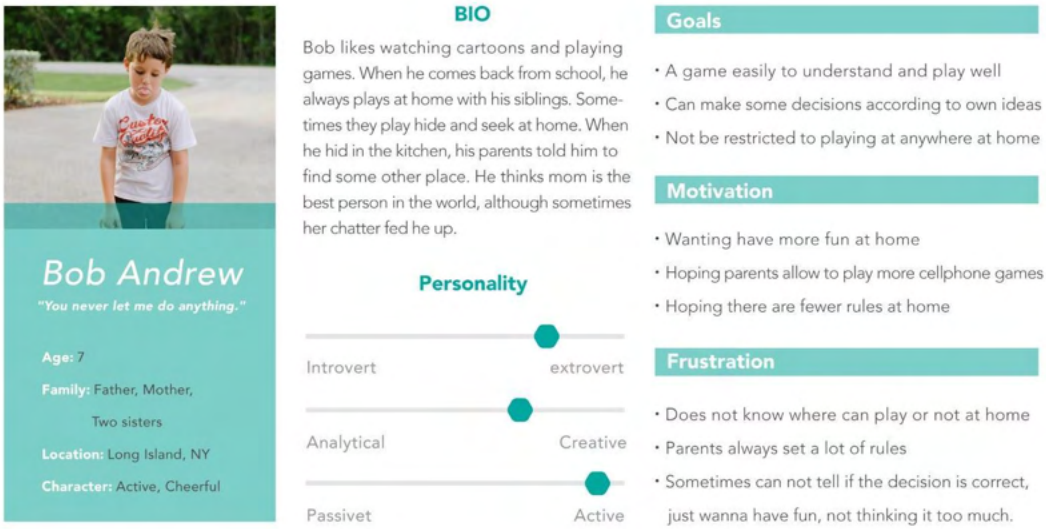

Figure 3 Child User Persona[4]

[3] Alan Cooper, "*The Inmates are running the Asylum"*, 2nd ed.,(Sams Publishing, 2004).
[4] [Figure 3. This child image downloaded from https://unsplash.com/photos/W82dYwtQrTk in April 2021.]

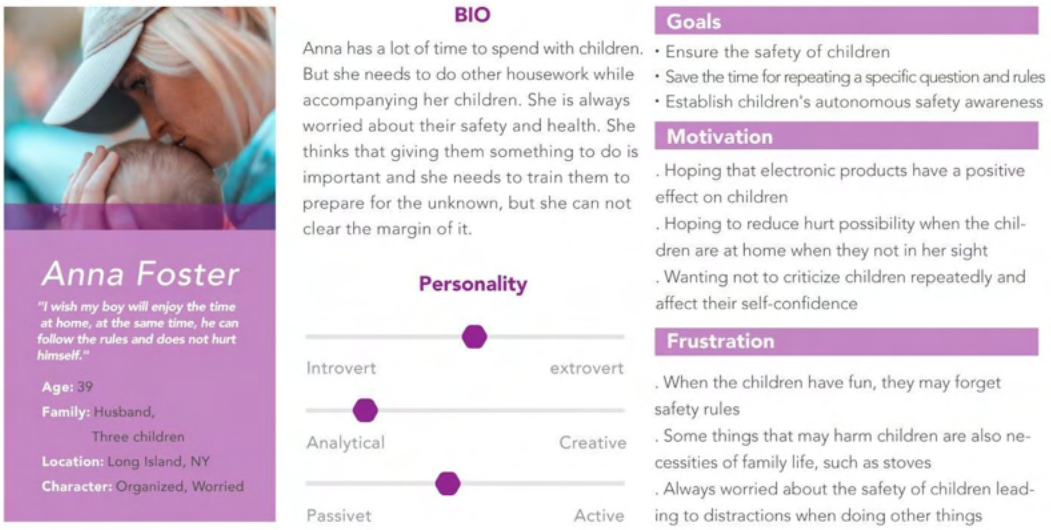

Figure 4 Parent User Persona[5]

User Storyboard:

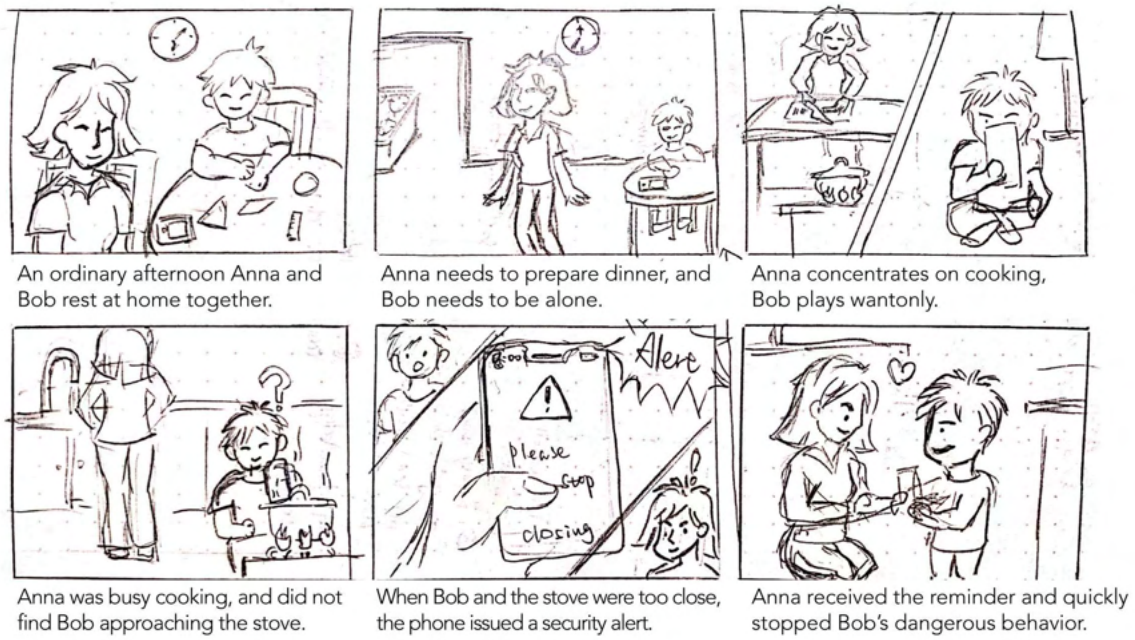

Figure 5 User Storyboard

[5] [Figure 4. This parent image downloaded from https://unsplash.com/photos/FK247ivR83A in April 2021.]

3.5 User Flow Diagrams

After all above research, I found that the whole roadmap for protecting children has 3 important points: what is danger before they close to some space, how they deal with the danger when they face it and what they can learn from it to make sure the next time they face it alone.

Therefore, I design a user flow diagram to define what this App needs to provide to the target users. And this also will guide me to create the wireframe for the next step.

