

Title	Ambiance : expanding personal style to public space
Sub Title	
Author	Choi, Ray Sekine(Inakage, Masahiko) 稻蔭, 正彦
Publisher	慶應義塾大学大学院メディアデザイン研究科
Publication year	2018
Jtitle	
JaLC DOI	
Abstract	
Notes	修士学位論文. 2018年度メディアデザイン学 第688号
Genre	Thesis or Dissertation
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO40001001-00002018-0688

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

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

Master's Thesis
Academic Year 2018

Ambiance
Expanding Personal Style to Public Space



Keio University
Graduate School of Media Design

Ray Sekine Choi

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

Ray Sekine Choi

Master's Thesis Advisory Committee:

Professor Masa Inakage (Main Research Supervisor)
Associate Professor Kai Kunze (Sub Research Supervisor)

Master's Thesis Review Committee:

Professor Masa Inakage (Chair)
Associate Professor Kai Kunze (Co-Reviewer)
Professor Hideki Sunahara (Co-Reviewer)

Abstract of Master's Thesis of Academic Year 2018

Ambiance Expanding Personal Style to Public Space

Category: Design

Summary

Today, people have infinite possibilities constructing their personal style through fashion. One of the key attributes of personal style is that it is a visually enjoyable experience. Another is that it is directly related to how one perceives themselves. It gives people the power to transform themselves, and in effect influences their mood. Personal style does have a limitation however. The area of expression is limited to ones personal space created with physical items on one's body. Clothing, accessories, and makeup must all be on ones physical body to be considered a part of their personal style. In this study however, we explore extending personal style by designing Ambiance. Ambiance accessories are wearable devices which trigger projected visual effects in the theme of the accessory on public surfaces around the user. Ambiance imagines a world where a persons surroundings subtly change based on their personal style. In the same way that people use bags and shoes to accessorize, users can use public surfaces within the city as spacial accessories that act as an extension of their personal style. By designing Ambiance accessories and testing them through two implementations Ambiance Found and Ambiance Walkway, this study proves it is possible to extend personal style to public spaces while maintaining three key attributes of personal style: That it is (1) A visual experience, (2) A part of self consciousness, and (3) A variable which may influence mood.

Keywords:

Personal Style, Accessories, Interaction, Fashion, Experience Design

Keio University Graduate School of Media Design

Ray Sekine Choi

Contents

Acknowledgements	ix
1 Introduction	1
1.1. Personal Style and Visuals	1
1.2. Personal Style and Self Perception	1
1.3. Personal Style and Mood	2
1.4. Key Attributes of Personal Style	3
1.5. Research Premise	3
1.5.1 Contribution	4
2 Related Works	5
2.1. Influencing Public Spaces	5
2.1.1 Medieval Banners	5
2.1.2 X Games	6
2.1.3 The Changing Room - Displays of Emotion	7
2.2. Personal Style Leaves the Body	9
2.2.1 Light Perfume	9
2.2.2 The Butterfly Dress	10
2.2.3 Step in the City	11
2.3. Accessories as Triggers	13
2.3.1 16 Ways That Accessories Can Update Boring Outfits	13
2.3.2 CSR and Cellini Bluetooth Pendant	14
3 Ambiance Concept	16
3.1. Concept Design	16
3.2. Target Audience	16
3.3. Preliminary Research on Personal Style	17
3.4. Vision Story Design	17
3.4.1 Target Persona	18
3.4.2 Vision Story	18
3.4.3 Experience Design	19

4 Proof of Concept	20
4.1. Ambiance Found	20
4.1.1 Ambiance Accessories	20
4.1.2 System Specifications	27
4.1.3 Experiment Design	28
4.1.4 Evaluation Method	30
4.1.5 Results	32
4.2. Ambiance Walkway	37
4.2.1 Ambiance Accessories	38
4.2.2 System Specifications	39
4.2.3 Experiment Design	42
4.2.4 Evaluation Method	43
4.2.5 Results	45
4.2.6 Test Subject A	45
4.2.7 Test Subject B	48
4.2.8 Test Subject C	49
4.2.9 Test Subject D	52
4.2.10 Test Subject E	53
4.2.11 Test Subject F	56
4.2.12 Test Subject G	58
4.2.13 Test Subject H	62
4.2.14 Test Subject I	64
4.2.15 Test Subject J	66
4.3. Results Summary	68
5 Discussion	69
5.1. Embarrassment Issue	69
5.1.1 Mood Issue	69
5.2. Limitations	70
5.3. Connectivity Issue	70
5.3.1 Scale Issue	70
5.4. Future Works	71
5.4.1 Immediate Improvements	71
5.4.2 Future Developments	71

Contents

6 Conclusion	73
References	74

List of Figures

1.1	Personal Style Psychology	3
2.1	Flags and Banners used in the Middle Ages in Europe	6
2.2	X Games by ENESS	7
2.3	The Changing Room - Displays of Emotion by Lauren McCarthy	8
2.4	Light Perfume by Yongsoon Choi, Rahul Parsani, Xavier Roman, Anshul Vikram Pandey and Adrian David Cheok	9
2.5	The Butterfly Dress by Intel and Ezra+Tuba	11
2.6	Step in the City at KMD Forum 2018	12
2.7	Accessories for a Date	13
2.8	Accessories for the Weekend	14
2.9	CSR Cellini Bluetooth Necklace	15
4.1	Flutter Ambiance Accessory	21
4.2	Flutter Visual Effect 1: A cluster of green butterflies appearing from the center	21
4.3	Flutter Visual Effect 2: Green fairy lights swarming	22
4.4	Flutter Visual Effect 3: A trail of green fairy lights moving from right to left	22
4.5	Flutter Visual Effect 4: A ring of green fairy lights with a cluster of green butterflies inside	22
4.6	Explosive Ambiance Accessory	23
4.7	Explosive Visual Effect 1: Concrete breaking apart	23
4.8	Explosive Visual Effect 2: A ring of fire burning	24
4.9	Explosive Visual Effect 3: Horizontal bars of fire appearing and disappearing	24
4.10	Explosive Visual Effect 4: Fire exploding in bursts	24
4.11	Speed Ambiance Accessory	25
4.12	Speed Visual Effect 1: A pink neon triangle being drawn	25
4.13	Speed Visual Effect 2: Horizontal lines of racing blue and pink neon lights	26

4.14	Speed Visual Effect 3: Purple neon lines flying from left to right	26
4.15	Speed Visual Effect 4: Blue neon triangles flying up vertically	26
4.16	Size of the Original Mamorio	27
4.17	Ambiance Found System	28
4.18	Ambiance Found Implementation at KMD FORUM 2018	29
4.19	Ambiance Booth at KMD FORUM 2018	29
4.20	Slide show Mood Boards Displayed on IPads	30
4.21	User holding Ambiance accessory with hand	34
4.22	User holding Ambiance accessory with hand	34
4.23	User waving Ambiance accessory	35
4.24	User with visuals on his shirt	35
4.25	Users Ambiance experience attracting attention	36
4.26	Goal Mood for Speed expressed on a Self Assessment Manikin . .	39
4.27	Goal Mood for Flutter expressed on a Self Assessment Manikin .	39
4.28	New Flutter Visual Effect 1: Calmly Rustling Leaves	40
4.29	New Flutter Visual Effect 2: Floating Green Fireflies	40
4.30	New Flutter Visual Effect 3: Butterfly Flying Up	40
4.31	New Flutter Visual Effect 4: Breathing Pattern	41
4.32	iBeacon Broadcast	41
4.33	Beacons List	42
4.34	Ambiance Walkway Implemented	43
4.35	Self Assessment Manikin Test	44
4.36	Test Subject A	46
4.37	Test Subject A	47
4.38	+1 Valence, -2 Arousal, +2 Dominance	48
4.39	+1 Valence, -1 Arousal, No Movement in Dominance	49
4.40	Subject C	50
4.41	-1 Valence, No Movement in Arousal, +1 Dominance	51
4.42	+1 Valence, -4 Arousal, +1 Dominance	53
4.43	Test Subject E	54
4.44	+3 Valence, +2 Arousal, No Changes in Dominance	56
4.45	Test Subject F	57
4.46	+1 Valence, +1 Arousal, +1 Dominance	58

4.47	Test Subject G	60
4.48	Test Subject G	61
4.49	+1 Valence, +1 Arousal, +2 Dominance	61
4.50	Test Subject H	63
4.51	+1 Valence, +1 Arousal, +1 Dominance	64
4.52	Test Subject I	65
4.53	+2 Valence, -2 Arousal, No Movemement in Dominance	66
4.54	-1 Valence, -1 Arousal, -1 Dominance	68

Acknowledgements

Firstly, I would like to thank my Mother and Father for always supporting me in all aspects of my life. I would also like to thank Professor Masa Inakage for his academic guidance and inspiration to explore various Playful topics. I would also like to thank Professor Ueki Asturo for always enlightening me with valuable advice and supporting me throughout my research. In addition I would also like to thank Professor Kai Kunze and Professor Sunahara Hideki for helping me to organize my research into a cohesive paper. I would also like to thank fellow researchers Ayana Kobayashi, Kathy Chen, and Audrey He for being the best collaborators one could ask for. I would also like to thank all KMD schoolmates who have given me guidance and supported me during my time here. Thank you so much! -Ray Sekine Choi

Chapter 1

Introduction

Since the beginning of civilization, people have been adorning their bodies with paint, jewelry, makeup, and clothing to express their personal style. For this study we define personal style as the total coordination of such body adornments on a person at one time. One thing to clarify is that one person could have multiple personal styles for different commitments and also choose personal styles depending on how they feel. For many that enjoy personal style, its versatility is what makes it so enjoyable.

1.1. Personal Style and Visuals

One of the key attributes of personal style is that it is a visually enjoyable experience. By design, humans are visual creatures with half of their brain devoted to processing visual information [1]. Personal style gives people different colors, designs, textures, and shapes to put on their body and alter their appearance. While comfort and functionality are important too, for the most part visuals determine how a personal style is constructed. People enjoy the act of mixing and matching different clothing and accessories to create pleasing combinations that suit how they want to express themselves. People also enjoy their personal style when they go out into the city. They catch glimpses of themselves in places like shop windows and cannot help but somehow feel good. On the surface it may seem like people are merely enjoying the designs of various clothing and accessories, but the fact that they see those designs on their body is much more significant. To explain why the visuals of personal style are being translated into enjoyment, we must look into human psychology.

1.2. Personal Style and Self Perception

Personal style is directly related to how one perceives themselves, and people utilize it as a powerful tool in aesthetic self management [2]. It essentially gives

people control over how they perceive themselves and how they imagine others will perceive them. By nature people perceive themselves through two types of self consciousness. According to professor emeritus of psychology Arnold Buss, public self consciousness is the focus on imagining how aspects of oneself that are apparent to others are being perceived [3]. This leads us to the second key attribute of personal style. People have self consciousness about their personal style because they understand that it is how they will be perceived as a person. According to a study by Franklin G. Miller, he found that there was a positive relationship between public self consciousness and fashion opinion leadership, clothing interest, clothing conformity, self perceived fashionability, and actual fashionability [4]. People want to present themselves in a way which makes them feel like others will perceive them in a positive way. For example, people imagine their peers perceptions and dress up to go to important meetings or when meeting with a significant other. On the other hand, private self consciousness is also closely tied to personal style. Private self consciousness is the focus on one's thoughts and feelings from their own point of view that are not apparent to others [3]. For example, a person may wear a sparkly dress regardless of how others perceive them, because it makes them feel radiant and beautiful inside. Studies have found that peoples private self consciousness make them want to present themselves in a designed manner to bring the viewers impression in line with their preferred self view or ideal self [5]. This explains why people in touch with their feelings may use personal style as a way of self expression. Seen in terms of public self consciousness and private self consciousness, we see that personal style is a powerful tool used by people to change self perception.

1.3. Personal Style and Mood

The third key attribute of personal style is that it may influence peoples moods. For this study we define mood as an emotional feeling experienced by one such as but not limited to elation, confident, flirty, rebellious etc.. As explained earlier in 1.2 personal style is linked to self perception, and when people view themselves in a certain way it may indirectly put them in a certain mood. People who are aware of this phenomenon can knowingly use their personal style to change their

perception of themselves and alter their mood as seen in 1.1. For example someone may put on heels in an effort to feel more confident by perceiving themselves as a taller, stronger, and overall more professional person.



(Source: Created by Ray Sekine Choi)

Figure 1.1 Personal Style Psychology

The notion that people utilize personal style in this way was proved in a study conducted by Yoon-Hee Kwon which showed that those with high levels of private self consciousness (who are in touch with their feelings) had the tendency to use clothing for the purpose of mood management [6]. One thing to note is that moods and emotions are subjective and it is difficult to say exactly what personal styles cause which moods. Given the resources and time limitations in this study, we list the ability to have some effect on mood as an attribute of personal style, but we decided to only explore this topic lightly.

1.4. Key Attributes of Personal Style

To summarize the key points explained above, for the purpose of this study we define the key attributes of personal style as being: (1) A visual experience, (2) A part of self consciousness, and (3) A variable which may influence mood.

1.5. Research Premise

For people in modern times, globalization and a rise in the freedom of expression have given them infinite possibilities to construct their personal style. Anthropologist and writer Ted Polhemus explains, As well as choice and complexity

our world is also characterized by rapid change and this too has profound impact upon the customized body. New fashion come and go with each season and particular styletribes gain or loose popularity. The result is a perpetual motion machine of different constantly changing ways of altering the appearance of the human form. [7]. In an unrestricted diverse society, people enjoy metamorphosing into many different versions of themselves. Despite the fact there are an abundance of personal style options, there are some limitations. One is that personal styles can only be created in personal space with body adornments on the physical body. