PIXELS

SOOHYUN PARK

CONTENT

DOMAIN

HUMAN

TECHNOLOGY

COMMUNICATION

SENSES

SELF

RELATIONSHIP

DESIGNER STATEMENT

As a new media designer and also a developer who designs technology, I create bridges between technology and humans. Specifically, I design the complexity of technology to be more simple and sophisticated for humans so that they (technology and humans) can communicate with each other in a better way. My design touches on several keywords: humans, technology, communication, relationship and emotions. Whenever I design things, I ask myself some of questions: What is human? What is technology? What are the relationships between human-human, human-technology and technology-technology? By asking these questions, I want to do human-centered design with the following thoughts.

As technology continues to develop more and more, I've always wondered whether the developments are entirely good for us or if there are things which should be concerned about before we say it is good. In the book *Nervous Systems and Anxious Infrastructures*, Hunt says that "our machines are disturbingly lively, and we ourselves frighteningly inert."[1] I agree with his idea; as we have been rapidly becoming a more high-tech world, many developers tend to build fancy technology to show off their abilities and to compete with other developers

[1] Jamer Hunt, *Talk to Me: Nervous Systems and Anxious Infrastructures* (MoMA), 7: 7, quoted in Donna Haraway, A Manifesto for Cyborgs:Science, Technology, and Socialist Reminism in the 1980s," in Elizabeth Weed, ed., Coming to Terms: Feminism, Theory, Politics(New York: Routledge, 1989), 174-76.

without thinking what side-effect it can generate. Not only positive aspects but also negative side effects occurred by new technology can entirely change our behaviors and lifestyles. As a designer, I feel responsibilities of how much I can affect to our behaviors, thoughts, communication, relationships and even our lives. Therefore, I believe design should be created with researching human, psychology, technology and other various aspects to create things based on deep understands in ourselves.

In *Alone Together,* Turkle says "we deserve better. When we remind ourselves that it is we who decide how to keep technology busy, we shall have better."[2] which I totally agree with. Thinking on the user side, I think some people who are the undiscriminating followers of technological trends lose control of using technology. For example, we are actually having issues of increasing isolation even though technology has increased connections and communications between people. In the past, we used technology because of a specific purpose or needs while nowadays we are following the fast current of new high technology unconsciously. At this moment, I'm afraid if designers focus on creating innovative technology without understanding of human-nature, the amazing technology will dominate the world while humanity loses its meaning. However, I don't deny technology; I actually agree that technology has brought more opportunities to us to open up new ways of thinking, creativity, and to create a better future. What I want to emphasize is to design technology as a tool for humans and our future instead of technology which controls us.

From the above thoughts, I try to explore the concepts in a variety of ways.

The first way I've tried was letting people experience interactions that can inspire them what they've been missing these days. Specifically, I created a "Hug" project, which aimed at inspiring people to think relationships. The project used a method of hug interaction which is obvious that we can only do in real world, instead of screen-based technology in order to convey the concept. The piece was worn by a performer and it had a default sound of "Beeeeeeeeeeeeeeeep" which represents dead pulse sound in hospital. However, the sound was triggered to the sound of "Beep Beep Beep" of the alive pulse. The project was processed through a scientific research which is called *Dependency in Monkeys* by Harry Fredrick Harlow, who was an american psychologist. The study shows 'contact comfort' is more important than feeding for infant monkeys. Also the study *Hug Therapy: High-touch Healing in a High-Tech World* describes the research that levels of cortisol(stress hormone) decrease when people hug. I explored the importance of human intimacy according to the studies. In this project, I tried to stress the idea of the importance of human relationships in the real world. Thus, the project aims to bring questions about significant factors of human beings which we've been missing. Likewise, I want to use technology to bring people to the real world and rethink the true value of their lives.

For the next exploration of my design keywords, I brought questions to people about what is human and how we feel emotions by designing a "Facial Expression Drawing Tool". Specifically, users' facial muscle movement affects the color of the drawings. In other words, the users have to move their faces to shape as a 'smile' face to create brighter colors, or the users should make their face 'gloomy' shape to have darker

[2] Sherry Turkle, alone together (New York: Basic Books A Member of the Perseus Books Group), 296.

colors. By playing with the project, they will see how their emotions affect the drawings and they also will be able to see how their fake facial expressions they've made for the needed colors affect their emotions in the end. As a designer of the project, I hoped the users can understand more about themselves and their feelings in order to understand the emotions by experiencing the work. Thus my design purposed to make people think again about 'who they are', 'what it means to be human'.

Thirdly, I designed a technology which helps us to experience a new way of absorbing the world that can open up our thoughts. The reason why I designed this is because I don't want to create things for just convenience or efficiency. To be specific, we are living in a technological world that provides abundant information. Therefore, now we don't need to memorize complex information because technology will assist us to find everything very quickly. At this point, I feel we are losing or restricting abilities of our brains because we have become more and more dependent on technology. I assume that we will be less intelligent as technology gets more intelligent. According to these concerns, I design technology that can assist us to be more intelligent instead of providing its intelligence. For example, I did a project, "f(color) = sound," in order to explore our brain and five senses. Through the project, I want people to feel and think in a different way by experiencing the project which can stimulate our brain activities and imagination. The project challenges our seeing and hearing senses by triggering sound through color. It is designed based on a study of the five senses' brain process using the logic we interpret color and sound sources; colors each have waveforms of light and each pitches also have frequencies of air molecule's which resemble each other. Experiencing the world differently will stimulate our sensory system process and hope to open a new way of thinking. To sum up, the project creates technology that helps us to be more intelligent and creative instead of offering suggested answers or options through technological algorithms. Therefore, I tried to design the project based on human studies; how we perceive the world and how we view the world.

