An AR Safety Instruction APP Designed for Kids

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An AR Safety Instruction APP Designed for Kids

BY

SHAOWEI LENG

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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ABSTRACT

Safety is very important for little kids. Our children could be harmed by various kinds of danger. According to the statistics, among those 0 to 19 years of age, more than 12,000 people die from unintentional injuries. Meanwhile, more than 9.2 million of them are treated in emergency departments for nonfatal injuries.

There are few lessons which could teach kids about what can do with the surroundings and what they could not do. Few kids know when facing threats, how to fix it.

In this paper, a safety instruction app is designed for kids. The app could help parents to educate their kids on the dangers within their environment, especially at home. And the app could guide them to find those dangerous items at home. Kids could play for fun and learn in the meantime. When all goals accomplished, kids could have a clear sense of what to do, and what to be cautious while at home. What’s more, AR technology is also involved in this design. Kids could use the rear camera of iPad Pro to look around their surroundings. Kids could recognize what should be paid attention to, and keep away from those items within the AR scene.

Keywords Safety instruction; App; Educate; Kids; AR technology

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Introduction

A comprehensive study by the Home Safety Council found that home injuries cause 21 million yearly medical visits and almost 20,000 deaths, 2,000 of which are children. According to the statistics, we can see that kids could be harmed by various kinds of danger while at home. Few kids could know what they could play with, and what should be kept away from without being educated. Based on the situation, educating kids within their environment especially at home could be a good way of solving the problem. However, most children especially those under 5 years old could feel overwhelmed when reading books. Little kids like watching animations more than reading. Meanwhile, it is very hard and boring to teach kids about safety instructions face to face.

Right now, AR technology is very popular all around the world. In 2020, Apple Inc. has published the latest version of iPad Pro, which is more powerful when using AR technology. And AR is a tendency not only right now, but also in the future. Yet, there are few apps using AR technology designed for kids in the market nowadays. And also, quite a few apps will teach kids about safety instruction.

According to those pain points above, a safety instruction App that could be launched on iPad Pro is designed. In this paper, we will discuss how to design an iPad Pro App which could help kids to learn about those dangerous items at their homes. And with the help of AR technology, kids could have fun of learning safety instruction. When finished the learning process, kids could better identify potential dangers and keep away from them. They can also know what should do, and what should not.

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Context

Nowadays, smart devices are available for most families. Even little kids could be able to use an iPhone or iPad. So, it is possible for us to create more apps targeted at kids (2-5 years old), such as Toca Boca, Sago Mini, and PBS Kids. As far as we know, most kids tend to watch cartoony animation and play games. So, with no requirement of reading, kids could learn safety instructions by watching animated instruction and finishing daily goals. What’s more, we can also leverage AR technology to guide kids to find those dangerous items at their home. The process of finding dangerous items could be like playing a game. Accompanied by parents, kids could use iPad Pro to interact with cartoony dangerous items within the AR scene, and have fun at the same time.

Methods

Research

There are 2 questionnaires, one is for parents, the other is for kids, the questionnaires are like what are shown in Figure 1 & Figure 2.
In the end, 34 valid responses in total from parents were received. Meanwhile, 28 valid responded in total from parents were received.

For the parents, 30 (88.24%) responded YES to the question “Have your kids been hurt at home?” 28 (82.35%) responded YES to the question “Will you let him/her use any smart devices to learn or play in the future?” 23 (67.65%) responded TELL HIM/HER IN PATIENCE to the question “Which way do you educate your kids on the dangers at home?” Meanwhile, 19 (82.61%) responded NO to the question “Do you think it works or not?”

For the kids, all answered they have been hurt while at homes. And all answered they like playing video games. None of the kids like their parents telling something seriously to them.
Based on the research, we can see that parents want to save time for them. They want an app which could help them to educate their kids on the dangers at their homes. Parents also want their kids can learn about those dangerous items in a safe environment. Based on these requirements, let kids focus on something fun, let them learn safety instructions about surroundings but without letting them touch those dangerous items are objectives for this design. Meanwhile, for kids, they want an app ease of using and fun. So, simple interaction and integrate learning while playing are required in this design.