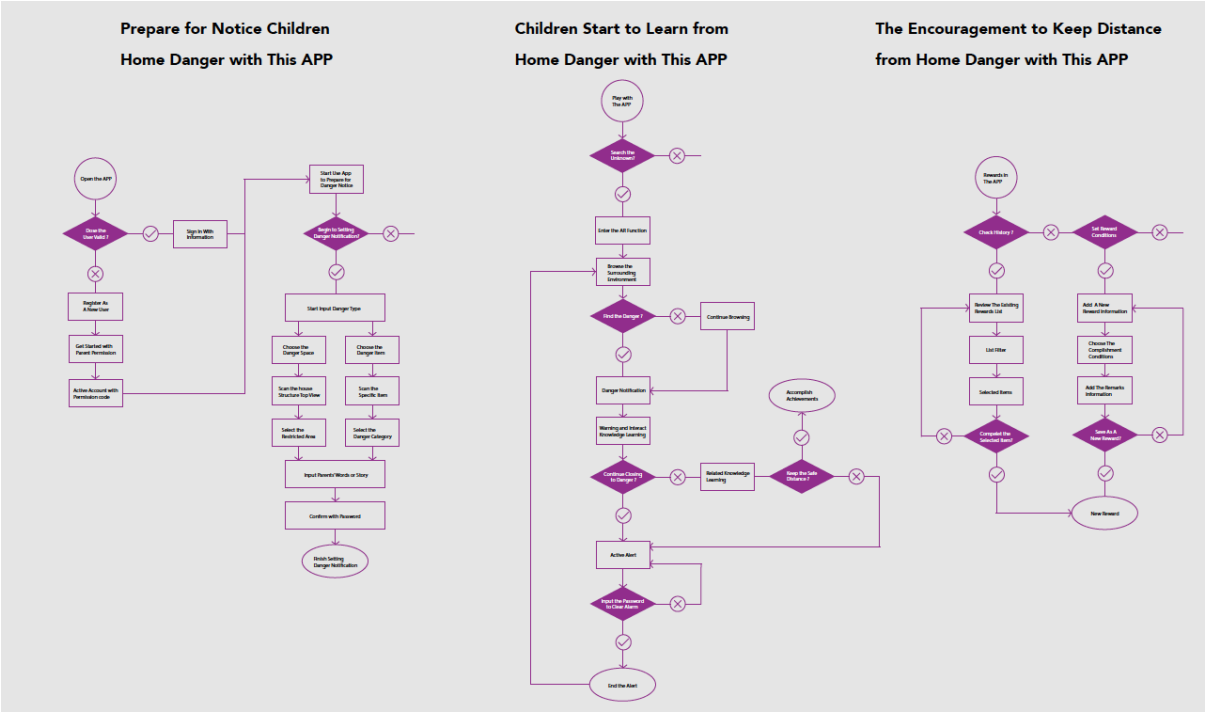

Figure 6 User Flow Diagrams

3.6 Low-Fi Wireframes

According to the guidance of user flow, I made wireframes. The main functions and interactive interface of the app are determined.

The function of the app is aimed at both children and parents, so the design strategy is different. The part of parental control is more rational, with more text descriptions. The part used by children is more experience oriented, and there are more graphical ones.

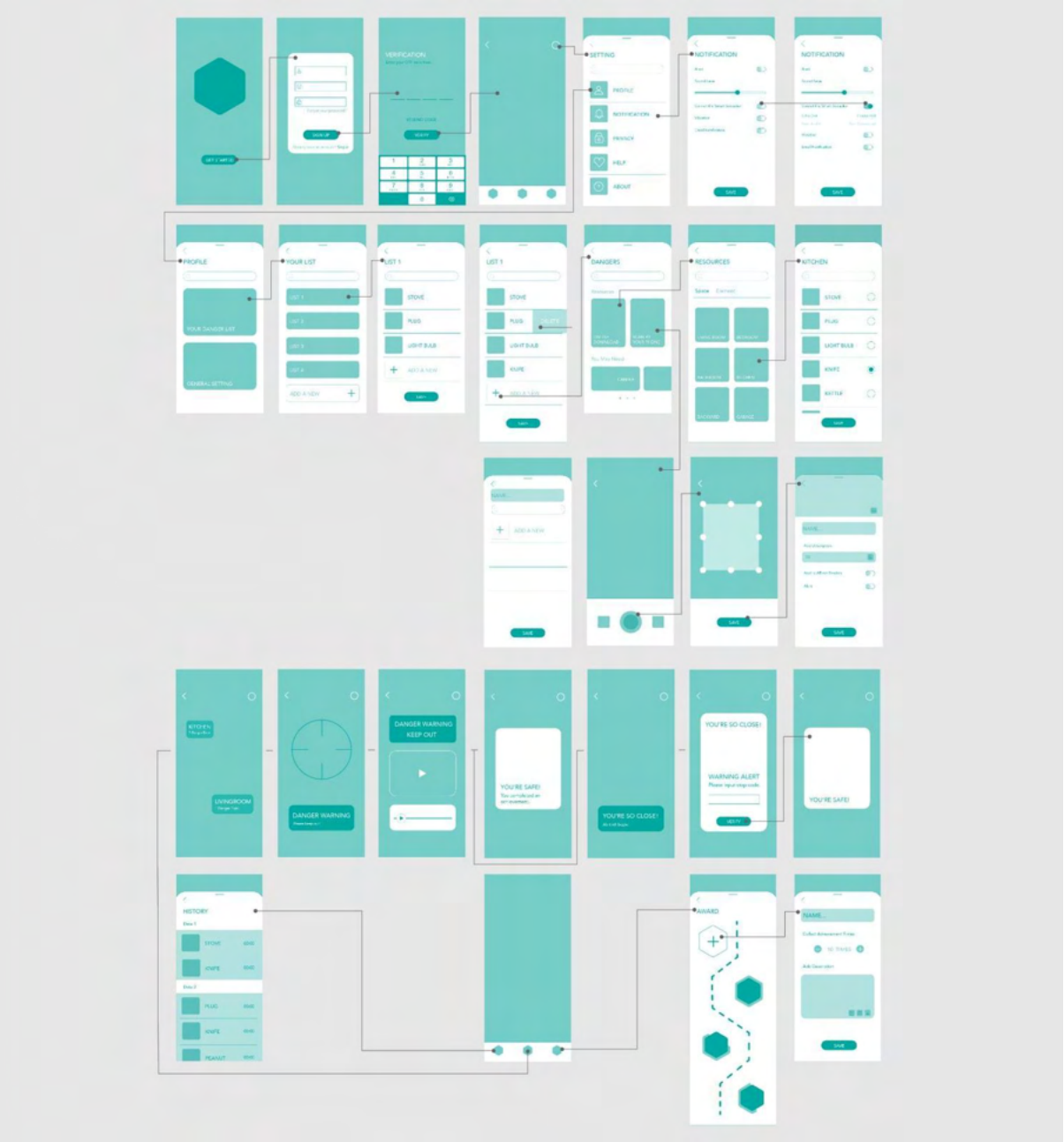

Figure 7 User Flow and Low-Fi Wireframes

IV. Results

4.1 Scenario 1 : Connect to Smart Speaker

Parents can log in to the App via email to better protect their children. After sign in , they can open the alert system and link the smart speaker. When the mobile phone detects danger, it will automatically alarm. Make sure to get parents' attention.

4.2 Scenario 2 : Customized the Danger List

Parents can set a customized list of danger for their kids. Then they will do real-time AR search through the screen. For different needs, they can start the scanning system to add a user-defined list.

4.3 Scenario 3 : AR Explore and Automatic Alert

Children can use the APP to explore anywhere in the home. When dangerous items are found, reminders will automatically pop up on the screen. If the phone feels that the distance is not pulled apart, a warning card and a voice reminder will appear automatically. Kids can keep the distance to get an achievement star as an encouragement. If the app detects that the distance is continuously approaching danger, and it will issue a strong alarm. The linked speaker will also sound an alarm, and it will stop only if the parent enters the release code.