In conclusion, I want to design human-centered technology to create better lives for us by enhancing our real human values. As a new media designer, I always ask what is human, what is technology, what is communication and what is relationship to understand more about us. Additionally, I always try in a variety ways to communicate with people to convey thoughts. As a designer and as a developer of new media, I will try to bring various aspects of our lives to prevent some of the side effects that might come with new technology through my design questions.

FIRST APPROACH TO THESIS

Smart devices have evolved in a variety of ways: smart phones, smart watches, smart TVs, smart glasses, etc. They have been developed to make our lives better. For example, now we don't have to calculate complicated mathematical problems by ourselves because of calculators; we don't have to buy bookshelves because of ebooks and tablets; we don't have to go out to communicate with people because we can connect to other people through the Internet. As I mentioned in the designer statement (See page 4), Hunt says that "our machines are disturbingly lively, and we ourselves frighteningly inert." Putting it differently, we have become passive to technologies around us while technologies keep evolving every second. From the reading, I have been wondering whether these developments have only brought positive effects to us or not. I feel we are losing something. I feel technology is getting smarter while we become more stupid, because we are more and more dependent on technology. Thus, I want to ask myself and us: "Do you really feel comfortable about the current dependency we have in the enormous new technological world?"

As a new media designer, I wanted to create things that can stimulate humans' potential abilities. Firstly, I did brainstorming to explore a thesis idea which enables us to stimulate our brain and our senses by producing new experiences with new way of interaction.

While I've been brainstorming, I found an interesting project named *The Sound of Colors* (see Figure 2 on Page 7). The project was created by Neil Harbisson, who is color-blind artist. He said he saw the world in grayscale. He couldn't express how orange color feels to him. Additionally, choosing colors for outfits didn't matter to him because he can't feel the difference of each color. However, now he can choose a color for his clothes because he implant a device to his body. He always put on the device, which is called Eyeborg, translating color to audible frequencies. After finding the relationship between color and sound, he inputted the sound generating system for himself to feel colors by hearing them. When he described his experience of sensing color in an audible way from his lecture on TED, "My head has turned into a music box. I can hear the sky, I can listen to my mother's eyes and I can hear rainbows." This inspired me deeply and encourages my desire to hear colors to experience the world in more plentiful ways. He also says, "My perception of beauty and music has also changed. I enjoy listening to people's faces. some people sound unusually melodic." He demonstrates how humans' five senses affect our way of experiencing the world. Also, the project shows how sensory translation can influence our emotions based on our experiences.

Figure 1 - brainstorming

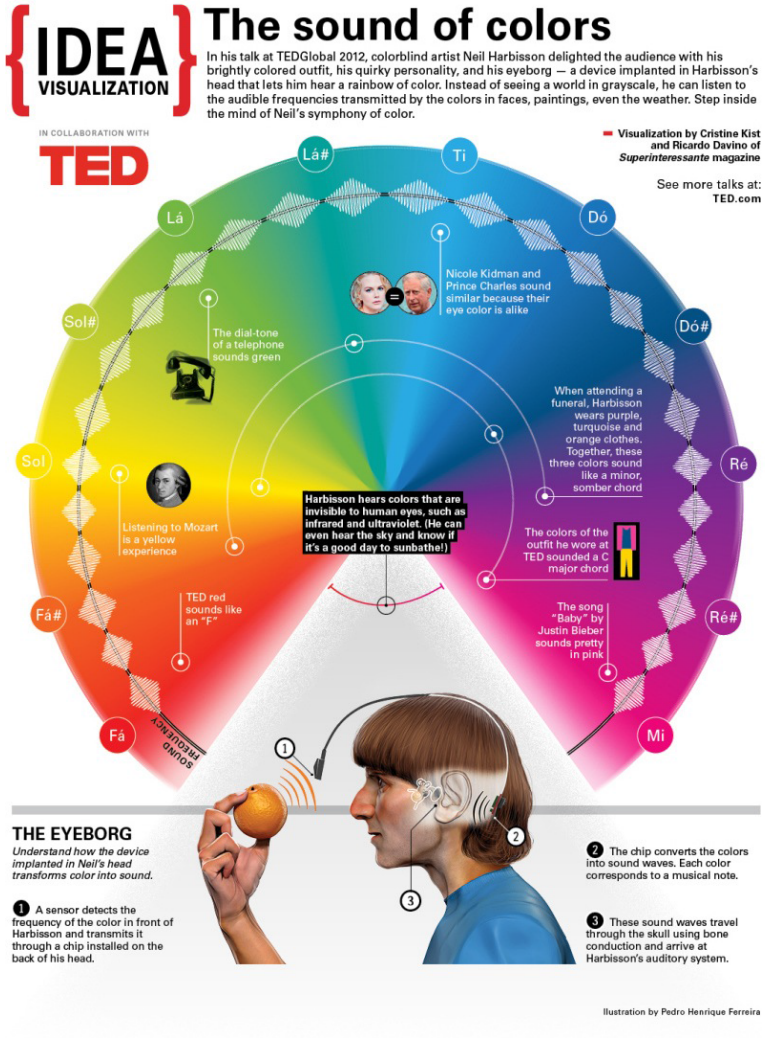

Figure 2 - The sound of colors by Neil Barbisson

Based on above process, I decided to build a musical interactive toy block - a multi-sensory toy which uses sounds, colors, forms and relationships between them - letting users play with using different senses from usual sensory sources. Putting it differently, the project aims to challenge users' usual sensory experience in order to expand our way of experiencing the world. By challenging our brain sensory system, I wanted to make users think in a cross-wired way which is a practice to be creative.