**Persona**

Kids do not like reading long pages full of text. Especially for those 2-5 years old kids, they could be struggling with basic reading skills. And just like what has been mentioned above, the content needs to be very interesting and animated. So, instead of lots of contexts, there are lots of voice-overs in this design, which could be better for kids to learn and remember.

For defining our target users better, we can establish a persona to help us.

**Liam**

*4 Years Old*

Ryan is a little bit naughty but very creative. He has broken items such as bowls and vases at home for so many times, and get hurt as well. His parents are worried about their boy could get himself in danger when they are busy working and have no enough time to go with Ryan. And one more thing, just like other kids, Liam does not like to read a lot. He likes playing video games and watch cartoons.

According to the persona, the whole interaction should be easy enough for them to get on board and like playing a game. Based on the statistics from the American Academy of Pediatrics (2013), the average child

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spends 8 hours a day on screens, such as television, computer and smart devices like iPhone and iPad.\(^8\)

Another thing needs to notice is that kids need structure, and a good schedule can handle this.\(^9\)

Based on these considerations, a simple interaction with a set-up daily routine is required in this design.

Meanwhile, we cannot let kids spend too much time on screen in one day.

**Safety Guarantee**

Because finding dangerous items alone at home can be risky for little kids, so the safety of kids needs to be guaranteed. When kids trying to use the App, their parents should be around with them. So, when kids trying to log into the App, Face Recognition of their parents or the password that set up by their parents is required. By doing this, we can make sure that the kids are using the app within a safe environment, and guaranteed by their parents.

**Learning Process**

There are six interactive components of the learning process: *attention, memory, language, processing and organizing, graphomotor (writing) and higher order thinking.*\(^{10}\) *What’s more, kids love a good challenge or conflict.*\(^{11}\) *Based on this, the safety instruction learning process for little kids can be the first, set up daily goals for them, and let them know the whole process. Then try to attract the kids’ attention by using cartoony motion graphics, friendly music or vivid color. After watching animated instruction, kids need to find those cartoony dangerous items at home by themselves and of course taken good care by their parents. In the end, the kids can review what they have found, which can enhance their memory of where those dangerous items are at home, and try to keep away from them.*

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What needs to be paid attention to is that an iPad Pro could be a little bit heavy for little kids to hold in their hands. So, when we try to let them hold an iPad Pro and looking around within the AR scene, we need to make sure the ease of this finding process, and try to avoid any interaction which requires tapping on the screen. In other words, the finding process should be quick, ease of use and no finger interaction required.

**User Flow**

Based on the research and considerations mentioned above, we can now make a user flow chart as you can see in the following picture (Figure 4). When kids opening the App, permission from their parents is required. It can be Face ID or passwords. Then the kids can see there are several daily goals set up for them to finish. For accomplishing these daily goals, they can watch animated instructions just like watching cartoons he first. And after this, they need to follow the guidance to find those dangerous items at their home with the help of augmented reality and image recognition technology. During the finding process, the photos of the dangerous items will be automatically taken by the rear camera, which for the kids to review later to enhance their memory.

![User Flow](image)

*Figure 4 User Flow*

**Wireframes**

Based on the user flow, there are several sketches of the wireframes design, including the first version and iterations, just like the following photographs show (Figure 5 and Figure 6). The style of the final design is
inspired by other App designs on the market – cartoony, colorful and lots of illustrations. The whole interaction could be divided into four steps (Figure 7, Figure 8, Figure 9 and Figure 10).

Figure 5 First Version of Wireframes

Figure 6 Iterations of Wireframes

**STEP 1 - GET PERMISSION FROM PARENTS**

1. Splash Page
2. Start

Figure 7 Step 1
STEP 2 - LEARN BY WATCHING ANIMATED SAFETY INSTRUCTION

After logging into the app, kids could see the daily goals set up for them which automatically encourage them to complete. Safety instructor can be boring. Make safety instructions like cartoons can easily draw kids' attention.