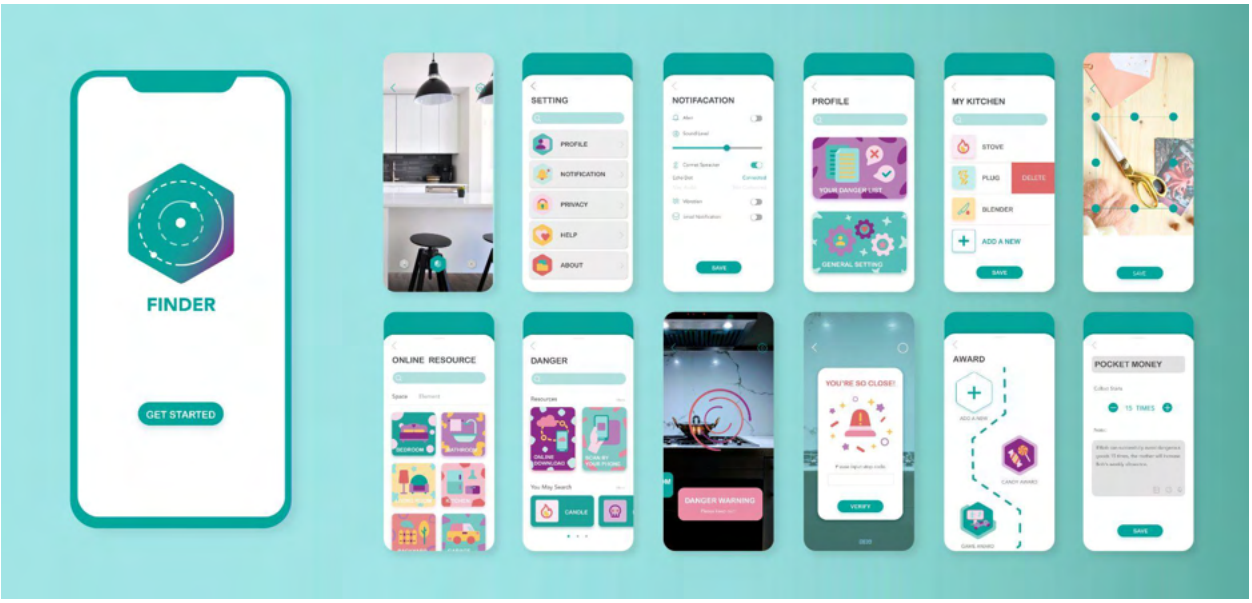

Figure 8 Hi-Fi Result

V. Evaluation & Discussion

5.1 Usability Testing

At the real process, before the hi-fi wireframes were built, I conducted a small user test. Usability Testing is to provide participants with the product or application interface to be tested, requiring the tested users to operate the product or interface in accordance with the specified tasks, and simultaneously, immediately speak out their own thoughts, feelings and opinions when using the product interface. I choose to apply this method because it allows me to directly see the real interaction process between users and products, which helps me to understand users' cognition and behavior more realistically and intuitively and to understand their thoughts more easily. In addition, it can also help me to understand where the tested user is lost or made a mistake in the product, so as to optimize the design more accurately. In this way, I can also easily check the reasonableness of low-fi wireframes and advance my design interfaces and user effectiveness. There are a total six representative users who have participated in my test. Next, I will briefly introduce my testing process. First step is to find the representative participants, and ask them to try the paper prototypes. Just like asking them to complete a task flow by it. Secondly, I observed their performance throughout the whole process with prototypes. Then, I talked with them about the experience and recorded their feelings at the same time. Last but not the least, I thanked them for their help. With the feedback from the participants, I made some adjustments for iterations, which I will expand into more details in the next section.

5.2 Iterative Design

Iteration usually refers to the process of continuous optimization and updating of products. Iterative design is an important step in the user interaction experience design process, and it is also an essential part of optimized design. This design method can effectively use real-time user feedback to improve and perfect our existing design. Thus, I conducted a total of three iterations. In my iterative design, I always remembered to think about the problem I want to solve and think with the purpose to get effective improvement. Next, I will expand my three iterations in detail as follows.

5.2.1 Iteration 1: How to use the App to clarify danger efficiently ?

From the ‘Usability Testing’ section, just as one of the participants wondered “What if the item I want to select is not in the list? How long do I have to swipe to make sure it is not there?” I found there are some problems in my previous design. Since it is a little difficult for users to define which category certain items belong to. And the list is kind of too long, which takes time for users to browse. To deal with these problems, I added a ‘Danger Category’ page, and also a segmentation search category. To be specific, I added a search bar to directly search for items that users need in order to save users' time. In addition to online item classification, I also added a manual scanning input function to enrich the item library. At the same time, I listed some common items and provided users with a shortcut to choose.

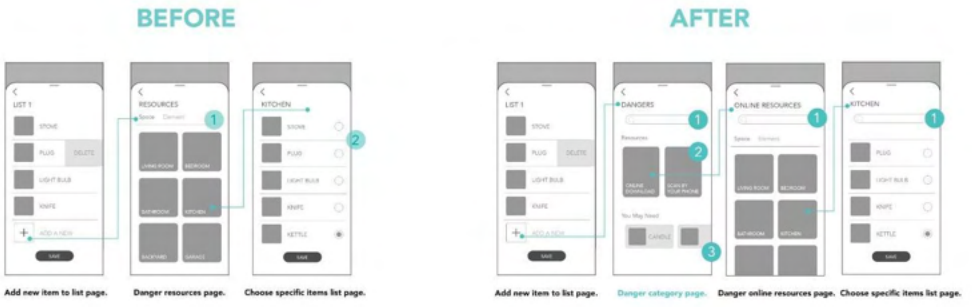

Figure 9 Iteration1

5.2.2 Iteration 2: How to make users more proactively away from danger ?

One of the participants questioned in the 'Usability Testing' section that "How to avoid if children click to confirm that they are not approaching, but can not do it?" There are indeed some shortcomings in my previous design. For example, it may obscure the user's insight, allowing the user to approach the danger without perceiving it. And children may have unrecognized words, hard time to read, and finally lose interest, which may make them skip the reminder quickly. If this situation becomes true, the app can not serve as a warning. Next, after clicking on the clear danger, there is no guarantee that the user is completely away from the danger at that time. Therefore, I designed the following improvement updates for my application. Firstly, I used the halo to determine the location of the danger, and use the card to remind users of the danger. Secondly, since most children like to listen to stories and use voice reminders instead of text. So I popularize common sense of dangerous items in my design. Thirdly, If the item exceeds a certain area and distance on the screen, it means that the user is too close to the dangerous item. When this situation happens, the system will immediately automatically deliver an alarm. In order to cancel the alarm, the permission code set by the parents is required by the system.

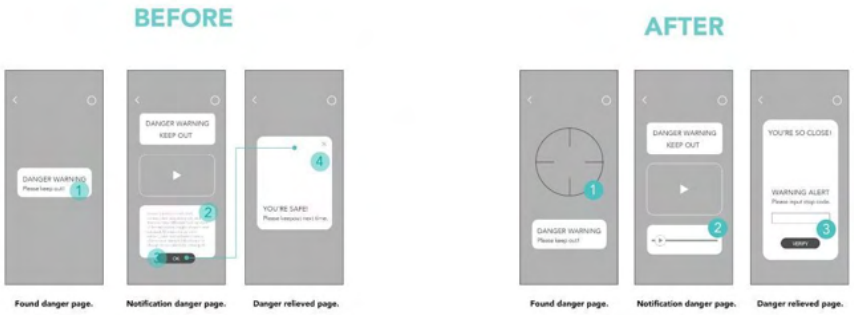

Figure 10 Iteration2

5.2.3 Iteration 3: How to make rewards more motivating for children to complete tasks ?

During the ‘Usability Testing’, some participants asked “How to let children voluntarily stay away from danger?” I went over my previous design and made some improvements. Previously, the progress bar may make users feel confused. Since the more users approach the danger, the easier for them to complete the task. And children’s curiosity about the unknown will cause them to want to explore the unknown dangers, which is prone to safety risks. For the sake of coping with the above potential safety risks, I came out with the following improvements to optimize my design. I added a new function to my application, so that users can customize the list and conditions of rewards. The reward comes from the number of times successfully maintaining a safe distance, not the number of times a danger is found. In this way, I try to improve users' safety awareness. Furthermore, parents can encourage children to complete tasks with customized rewards that are more in line with their children's needs.

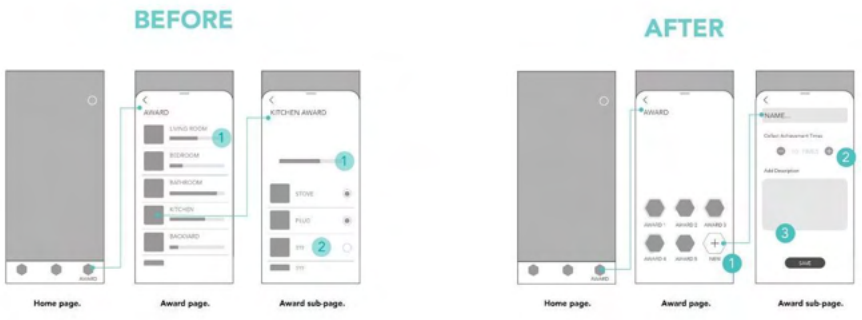

Figure 11 Iteration3

VI. Conclusions

5.1 Theory guides practice

In this thesis project, I used interviews, competitor analysis to reach the project target and built the persona, user storyboards to Close to the real audience. Follow the user flow diagram to make the low-fidelity prototype.Then used the paper prototype to test the design. Get feedback from participants in the test and guide the final practice. The user experience method from beginning to end guides the final design results. Make my design not only a visual result, but also a practical tool to solve problems. Let me learn the scientific design theory to guide the specific design process.

5.2 Cross-device Usage

In solving the problem of how to wake up parents in danger, my design uses smart home appliances-smart speakers. With the development of mobile phones and the Internet, more and more smart home appliances are flooding our lives, bringing more convenience to mankind. The future should

be an era of smart homes. Designers should pay more attention to smart homes and look for more possibilities, do more cross-device usage design.

5.3 Specificity of design for children

Children are quite different from adults in their consciousness and understanding. When designing for children, we should pay more attention to the psychological needs of children. Focus on guidance and communication, and reduce admonishment. Children's simple way of thinking is also the best embodiment of "Don't Make Me Think".

5.4 Think of AR products

From traditional media to Internet media, design has undergone tremendous changes, new industry segments are born, and outdated industries shrink. Now, AR has slowly entered the lives of users, designers should pay attention to the development direction of the times, use them to guide and improve their skills, and not be abandoned by the times.

VII. Appendix A: References

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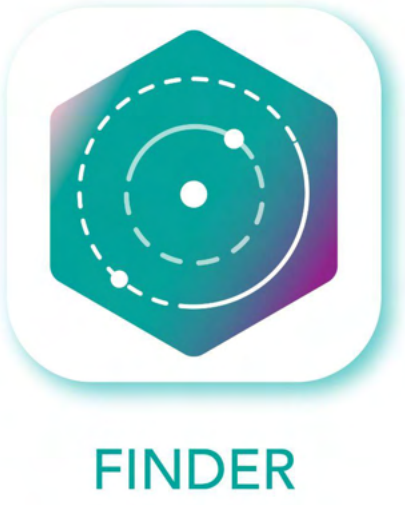
Appendix B: Thesis Defense Presentation



FINDER

Finder is an AR interaction app that can guide children to learn to avoid potential dangers in their home and inform their parents of their situation promptly. This will share a digital way to improve the safety awareness of children at home.

CHALLENGE

How to use entertaining ways to make children recognize the danger, and be able to guide them correct behavior to avoid harm? And how can notify their parents when the situation is bad?

PROBLEM

1. Children are always curious and excited about the world, but there are often accidents around them. For the level of cognition they have, they don't understand security warnings very well, and often **feel that their parents' advice is boring**.

2. The children who are under 7 should not be left alone for any period of time, legally. But in this kind of situation, each year in the United States, **more than 2,200 children** – or **six kids a day** – die from an injury **at home**.

3. Parents need to set simple life safety rules for their children and be consistent about enforcing them in a reasonable manner. **Reduce the possibility of psychological harm to children** when correcting errors.

SOLUTION

Scan Engine

Scan the real situation of home to find and report the danger. Easy for children to understand and operate.

AR Animation

Show dangerous through AR screens, grab children's attention to pay attention. Let children learn to actively avoid danger in a straight way.

Gamification

Use gameful content to increase user participation and inspire children to think about the right decisions when they face dangers.

Alert System

When children cannot stay away from danger, the system will automatically remind parents to pay attention to check their safety.

Literature Review

Literature reviews are the fundamental method of research to find the feasibility for my project. Because I cannot reach children of all ages in the survey, literature review can help me to narrow down the characteristics of the target audience.

Research Findings:

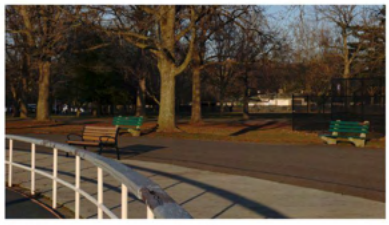
1. 2015, in the journal Psychological Science in the Public Interest showed four factors to look for in an app for a more effective educational experience : **active involvement**, **engagement**, **meaningfulness**, **social interaction**.

2. Children have the ability to read after 5 years old. **Toddlers can not learn from the screen**.

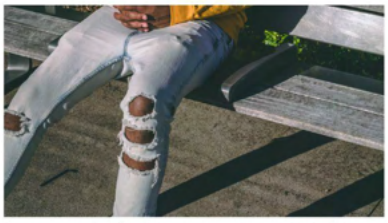
3. In the United States, the Children's Online Privacy Protection Act (COPPA), **collecting personal information from children is illegal without verifiable parental consent**. App development needs complying with COPPA, getting parent consent or creating in a "zero-data" environment.

Interviews with Target Users

Sometimes I go to the park near my home to practice skateboarding. At the same time, there are many children and their parents playing in this place. Some of them happen to be the target audience of this app. So I talked to some of them and finished the semi-structured interviews. **Tried to figure out their concerns and pains**.



[This park image photographed by the auther in March 2021.]



[This person image downloaded from https://unsplash.com/photos/mhpX02AGQNA in April 2021.]

Interviewed Record:

Female, Age 39, a 5 years old daughter, driver, American, lives in Long Island.

Male, has a 3 children, accounting, American, lives in mineola.

Female, has 2 sons and 1 daughter, Americalives in Long Island.

Male, Age 6, primary school student, Chinese, lives in Long Island.

Female, Age 34, has a 6 years old son, Chinese, lives in Long Island.

Key Problems:

NO.1

Compared with outdoor activities, parents **cannot always keep their eyes on their children** at home.

NO.2

On the premise of safety, **children should have the freedom** to use various spaces and tools at home.

NO.3

It is easy to **neglect to take care of** the child when there is something to be done right away.

NO.4

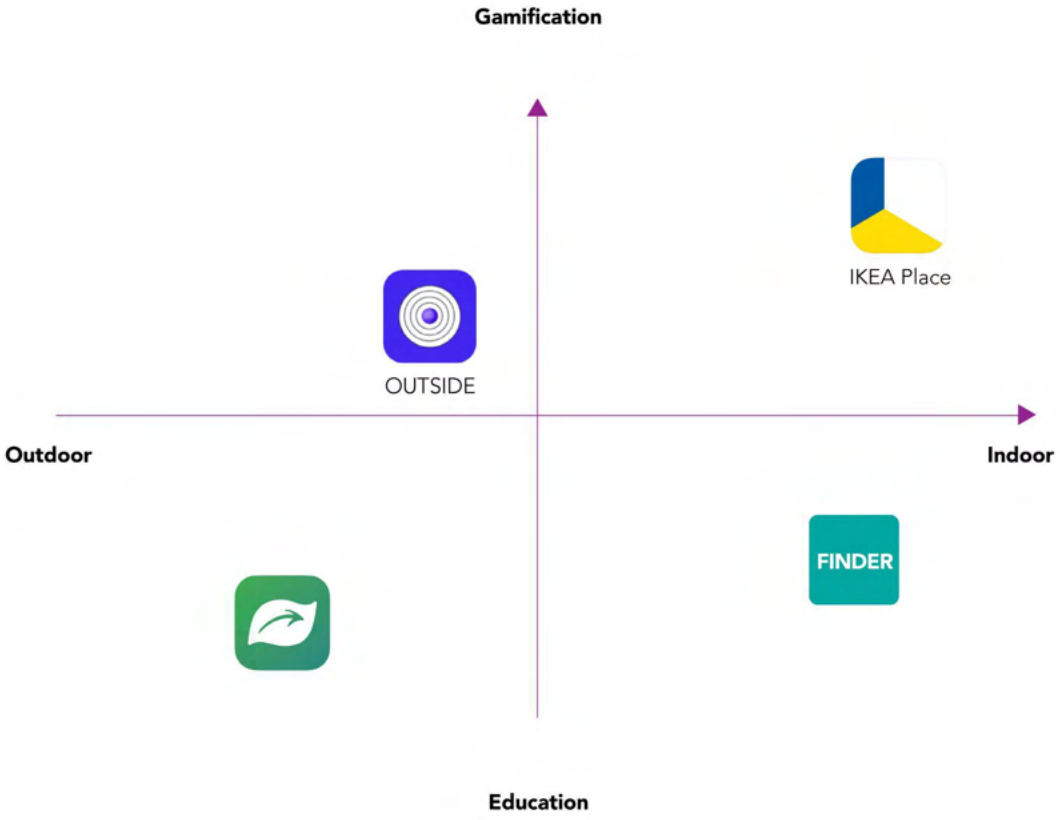
Severe criticism will hurt children's feelings, but children **without clear rules** will make the same mistakes.

Competitor Analysis

Although the concept of AR has become very popular in recent years, it has even been hailed as a new model of future education. But there are not many real applications of AR, and there are fewer types of education.

I explored the existing educated or home experienced applications, and compared three of them to find out necessary factors for the next step design.

	IKEA Place	OUTSIDE	Seek
Discover the Unknown	✓ Specific product placement experience	✓ Download from cloud saving data to update new the information	✓ Use the camera to find the things users don't know
Children Mode / Parents Control	✗ Has private policy ralated some safety warning regulations for products not for App	✗ No Chidren Mode or safety warning	✗ Only has the safety warning before the first time to use it
Encouraged Feedback	✗ No complete reminders and encouragement	✗ No complete reminders and encouragement	✓ Achivements for users own discovery history
Teach Knowledge	✗ Only product information	✓ Description the item and has a sound track to tell stories of this item	✓ Can read more detail for what users to learn about the nature



Persona and User Storyboard

With the all research above, I built up Persona and User Storyboard to focus on the target users' need.

The target users can be divided two parts, parents and their kids. They are all involved in the prevention and control of dangers in the environment

Kid Persona:

Bob Andrew

"You never let me do anything."

Age: 7

Family: Father, Mother, Two sisters

Location: Long Island, NY

Character: Active, Cheerful

[This child image downloaded from https://unsplash.com/photos/W82zfYwtQvTk in April 2021.]

BIO

Bob likes watching cartoons and playing games. When he comes back from school, he always plays at home with his siblings. Sometimes they play hide and seek at home. When he hid in the kitchen, his parents told him to find some other place. He thinks mom is the best person in the world, although sometimes her chatter fed he up.

Personality

Introvert — extrovert

Analytical — Creative

Passivet — Active

Goals

- A game easily to understand and play well
- Can make some decisions according to own ideas
- Not be restricted to playing at anywhere at home

Motivation

- Wanting have more fun at home
- Hoping parents allow to play more cellphone games
- Hoping there are fewer rules at home

Frustration

- Does not know where can play or not at home
- Parents always set a lot of rules
- Sometimes can not tell if the decision is correct, just wanna have fun, not thinking it too much.

Parent Persona:

Anna Foster

"I wish my boy will enjoy the time at home, at the same time, he can follow the rules and does not hurt himself."

Age: 39

Family: Husband, Three children

Location: Long Island, NY

Character: Organized, Worried

[This parent image downloaded from https://unsplash.com/photos/FK247vR83A in April 2021.

BIO

Anna has a lot of time to spend with children. But she needs to do other housework while accompanying her children. She is always worried about their safety and health. She thinks that giving them something to do is important and she needs to train them to prepare for the unknown, but she can not clear the margin of it.

Personality

Introvert — extrovert

Analytical — Creative

Passivet — Active

Goals

- Ensure the safety of children
- Save the time for repeating a specific question and rules
- Establish children's autonomous safety awareness

Motivation

. Hoping that electronic products have a positive effect on children

. Hoping to reduce hurt possibility when the children are at home when they not in her sight

. Wanting not to criticize children repeatedly and affect their self-confidence

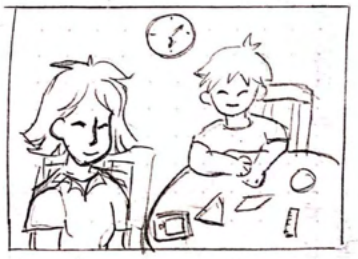
Frustration

. When the children have fun, they may forget safety rules

. Some things that may harm children are also necessities of family life, such as stoves

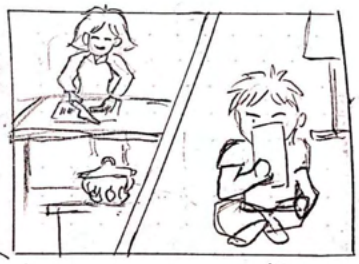
. Always worried about the safety of children leading to distractions when doing other things

User Storyboard:



An ordinary afternoon Anna and Bob rest at home together.

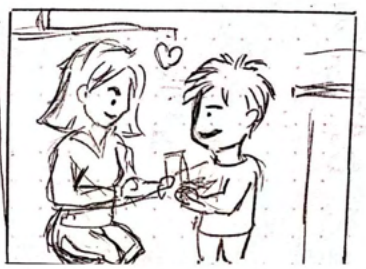
Anna needs to prepare dinner, and Bob needs to be alone.



Anna concentrates on cooking, Bob plays wantonly.

Anna was busy cooking, and did not find Bob approaching the stove.

When Bob and the stove were too close, the phone issued a security alert.

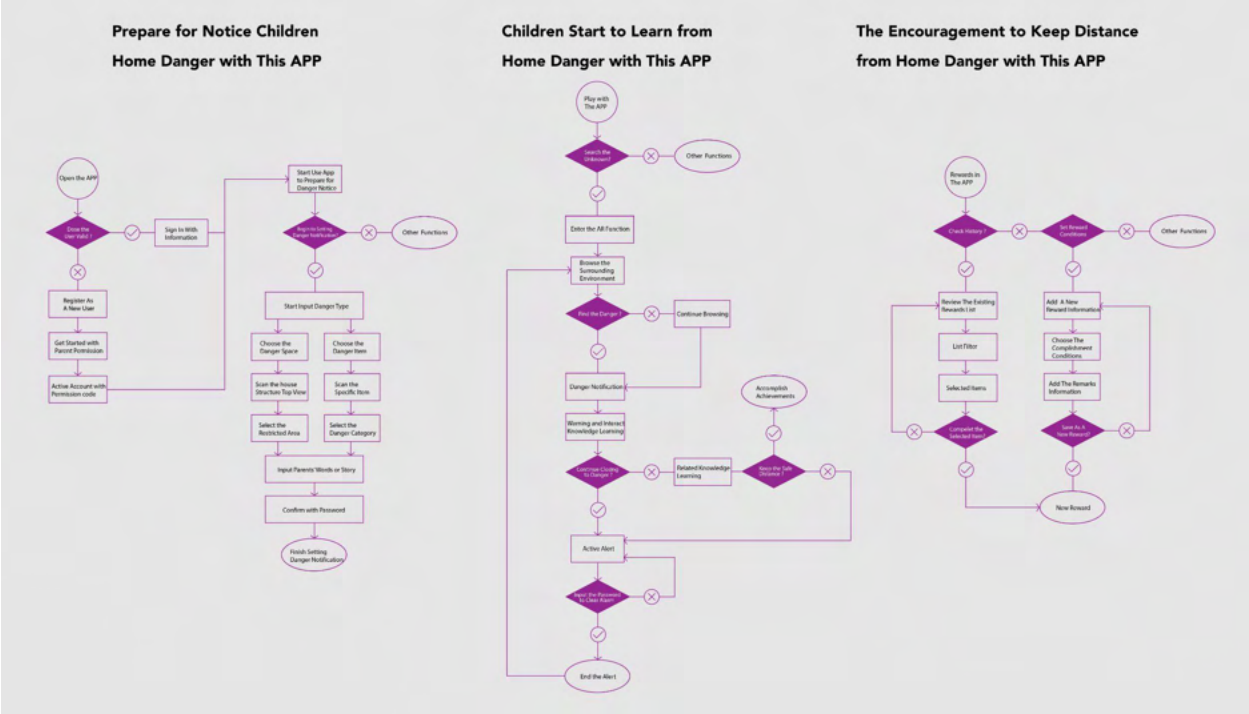


Anna received the reminder and quickly stopped Bob's dangerous behavior.