It works in an algorithm that each colored toy block has each note (pitch) related to its color. Users can play with its colors, pitches or both of them by placing the blocks side by side. The toy aims to stimulate users' sensory system by "seeing the music" that they created or by "hearing the form" that they've built.

Figure 1 - brainstorming

PROTOTYPE 1

Musical Light Box

A prototype, “Musical light box”, purposed to test the sensory cross-wiring experience. It is a musical toy cube which users can turn a knob on the side to choose among color options and hear its related pitch. Moreover, users can turn the knob from one to another color to hear a sequence of pitches (See Figure 4). In other words, users can create melodies by playing with lights and color wheels. It also has a button that can change instruments so that I can test which instruments are more effective on the project. The musical cube should plug in to a speaker to hear the sound (See Figure 5). The reason why I didn’t choose embedded speaker is because I wanted to hear rich sound instead of rough tiny sounds for Arduino chip. For the final version of the project might need embedded sounds, but I want to have another option that user can plug in to the project to hear more cool sounds for the adult user.

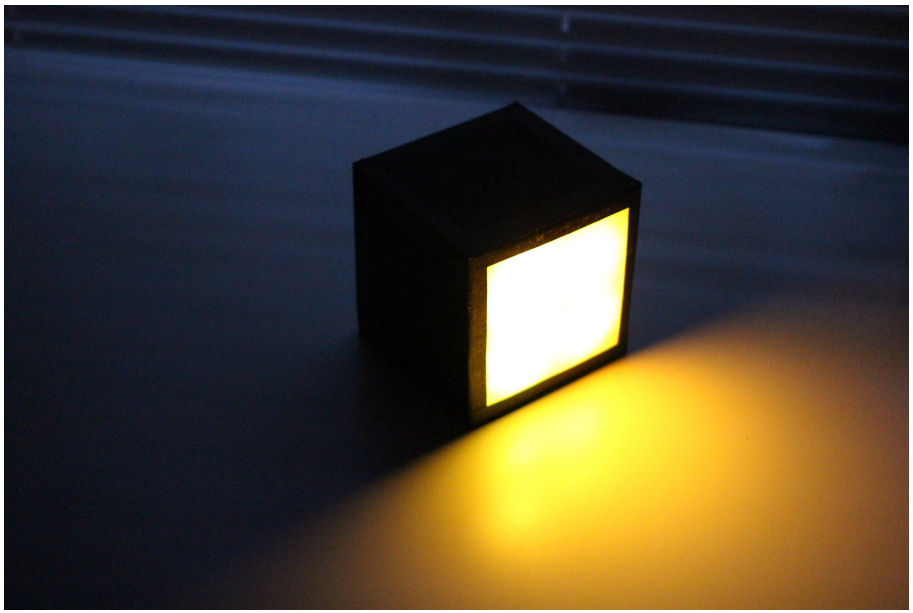

Figure 3 - Musical Light Box (video : https://vimeo.com/113318439)

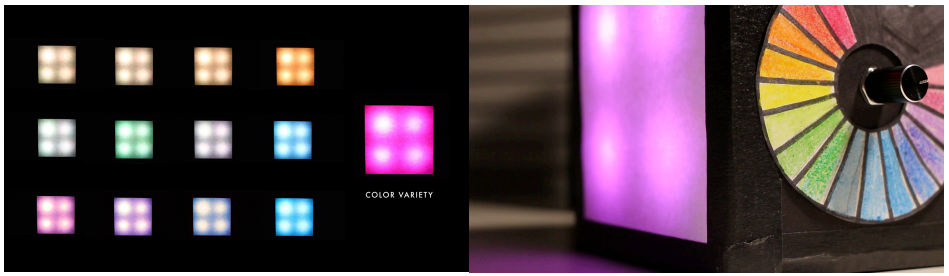

Figure 4 - Color options (Left); Knob side (Right)

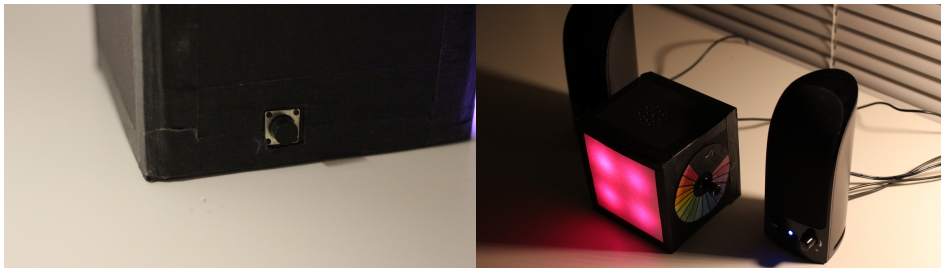

Figure 5 - Button side (Left); Set with speaker (Right)

PROTOTYPE 2

Cubical

For the second prototype, I created a web application for iPads which is called as “Cubical,” (See Figure 6) digital version of the project, “Musical Light Box” (See Figure 5 on page 8). Through the digital version, I aimed to test users about the concept of creating melody based on not only their color choices but also arrangement of colors. To be specific, the users can drag colored shapes to attach them side by side to play them as a melody.

At the beginning of building Cubical, I designed it for me to study a logic of creating melodies by attaching the blocks because I considered to build my own circuit for the project. However, Cubical influenced me to think in a different way of building a project. “What if I build a project that can communicate to each other so that can open up more availabilities of playing with it?”

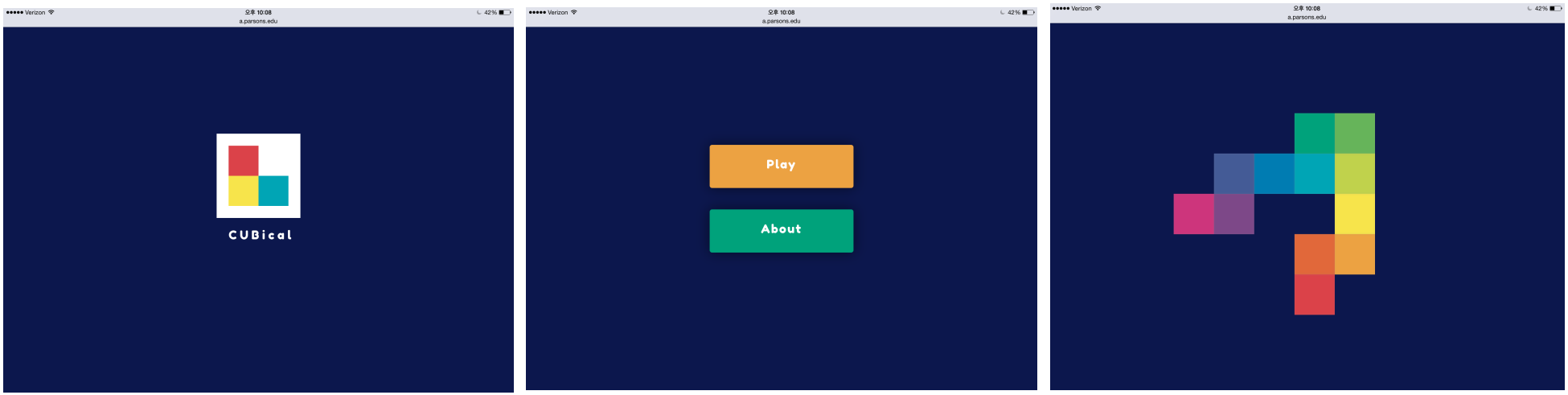

Figure 6 - Cubical WebApp Feature

SCIENCE FAIR

I tested two of prototypes, **Musical Light Box** and **Cubical**, at MFA Design and Technology Science Fair. After the fair, I could have major four feedbacks. Firstly, people enjoyed the interaction of hearing sounds with light changes, but they wanted to have more fun options they can play with. I agree with them because its simplicity couldn't let them enjoy the project continuously. Secondly, they wanted to save the melody they'd created while playing it. I thought it is a good approach to increase engagement of the toy. Thirdly, a person behaved to mount a phone on the top of the box. It was very interesting interaction to me because I could think about how the digital toy, Cubical, can be played along with physical toy at the same time. Lastly, they imagined a set of the toy which can communicate each other instead of combining with the digital toy. However, I wanted to create a digital environment which can talk with physical box in order to demonstrate the fact that playful experiences can be anywhere. Although I wanted to keep the digital toy, I could imagine a set of the box instead of making one box which has complex interface. Also, I heard several questions from people; "What emotional states user should have from the project?"; "What user scenarios the project is expected?" From these two questions, the project could toward to the final concept and final design of the project.

Overall thoughts from the feedback, I learned that people liked Musical Light Box's simple interface that they could easily play with. The colorful lights were effective to catch users' eyes and to evoke their curiosity. On the other hand, there were two concerns about the projects. Firstly, the abstract explanation of the concept confused people. They couldn't understand why and how interactive lighting can evoke users playfulness. Secondly, they were uncertain what kinds of emotions the project want to stimulate. Therefore, I started to rethink concept statement.

After the Science Fair, I had to think about what story I want to sincerely address through the project. Even though color and sound theory was interesting approach for exploring human, I realized that it doesn't convey all domains I have. Therefore, I decide to rethink from the beginning of the project.

THESIS : PIXELS

Based on my domains - human, technology, communications, senses, self and relationship - I questioned to myself what we've been missing from the technological world. Can we avoid technology? Is it the only way to solve the problems we've been facing? I believe new technologies brought lots of opportunities for humans. Then what can we do?
After asking those questions, I decided to bring the questions to people in order to think together about the problems caused by new technological world. Current world become a mixed digital and physical environment since technology evolved. Embedded technologies and wearable technologies are connected to each other which bridges human activities and surrounded spaces. Entering to a new era of technological world, I believe we don't have to abandon all technologies which have great possibilities for us. However, we do need to know the impacts of technologies and the important things we should not forget about. The most important thing is how we use technology in a right way. According to Marshall Macluhan, he says "we become what we behold. We shape our tools and then our tools shape us."[3] I totally agree with his opinion how much it is important to guide our future properly by adapting new technology appropriately. Additionally, Margaret Atwood also told "science is a tool, and we invent tools to do things we want. It's a question of how these tools are used by people."[4] Likewise, I believe we need to study about how to adapt the upcoming world properly instead of just avoiding them.

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[3] McLuhan, 1964, after Alexander Pope and William Blake

[4] Wired, "Margaret Atwood, Speculative Fiction's Apocalyptic Optimist"
(http://www.wired.com/2009/10/margaret-atwood-speculative-fictions-apocalyptic-optimist/)


PIXELS

ABSTRACT

PIXELS is a series of light-emitting objects and an iOS application that blends digital and physical spaces. We live in a world in which the digital and physical are intertwined and, at this point, it would be impossible to separate them. In my project, I ask, how much do we perceive their co-existence? I want my users to ask how much are we adapting to the blended environment. This is an investigation into how much the digital environment influences us and vice-versa. Based on these questions, PIXELS explores the new era in a delightful and amusing way.

CONCEPT STATEMENT

PIXELS is designed to tell the story by taking one pixel out from a digital space to a physical space. In other words, by creating experiences of touching and interacting with tangible pixel, which is usually intangible digital form, the project tries to represent convergence of physical and digital spaces. Specifically, the object has a feature of a cube chipped off. The object's chipped off side emits a light with a color which a digital space's pixel has. However, the color of light can be changed to another color by our interactions. Moreover, the changed color effect digital spaces through the connection between them. This is because PIXELS aimed to demonstrate how they were blended to each other through the circulation of cause and effect in between the spaces.

Contrast to the pixel-shaped object, digital spaces are filled with nature graphics in order to represent the fact that digital spaces have been resembled to physical spaces. It is because designers and developers have been researched deeply about human to make the digital spaces intuitively communicates with us. For example, Google's material design concept emerged to make a visual logic based on scientific grounds which increases our understands in digital spaces. As a result, digital spaces have been alike to physical environment. Therefore, PIXEL used nature graphics to represent the tendency of digital spaces' evolution.

In conclusion, the project, PIXELS, tried to tell us about blended digital and physical spaces we are facing. Instead of telling negative aspects of the sudden changes occurred by new technology, it is designed to understand and adopt appropriately about their coexistence. In the end, Soohyun Park, the designer of the project, throws a question what concerns we need to do for proper adoptions of the converged spaces while we are staring the gleamed pixel on our hands.

RESEARCH

“Lighting: Its Effect on People and Spaces” Implications Vol 2. Issue 2.
by Delores A. Ginthner, University of Minnesota

From the reading, the author states lighting enables to create moods of spaces. She tells, “lighting is a key factor in helping the space meet the intent of its owner and the needs of its users.” She describes five categories that lighting can decide: pleasant versus unpleasant, public versus private, spacious versus confined, relaxed versus tense and visually clear versus hazy. She also explains which lighting styles can influence the mood of spaces (See Table 1). According to her description, I could demonstrate my project enable to convey both pleasant and relaxed mood which can created from non-uniform distributed lighting which is also minority lighting. My project, PIXELS, can create the space more pleasant or relaxed by users choice of the light color and their own arrangements of a set of light boxes in their spaces. Therefore, not only users are able to give special moods to their own spaces, but also they can have playful interactions while they are creating the light of moods.

Pleasant	Use wall lighting, instead of the majority of the lighting coming directly down from the ceiling. Use a non-uniform distribution of brightness in the space; how bright or dim is dependent upon the visual tasks being performed within the space.
Public	Rely on higher levels of illumination with a more uniform distribution of light from overhead lighting sources, predominantly.
Spacious	Provide overall high levels of illumination with even distribution of light on the walls and uniform lighting on all surfaces.
Relaxed	Use non-uniform distribution, wall lighting, and lower light levels, typically.
Visually Clear	Provide higher luminance on the activity/task planes, with peripheral luminance.

Table 1 - Referenced from “Lighting: Its Effect on People and Spaces” by InformeDesign (p3: 63-69)