- Simple daily goals set for kids to automatically complete
- Cartoonish safety instruction
- Easy to learn
- Watch animation for fun

Figure 8 Step 2

STEP 3 - FIND THE ITEM AT HOME WITHIN AR TECHNOLOGY

After watching the animated safety instruction, kids can start finding the dangerous item indicated by the animation. Using image recognition technology to identify dangerous items at home for kids. Then create an AR scene, in which kids could play for fun & compete a mission.

- Interact within AR scene
- Better acknowledge danger items at home
- Play for fun

Figure 9 Step 3
Considering that kids want feedback on everything, and consistency is very important for kids, so creating a cartoony pal to guide them and keep giving them consistent feedback is a good way. Combining with the name of the design, SAFECUB, a little cartoony monster character is designed, like the following photograph (Figure 11) shows.

**Graphics**

Due to this design is for kids, the keywords for the color palette could be colorful, youth, cute, adorable, zealous and ebullient. So, the color theme for the design is called *Lollipop*, just like the following
photograph (Figure 12) shows. Meanwhile, considering the readability and the style of the design, the Baloo Thambi font (Figure 13) is being used in this design.

![Figure 12 Color Palette](image)

**Baloo Thambi**

![Baloo Thambi](image)

*Figure 13 Typeface - Baloo Thambi*

**Animated Instruction Design**

According to the statistics, in 2017, in the United States, electric shocks are responsible for approximately 1,000 deaths or 1 percent of all deaths. And we can see that child electric shock injuries are extremely important for every single parent to prevent. So, in this design, the outlet or socket is being taken as an example.

Kids can easily be attracted by cartoons because they are fun and kids can easily learn many things from cartoons. And when we try to create a short cartoon, we need to create a character that can drive plots. So, taking outlet as an example, we can personate the outlet and let it be the main character of our animated instruction. Because the outlet is responsible for all the appliances at home just like a strong man, so in this

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design, the outlet is designed as an amiable man, called Mr. Outlet. The storyboards, the lines for the voice-over and the final design can be seen in the following photographs (Figure 14, Figure 15 and Figure 16).

![Figure 14 Storyboards of Animated Instruction](image)

**VOICE-OVER**

Hi! I am Mr. Outlet. 

I supply electricity to every single appliance in your house!

Boo! 
(Break)

Electricity is not safe! 
(Break) Look at this boy!

So you need to use me in the right way!

First! You need to find a power adapter. Like this and this.

Watch out! The green part is allowed to be touched. However, you cannot touch the red part!

Oh! One more thing! Never use wet hands to touch me, and the power adapter as well!

And the last thing! Never use any metal thing to touch me!

I can be like this, this and this! You can see me on the wall! Now, try to find me at your home!

![Figure 15 Lines for Voice-over](image)
AR Scene Design

According to what has been discussed in Learning Process, the finding process within the AR scene should be quick, ease of use and no finger interaction required, just like the following photograph (Figure 17) shows. So, all the kids can do is to hold iPad Pro and look around. Combining with the Image Recognition technology, the App will recognize the dangerous items, and automatically takes photos of them. Based on this, a game is designed. It is a mission which is letting the kids use the yellow target point in the middle of the screen to connect TV and lamp with Mr. Outlet. By doing this, the kids could help the little monster (called Safecub, the main character of this design) to watch TV and turn on the lamp, just like the following photographs (Figure 18 and Figure 19) showing.