User Flow Diagrams

After all above research, I found that the whole roadmap for protecting children has 3 important points: **what is danger before they close to some space**, **how they deal with the danger when they face it** and **what they can learn from it** to make sure the next time they face it alone.

Therefore, I design a user flow diagrams to define what this App need to provide to the target users. And this also will guide me to create the wireframe for the next step.

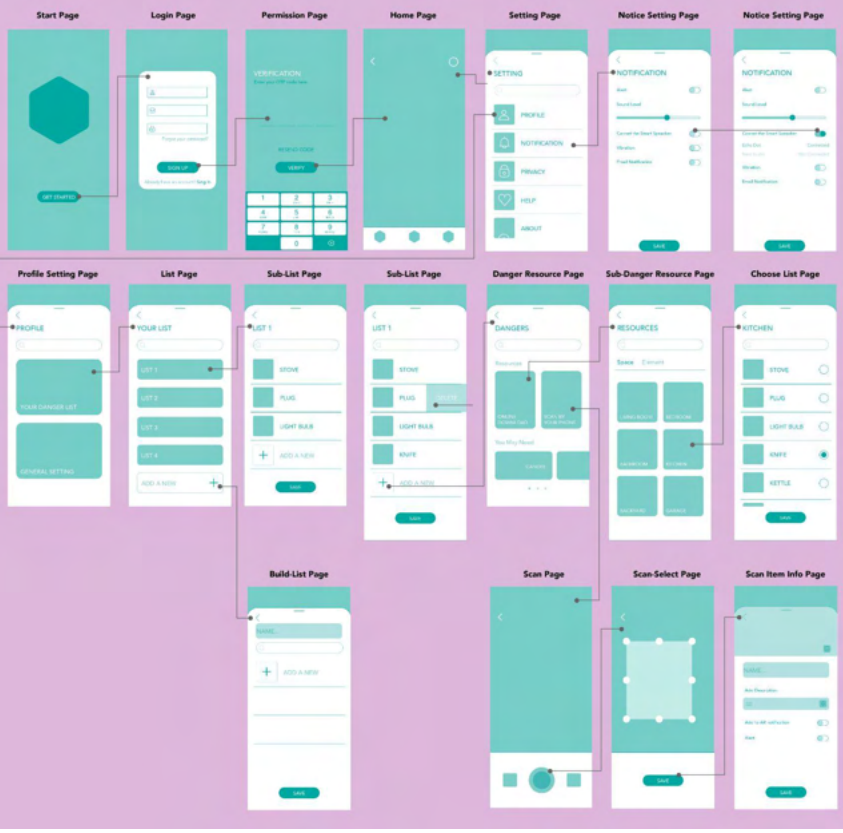


Low - Fi Wireframes

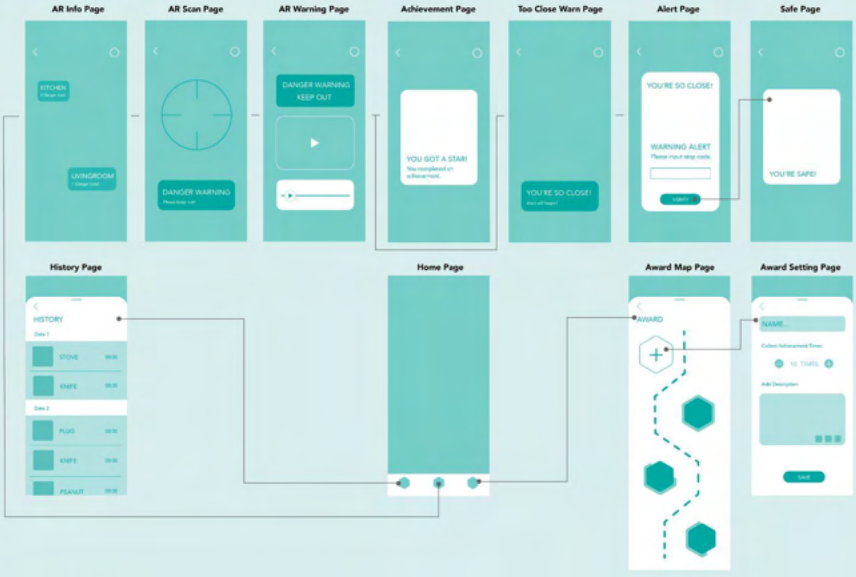
According to the guidance of user flow, I made wireframes. The main functions and interactive interface of the app are determined.

The function of the app is aimed at both children and parents, so the design strategy is different. The part of parental control is more rational, with more text descriptions. The part used by children is more experience oriented, and there are more graphical.

Parents' flow



Children's flow



Usability Testing

Before the hi-fi wireframes, I conducted a small user test.

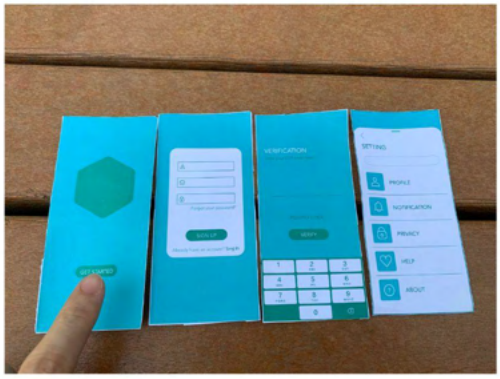
Why : Check the reasonableness of low-fi wireframes. Advance the design interfaces and user effectiveness.

Who : 6 representative participants.

How : 1. Find the representative participants.

2. Ask them to try the paper prototypes. Just like asking them to complete a task flow by it.
3. Observed their performance throughout the process with prototypes.
4. Talk with them the experience and record their feelings.
5. Thank them for their helping.

With the feedback from the participants, I made some adjustments for iterations.



[These testing images photographed by the auther in March 2021.]

Iteration 1: How to use the App to clarify danger efficiently ?

"What if the item I want to select is not in the list? How long do I have to swipe to make sure it is not there?"

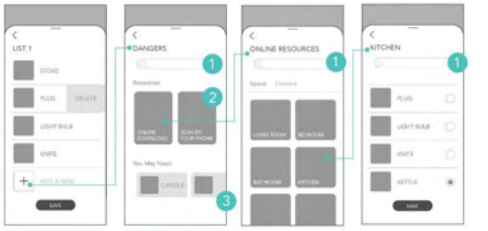
---Quote from No.1 participant

BEFORE

Add new item to list page. Danger resources page. Choose specific items list page.

1. It is difficult for users to define which category certain items belong to.
2. The list is too long, it takes time to browse, and unnecessary usage time is increased.

AFTER



Add new item to list page. Danger category page. Danger online resources page. Choose specific items list page.

Add a Danger Category Page, segmentation search category.

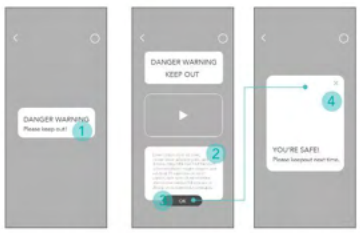
1. Add a search bar to directly search for items that users need, save users' time.
2. In addition to online item classification, add manual scanning input function to enrich the item library.
3. List some common items and provide users with a shortcut to choose.

Iteration 2: How to make users more proactively away from danger ?

"How to avoid if children click to confirm that they are not approaching, but can't do it?"

---Quote from No.5 participant

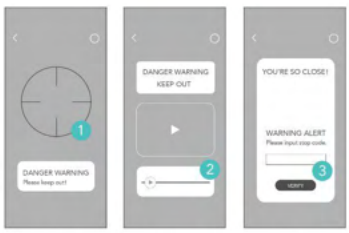
BEFORE



Found danger page. Notification danger page. Danger relieved page.

1. May obscure the user's insight, allowing the user to approach the danger without perceiving it.
2. Children may have unrecognized words, difficult to read, and lose interest. Skip the reminder quickly, it can't serve as a warning.
3. 4. After clicking on the clear danger, there is no guarantee that the user is completely away from the danger at this time.

AFTER



Found danger page. Notification danger page. Danger relieved page.

1. Use the halo to determine the location of the danger, and use the card to remind the danger.
2. Most children like to listen to stories and use voice reminders instead of text. Popularize common sense of dangerous items.
3. If the item exceeds a certain area on the screen, it means that the user is too close to the dangerous item. The system will automatically issue an alarm. To cancel the alarm, the permission code set by the parent is required.

Iteration 3: How to make rewards more motivate for children to complete tasks ?

"Why children want to keep their distance from danger?"

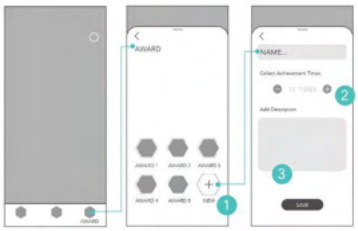
---Quote from No.6 participant

BEFORE

Home page. Award page. Award sub-page.

1. The progress bar can make users feel confused. The more you approach the danger, the easier it is to complete the task.
2. Children's curiosity about the unknown will cause them to want to explore the unknown dangers, which is prone to safety risks.

AFTER

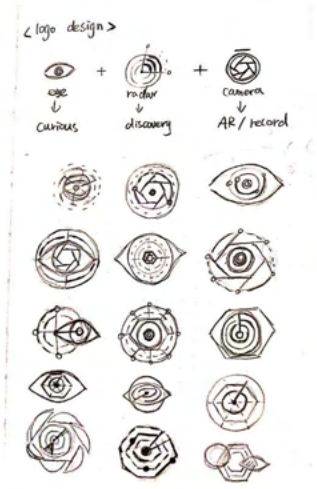


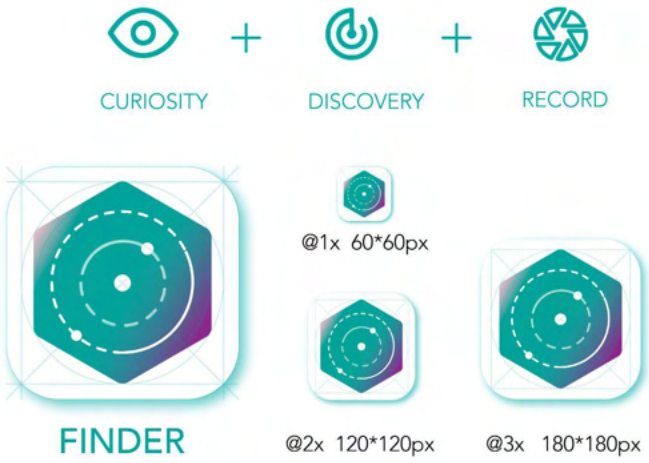
Home page. Award page. Award sub-page.

1. Users can customize the list and conditions of rewards.
2. The reward comes from the number of times successfully maintaining a safe distance, not the number of times a danger is found, to improve safety awareness.
3. Parents can encourage children to complete tasks with customized rewards that are more in line with their children's needs.

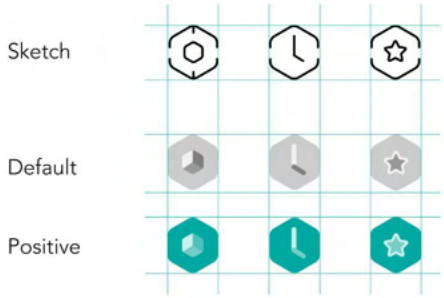
Visual Design

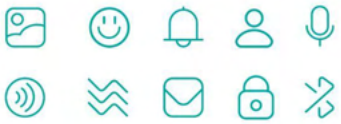
App logo Identity





Iconography





Fonts

Arial Rounded MT Bold

This font is used in the main title and most of the text in the children's operation section.

Friendly, clear and easy to identify.

Avenir Medium

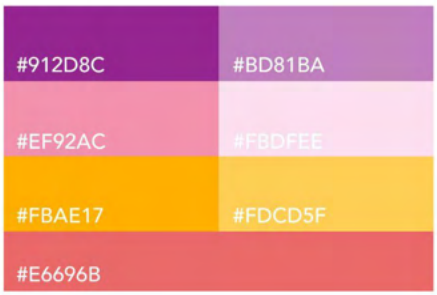
This font is used for the subtitle and parental settings.

Professional, rational, clear even when there are more words.