PROTOTYPE 3

DLIGHT

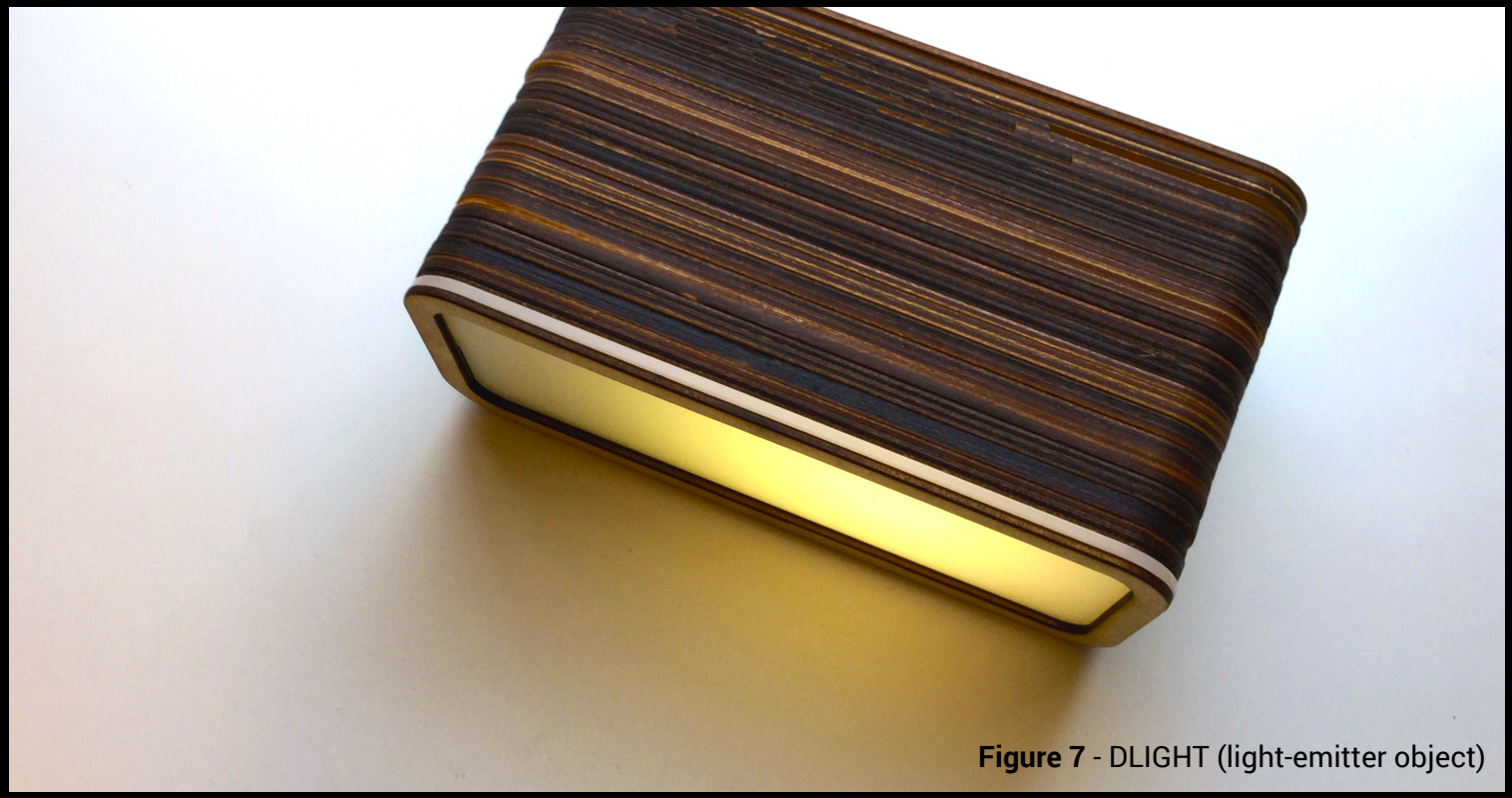


Figure 7 - DLIGHT (light-emitter object)

For prototype version 3, my major concern was to test which material would be suitable for the project (See Figure 7). I chose wooden material for the DLIGHT, but after user-testing I realized that it didn't represent the concept - pixel - well. Also, the name DLIGHT influenced people to expect the object as an interior element. As a result, the users had difficulties of finding the connection between concept and the feature of the object even though it was beautifully made. Also, the mounted chip "Bluefruit"(See Figure 8) was required lots of the object's inner space which restricted the object's size. As a result, I decided to find another way of making connection between the object and iOS application for the final piece.

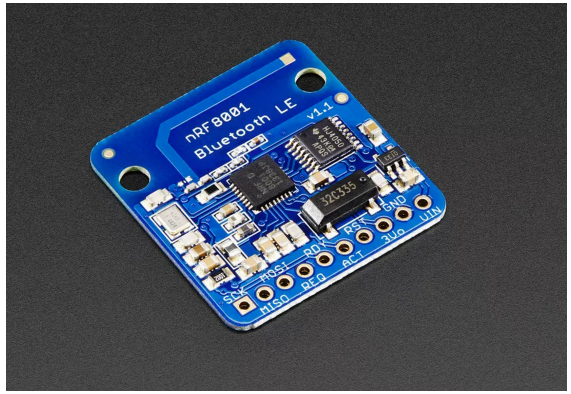
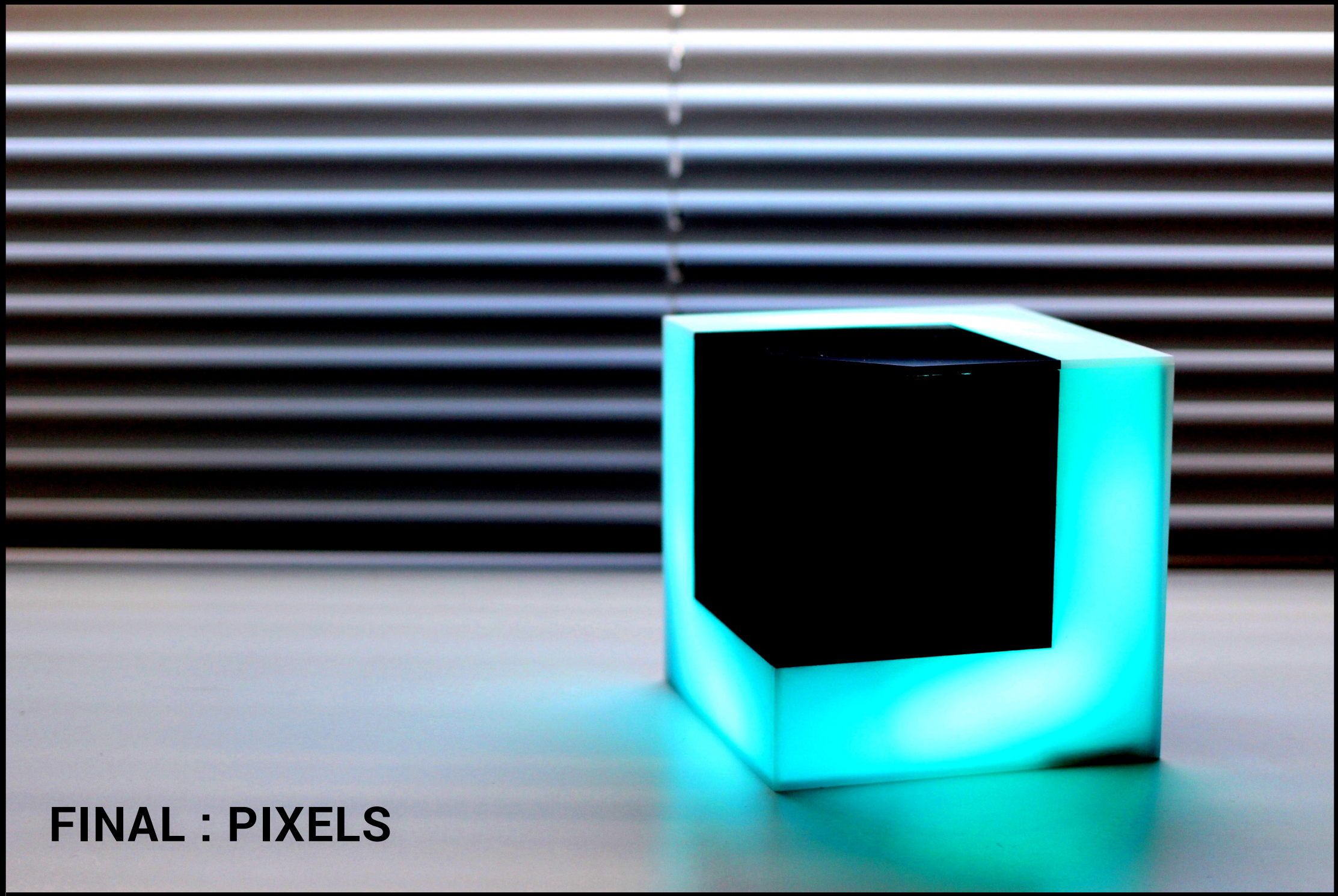
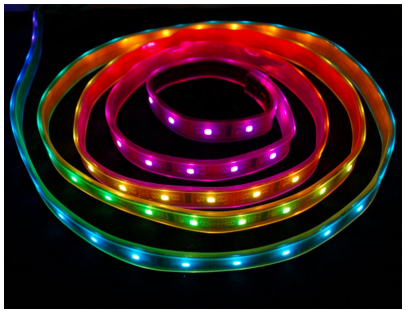