Figure 16 Captures of Final Animation

Figure 17 A Kid Holding an iPad Pro
Figure 18 Sketch of AR Scene Design

Figure 19 Captures of AR Scene
Results

Based on what has been discussed above, we have the final design (Figure 20). When the kids get on board to the App, they can watch a vivid animation of the little monster who is the main character of the design. When they tap to start using, the App will need the face recognition of their parents. After getting permission from their parents, the kids will enter into the home page. The daily goals and how many are waiting to be accomplished can be easily seen on the home page. They can also see two buttons, one is playing the animated safety instruction, and another is to search the item indicated at their homes. The latter one would be inactive if they have not finished watching the safety instruction. After watching the animation, the kids can start searching the dangerous item which has been introduced in the safety instruction within the AR scene. Kids can finish finding those dangerous items like playing games. During the finding process, the photos of those dangerous items will be automatically taken by the App. After finishing the searching process, the kids will go back to home page, and get noticed that they have finished the daily goals by seeing the motion of the trophy. When the kids want to review where those dangerous items are, they can easily tap the captures button on the right above. Then they can switch between original photos and the AR scenes, which could enhance their memory of those dangerous items.

All the information and the final design can be found on the webpage: https://www.shaowei-portfolio.com/safecub
Eight volunteers were welcomed to participate in the usability testing of this design, whose ages are between 3-5 years old. The wireframes of the design were printed out for them to finish the usability testing, and the questionnaires (Figure 21) were printed out as well. There are two tasks for the volunteers to accomplish (Figure 22). After watching the animated safety instruction, eight volunteers were required to answer several questions. What’s more, an iPad Pro (11 inches version) was required to be held in their hands and try to find an outlet on the wall.
Statistics

Seven volunteers (87.50%) had successfully finished task 1 of usability testing, and five volunteers (62.50%) had finished task 2. Seven volunteers (87.50%) answered “Yes” to the question “Do you like the overall design of the App”. All eight volunteers like to play a game within an AR scene. And all of the
volunteers correctly answered the questions based on the animation they had watched. In the end, five volunteers (62.50%) can hold an iPad Pro (11 inches version) and successfully found an outlet on the wall, the other three of the volunteers (37.50%) cannot hold an iPad Pro in their hands (11 inches version).

Conclusions

An AR safety instruction App for Kids to learn about dangerous items at home is designed in this paper. According to the statistics, kids like the overall design of this App. The animated safety instruction could let kids learn about the key points which should be paid attention to. However, only 62.50% of the volunteers successfully found the “Capture” button, which means that the button’s function might not be easily understood by little kids. And another thing is that only 62.50% of the volunteers could hold an iPad Pro (11 inches version) in their hands, which reflects that it might not be a good way of letting little kids to use such a big and heavy device to do the job.

In conclusion, the overall design of the app is succeeded. It could effectively let little kids learn about the safety instruction. And what’s more, kids love playing games within an AR scene, which means that it is viable for us to keep studying on designing more apps with AR technology involved. However, the iPad Pro might be too big and heavy for a kid like 2-5 years old to hold up and walk around. So, the device can be switched to iPhone or other smaller smart devices. Meanwhile, the “Captures” button could be modified to a more understandable button. One of the possible solutions is that it can be designed like a treasure box which could appeal more kids to tap it.

All in all, this design will be continuing refined. Hope in the future, this design could help more kids to learn and try to avoid those potential dangers at their homes.
SAFECAB

An AR Safety Instruction APP Designed for Kids to Learn About Dangerous Items At Home

Shaowei Leng
Thesis Process Deck
VCD 2020, RIT
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We live in a world designed by adults, for the convenience of adults, and the safety of children is often not considered. **Parental supervision** is often **not sufficient** to prevent **injuries in kids**, because it's not humanly possible for parents to be there 100 percent of the time. There are going to be **lapses of supervision**.

Dr. Gary Smith,
Director of the Center for Injury Research and Policy at Nationwide Children’s Hospital in Columbus, Ohio.
PROBLEM

Kids are curious about everything. Without being educated and lapses of parental supervision, kids may get hurt at home.
Help parents to educate their kids on the dangers at their homes, but without letting kids touch the dangerous items.
There are 2 questionnaires, one is for parents, the other is for kids. In the end, 34 valid responses in total from parents were received. Meanwhile, 28 valid responded in total from parents were received.