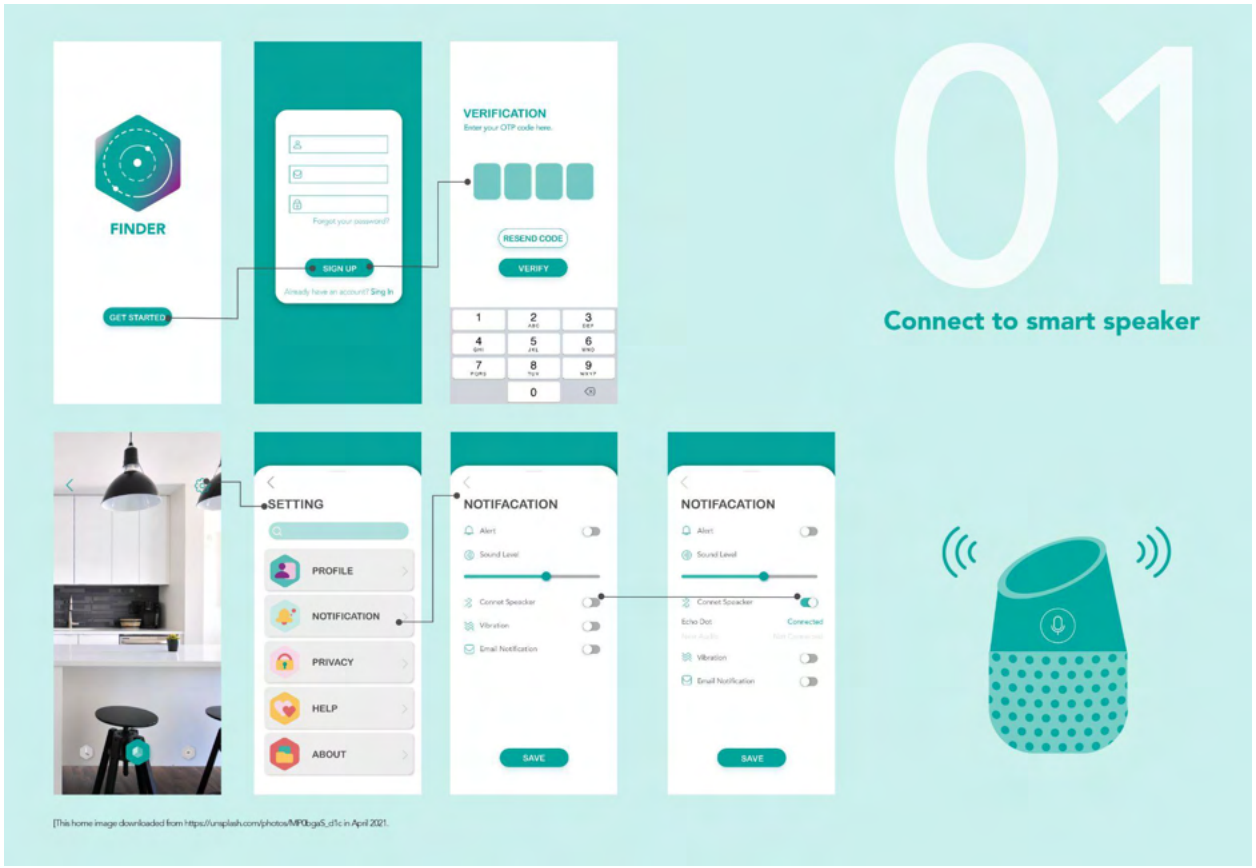
Color Palette

Primary

Secondary



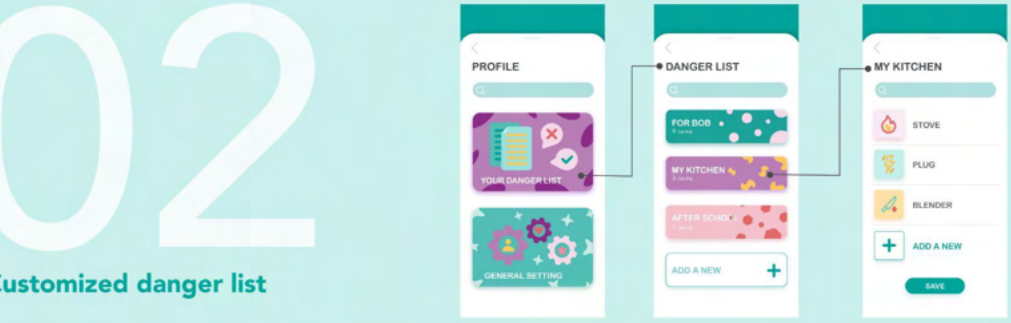
UI Illustration

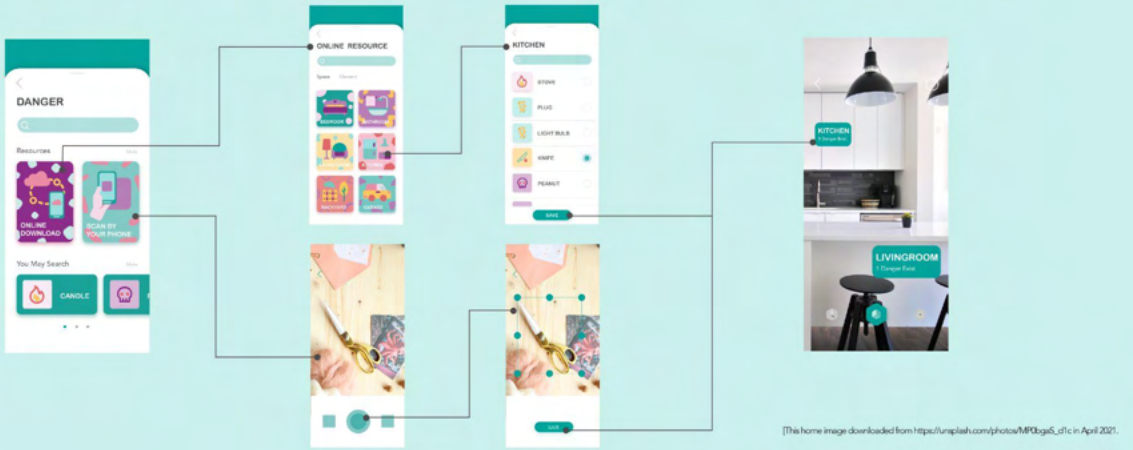


[This home image downloaded from https://unsplash.com/photos/MP0bgaS_d1c in April 2021.

02

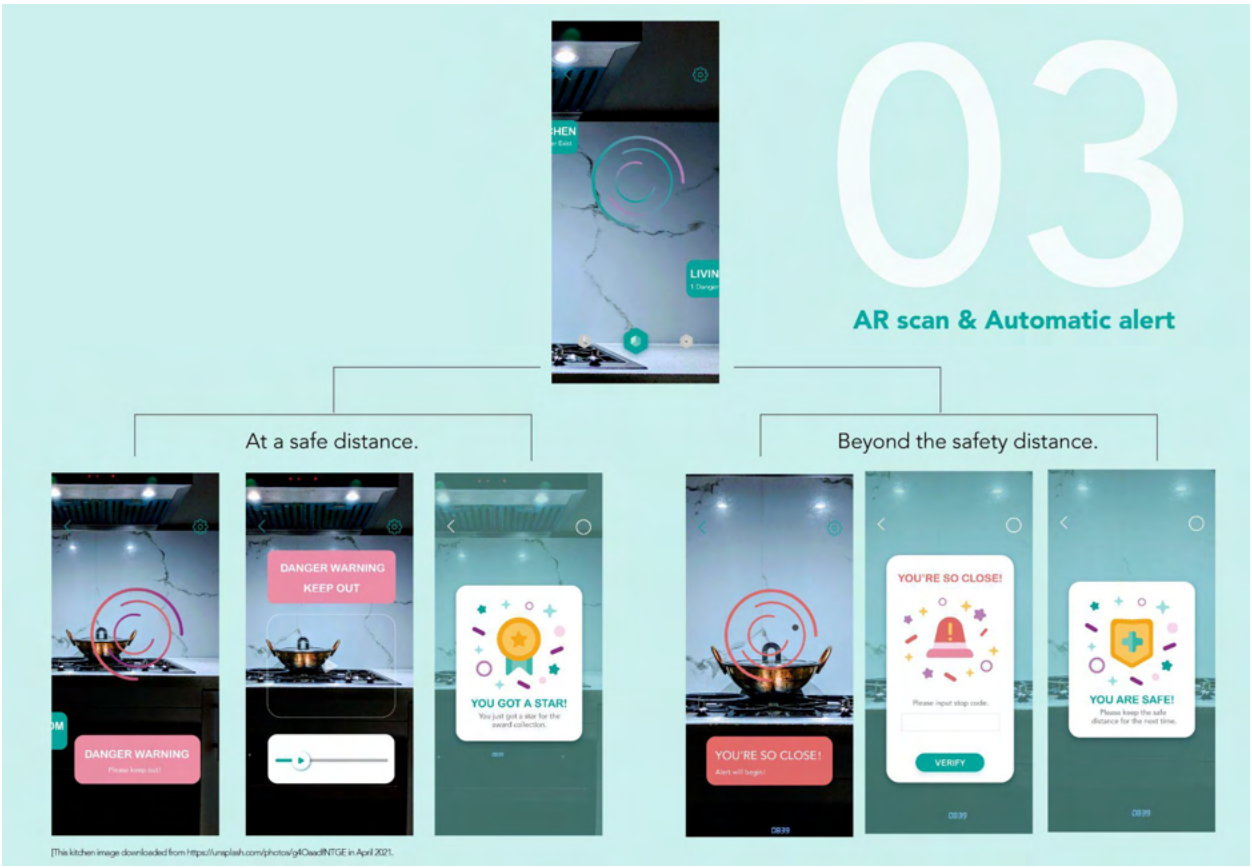
Customized danger list





[This home image downloaded from https://unsplash.com/photos/MP0bgaS_d1c in April 2021.

[This scissors image downloaded from https://unsplash.com/photos/SnITZTTeJVE in April 2021.



[This kitchen image downloaded from https://unsplash.com/photos/g4OaadfNTGE in April 2021.