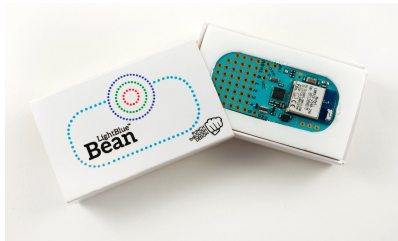
Figure 8 - Bluefruit (Blutooth LE) from Adafruit



FINAL : PIXELS

TECHNICAL DIAGRAM





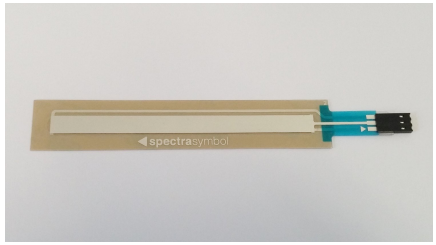
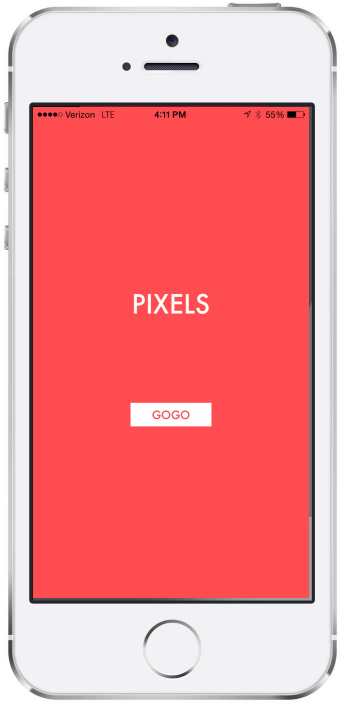


Figure 9 - DotStar LEDs (Top Left)
Figure 10 - LightBlue Bean (Bottom Left)
Figure 11 - SoftPot (Bottom Right)

Connect a color data of one pixel on the screen and the object's color of light



WEB SERVER

Communicate with web server to visualize digital environments (Hybrid application)

Figure 12 - PIXELS iOS Application

Inside of the physical PIXELS (the object), it has a LED strip for lighting and a SoftPot for touchable selector of the colors of lights. I used a Lightblue bean which is bluetooth Light Energy chip in order to communicate with PIXELS iOS Application (See Figure 9,10,11,12 on Page 18). Whenever users connect the object to the application through bluetooth, the users get colored light which is on the application. Also, when users change the color by the SoftPot, the application shows its correlated aesthetic visual effects.

User Scenario

1. Connect PIXELS object to iOS Application.
2. Set a color from the object by SoftPot sensor.
3. See the changes of the digital environment on the screen.
4. See the correlated changes when visual effects goes through the digital environment PIXELS box (See Figure 14 - white box).
5. Move the white box to somewhere else on the screen and see any changes of the object's light.
6. Choose another color from the object and see what else happen on the screen.

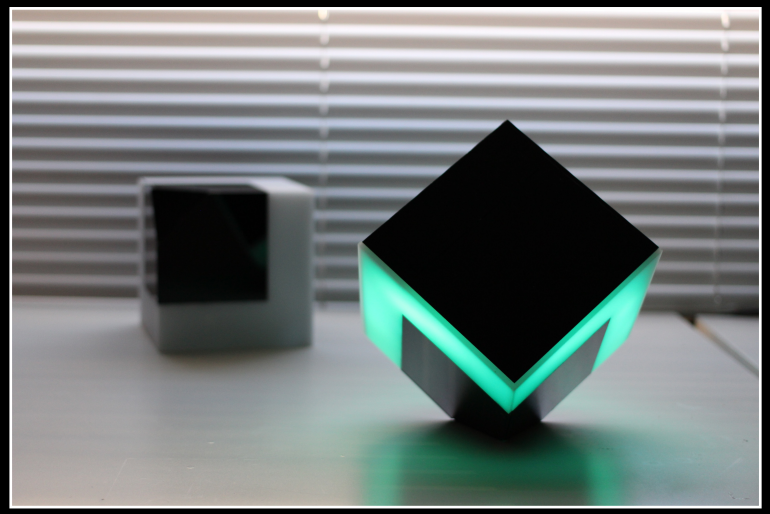


Figure 13 - Object PIXELS with light on

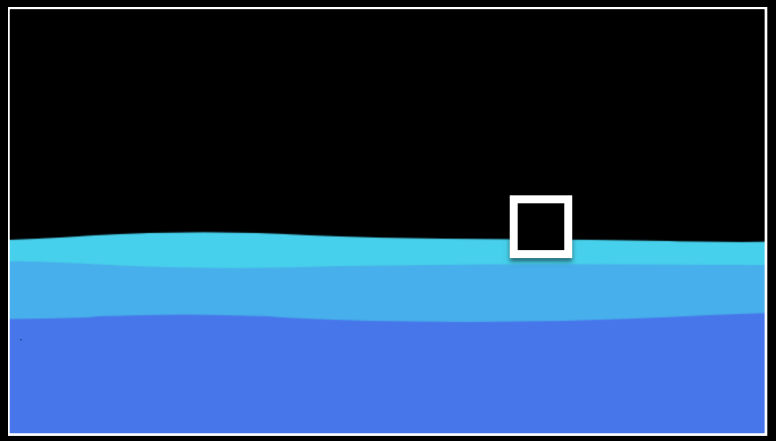


Figure 14 - PIXELS iOS Application View

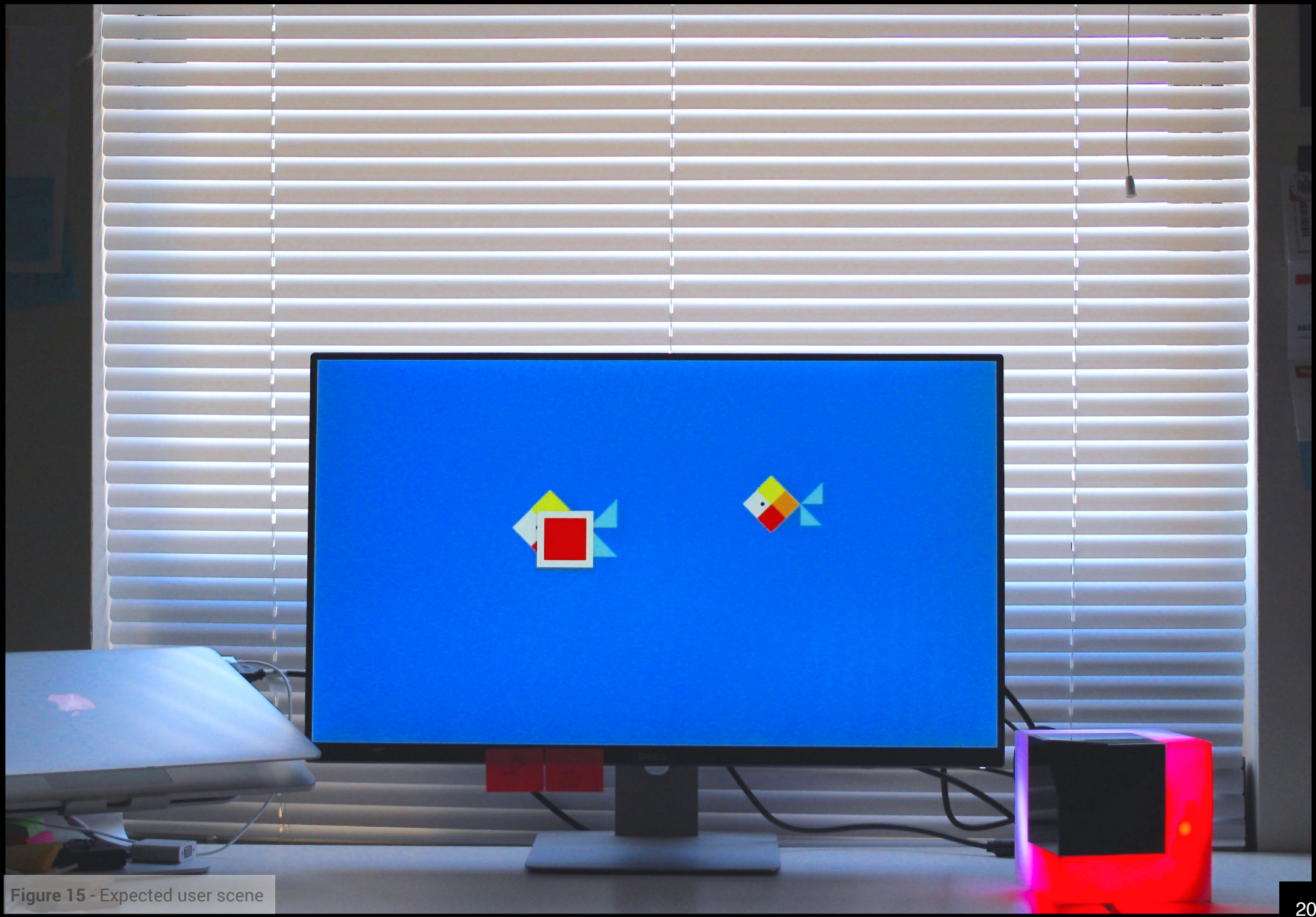


Figure 15 - Expected user scene

CONCLUSION

The most difficult part while creating the project was making design decisions for two forms: physical object and digital interface. It took a lot of time to think correlated features between physical object and digital interface in order to convey the concept clearly. I did lots of trials for the object and the application's interface (See prototype 1, 2 and 3). After the prototypes and the user testings of them, I could find proper materials for the project such as acrylic surface and LEDs for brightest color.

After several user testing, I realized that it can be a small toy for adults. For example, the participants of user testing wanted to find another colors and options while they were playing with it. They enjoyed bright color and cute aesthetics inside which some of them told it can be a small game. Additionally, they told me that the light-emitting object can be placed on their desk and used as a mood lamp.

In conclusion, I decide to iterate the project as an interactive mood lamp which has game features when they connect to the application. I would love to create more varieties for the digital environmental effects for improve engagement of users. Since the project contains digital app, I will create a platform that can share users' digital environments for the PIXELS users.

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