For the parents, 30 (88.24%) responded YES to the question “Have your kids been hurt at home?” 28 (82.35%) responded YES to the question “Will you let him/her use any smart devices to learn or play in the future?” 23 (67.65%) responded TELL HIM/HER IN PATIENCE to the question “Which way do you educate your kids on the dangers at home?” Meanwhile, 19 (82.61%) responded NO to the question “Do you think it works or not?”

For the kids, all answered they have been hurt while at homes. And all answered they like playing video games. None of the kids like their parents telling something seriously to them.
Based on the research, we can see that **most parents are worried about the safety of their kids**. And parents are using or will use smart devices to help them to let their kids learn about safety instructions. When kids get hurt, most parents will tell their kids in patience about the dangers. However, **most** of them **do not think this works**.

For kids, most kids answered they **do not like reading and learning as well**. Meanwhile, most of them like playing video games and watching cartoons. **None** of the kids **like their parents telling something seriously to them**. Compared to the real picture of an outlet, they **prefer the cartoony one**.
As a parent, I want something that could help me to:

- Let kids learn about safety instructions safely
- Save time for me

"My boy often got him hurt just when I was busy doing my job. What's more, every time I tried to tell him what cannot touch in patience, he just can't listen to me carefully."

Picture Source:
https://unsplash.com/photos/KQCXf_zvdaU
OVERVIEW

USER STORIES

As a kid, I want something that:

- Tell me what I can play with & what I can't
- Fun & safe

"I don't like reading. I just like watching cartoons and playing games."

Picture Source:
OVERVIEW

WHAT USERS NEED

Educating kids on the dangers at home in an effective, easy, fun & safe way.

For Parents

- Save time
- Educate kids on the dangers at homes
- Safety of kids

For Kids

- Ease of using
- Fun

- Kids focus on something fun
- Kids learn safety instructions about surroundings
- Kids learn about items without touching them
- Simple interaction
- Integrate learning while playing
OVERVIEW

THESIS OBJECTIVES

Animated Safety Instruction
Kids like well-organized. Set up daily goals, and let kids learn safety instruction in a fun & easy way.

IR+AR
When holding smart devices in hands, kids can see dangerous items on the screen without touching them, which is very safe. So, leveraging Augmented Reality technology, combining with Image Recognition technology, let kids find those items at home, and learn about them.

Gamification
Kids like challenging. Let kids learn while playing in an effective and fun way.
APPLIED SOLUTION

Design an **AR safety instruction app** that could be launched on the **iPad** for letting kids learn about those **dangerous items** around them at their **homes**.

**When Designing An App For Kids**

- Kids may not be strong readers yet
- Kids like challenging & well organized
- Using audios & visuals
- Set up goals to let kids automatically complete
Competitive Analysis

Gaps in the Market
COMPETITIVE ANALYSIS

Bark
What Have Done -
Bark monitors your child’s text messages, YouTube activity, emails, and 24+ different social networks for potential safety concerns.
What’s Not -
Just a tool for parents, no tutorials about what children could say, and what can be prevented.

Toca Boca
What Have Done -
Toca Boca captures the power of play. It creates digital toys and everyday products that are filled with fun and silliness that kids from any corner of the world can instantly relate to.
What’s Not -
Only a game for fun. Kids have no boundaries about everything it Toca Boca.

PBS Kids
What Have Done -
PBS KIDS offers all children the opportunity to explore new ideas and new worlds through television, digital platforms, and community-based programs.
What’s Not -
Kids have too many options, and kids could only play for fun. But how about we add some educational materials into the app?
GAPS IN THE MARKET

- *Few* apps could teach kids about how to react to emergencies.
- *Augmented Reality* technology seldomly be a part of apps for kids.
Overview of Final Design

Step 1
Step 2
Step 3
Step 4
STEP 1 - GET PERMISSION FROM PARENTS

Kids' safety is always the first. Parental supervision is required when getting started. Using Face ID or passwords set by parents could guarantee that the kids are under their parents' supervision.

- Face ID unlocked by parents
- Safety guarantee for kids

1. **PARENTS** button - For parents to set up Face ID or passwords
2. **CAPTURES** button - For the user to review the photos of dangerous items automatically taken by the app
3. **HELP & RESOURCES** button
4. **START** button - Start using the app

Splash Page

Face Recognition Page - 1

Face Recognition Page - 2
Overview of Final Design

**STEP 2 - LEARN BY WATCHING ANIMATED SAFETY INSTRUCTION**

After logging into the app, kids could see the **daily goals** set up for them which automatically causes them to complete. Safety instruction can be boring. Make safety instructions like cartoons can easily draw kids' attention.

- Simple daily goals set for kids to automatically complete
- Cartoonish safety instruction
- Easy to learn
- Watch animation for fun

![Diagram of app interface with buttons and indicators]

1. **HOME** button - For the user to go back to the Log in Page
2. **PROCESS INDICATOR** - Show how many goals finished by the user
3. **SELECTED GOAL CARD** - The goal selected by the user. When first loading, the animation will be playing
4. **PLAY ANIMATION** button - Play animated safety instruction
5. **SEARCH AT HOME** button (inactivated) - Search dangerous items indicated in the animated safety instruction at home
6. **UNSELECTED GOAL CARD** - The goals unselected by the user
7. **BACK** button - For the user to go back to previous page
8. **ANIMATION FRAME** - Animated safety instruction played inside this frame
9. **PLAY** button - Tap to start playing animated safety instruction
10. **REPLAY** button - Tap to replay the animated safety instruction
11. **SEARCH AT HOME** button (activated) - Search dangerous items indicated in the animated safety instruction at home
STEP 3 - FIND THE ITEM AT HOME WITHIN AR TECHNOLOGY

After watching the animated safety instruction, kids can start finding the dangerous item indicated by the animation. Using Image Recognition technology to identify dangerous items at home for kids. Then create an AR scene, in which kids could play for fun & complete a mission.

- Interact within AR scene
- Better acknowledge danger items at home
- Play for fun

1. CAPTURES button (new photos) - The user can check the latest photo of the dangerous items
2. IR SCANNING FRAME - Notify that the user is finding the correct item
3. AR SCENE - When IR scanned successfully, an AR scene will be created based on the marker-less tracking AR mode
4. OPERATION TIP - Notify the user how to operate & play
5. TARGET POINT - Always being displayed in the center of the screen. For the user to drag it follow the direction and finish the AR game
6. DONE button - The user can tap it to finish finding & go back to Home Page
Learning is a process. Learn about a new thing and revise for it could help kids to enhance their memory. After successfully finding the items and finish the AR game, kids could review the photos of those dangerous items, which could help them to enhance their memory of what they have found.

- Enhance memory of the danger items & where they are at home
- Sense of achievement

1. ALBUMS CARD (selected) - The captures of the dangerous item selected
2. REVIEW button (new photos) - The user can tap it to start reviewing the photos of dangerous items
3. ORIGINAL button - Notify that the user can switch to review the photos of the dangerous items in the real world
4. AR SCENE button - Notify that the user can switch to review the photos of the dangerous items in the AR scene
Wireframes Design

Learning Process & User Flow  24

Wireframes Design  25-26
Kids like well-organized things and challenging. So for kids to learn about the dangers at home better, we need to provide them with a set-up daily goals that could let them complete. Then watch animated safety instructions to perceive new knowledge. After watching the animation, kids can find dangerous items at their homes (IR+AR). In the end, they can revise for what they have learned by reviewing the pictures of the dangerous items. Based on this, we can design the user flow of this app.
Based on the learning process & user flow, and considering the interaction on an iPad Pro, the wireframes are designed.

**Grid system**
14 Columns, Width: 64px, Gutter: 24px
68 Rows, Height: 8px, Gutter: 8px
Based on the sketches of wireframes, final wireframes are designed.
Graphics Design

Moodboards 28
Style Boards 29
Typeface & Color Palette 30
Character Design 31
MOODBOARDS

Due to this design is for kids, and kids love **lollipop** very much. So the **pastel color** could be the color palette.

**Keywords**
Colorful
Youth
Cute
Adorable
Zealous
Ebullient
STYLE BOARDS

Current visual solutions in the market all have lots of cartoony illustrations.

Keywords
Cartoony
Papercut
Lots of illustrations
Colorful
**TYPEFACE & COLOR PALETTE**

**Typeface**
The typeface should be *easy to read*. Meanwhile, the typeface could have a *round corner & cartoony*. So the *Baloo Thambi* could be the choice.

**Color Palette**
A series of colors from pastel color palette which could make kids feel playful and happy.
CHARACTER DESIGN

Considering that kids want feedback on everything, and consistency is very important for kids, so creating a cartoony pal to guide them and keep giving them consistent feedback is a good way. Inspired by the current cartoony character designs, combining with the name of the design, SAFE CUB, a little cartoony monster character is designed.

- Bubbly
- Cute
- A little bit silliness
- Amiable
Animated Safety Instruction Design

Why Choose Outlet As An Example 33
Character Design 34
Script For Voice-over 35
Storyboards Design 36
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WHY CHOOSE OUTLET AS AN EXAMPLE

According to the statistics, in 2017, in the United States, electric shocks are responsible for approximately 1,000 deaths or 1 percent of all deaths. And we can see that child electric shock injuries are extremely important for every single parent to prevent. So, in this design, the outlet or socket is being taken as an example.
CHARACTER DESIGN

Kids can easily be attracted by cartoons because they are fun and kids can easily learn many things from cartoons. And when we try to create a short cartoon, we need to create a character that can drive plots. So, taking the outlet as an example, we can personate the outlet and let it be the main character of our animated instruction. Because the outlet is responsible for all the appliances at home just like a strong man, so in this design, the outlet is designed as an amiable man, called Mr. Outlet.
Using audio when designing for children is almost a given because they may not be strong readers yet. So voice-over and fewer texts should be considered.

The animated safety instruction should teach kids such as what the dangerous item is, what it can be used for, the danger of it, how to correctly use it, how to identify it and keep away from it in daily life.
In the beginning of the animation, Mr. Outlet should be *on the wall*, and then *jump out of the wall* to *introduce himself*. Then Mr. Outlet should *warn* kids about the *danger of the electricity and himself*. And tell kids *how to correctly use* him. First you need to find a power adapter, and how to use it. Meanwhile, never use wet hands to touch Mr. Outlet, and never use any metal thing to touch him as well. In the end, Mr. Outlet should tell kids *how he looks like* and *where can kids find him*. 
FINAL STORYBOARDS DESIGN

1. Open Scene
2. Mr. Outlet is Coming Out - 1
3. Mr. Outlet is Coming Out - 2
4. Mr. Outlet is Introducing himself
5. Cables Connecting Between Mr. Outlet & Appliances
6. An Outlet Supports Electricity to Every Single Appliance At Home
7. Mr. Outlet Illustrating that Electricity is Not Safe
8. “Electricity is Not Safe” is Shocked By Electricity
FINAL STORYBOARDS DESIGN


10. First, Kids Need to Find a Power Adapter

11. The Green Parts Can Be Touched

12. However, the Red Parts Are Not Allowed to Be Touched

13. Kids Can Not Use Wet Hands to Touch Mr. Outlet

14. Meanwhile, Kids Can Never Use Any Metal Thing to Touch An Outlet

15. Mr. Outlet Is Introducing What It Can Be Look Like

16. Final Scene - Tell Kids Try to Find Mr. Outlet At Home
AR Scene Design

Using Scenario 40
AR Working Principle 41
AR Scene Design 42
AR Scene Final Storyboards 43-44
USING SCENARIO

The finding process within the AR scene should be quick, ease of use, and no finger interaction required.
AR SCENE DESIGN

AR WORKING PRINCIPLE

This app is designed based on the **marker-less tracking AR mode**. This mode is premised on object recognition. AR applications that work based on marker-less tracking are triggered when they **recognize** certain **real-world features**. In the case of this design, the real-world features are the **dangerous items** themselves.
AR SCENE DESIGN

So, all the kids can do is to hold an iPad Pro and look around. Combining with the Image Recognition technology, the App will recognize the dangerous items, and automatically take photos of them. Based on this, a game is designed. It is a mission which is letting the kids use the yellow target point in the middle of the screen to connect TV and lamp with Mr. Outlet. By doing this, the kids could help the little monster (called Safecub, the main character of this design) to watch TV and turn on the lamp.
AR SCENE STORYBOARDS

1. Notify the User How to Find Mr. Outlet Within the AR Scene
2. Identify An Outlet on the Wall
3. Identify succeeded
4. The AR Scene is Created Based on the Identification

5. The Little Monster Comes Out & Introduce Itself
6. A Photo Automatically Taken When the Little Monster & Mr. Outlet Are Together
7. The Little Monster Is Introducing Its Problem
8. Notify the User How to Play Within the AR Scene
AR SCENE DESIGN

AR SCENE FINAL STORYBOARDS

9. A Yellow Target Point Comes Out in the Middle of the Screen

10. The User Follows the Guide to Connect the Cable Between Mr. Outlet & the Appliances

11. Mission Completed

12. Bonus Page
Evaluation

Usability Testing & Questionnaire

Statistics
8 volunteers were welcomed to participate in the usability testing of this design, whose ages are between 3-5 years old. The wireframes of the design were printed out for them to finish the usability testing, and the questionnaires were printed out as well. There are 2 tasks for the volunteers to accomplish. After watching the animated safety instruction, eight volunteers were required to answer several questions. What’s more, an iPad Pro (11 inches version) was required to be held in their hands and try to find an outlet on the wall.
7 volunteers (87.50%) had successfully finished task 1 of usability testing, and 5 volunteers (62.50%) had finished task 2. 7 volunteers (87.50%) answered YES to the question "Do you like the overall design of the App". All 8 volunteers like to play a game within an AR scene. And all of the volunteers correctly answered the questions based on the animation they had watched. In the end, 5 volunteers (62.50%) can hold an iPad Pro (11 inches version) and successfully found an outlet on the wall, the other 3 of the volunteers (37.50%) cannot hold an iPad Pro in their hands (11 inches version).
Conclusion & References

Conclusion

References
CONCLUSION

According to the statistics, *kids like the overall design of this App*. The animated safety instruction could let kids learn about the key points which should be paid attention to. However, only *62.50%* of the volunteers *successfully found the CAPTURES button*, which means that the button’s function might *not be easily understood by little kids*. And another thing is that *only 62.50% of the volunteers could hold an iPad Pro* (11 inches version) in their hands, which reflects that it might *not be a good way of letting little kids use such a big and heavy device to do the job*.

In conclusion, the overall design of the app is *succeeded*. It could effectively let little kids learn about safety instruction. And what’s more, kids love playing games within an AR scene, which means that it is viable for us to keep studying on designing more apps with AR technology involved. However, the iPad Pro might be too big and heavy for a kid like 2-5 years old to hold up and walk around. So, the device can be switched to an *iPhone or other smaller smart devices*. Meanwhile, the *CAPTURES button* could be modified to a more understandable button. One of the possible solutions is that it can be designed like a *treasure box* that could appeal more kids to tap it.

All in all, this design will be continually refined. Hope in the future, this design could help more kids to learn and try to avoid those potential dangers at their homes.
REFERENCES


Thanks
Appendix A

Webpage: https://www.shaowei-portfolio.com/safecub
References


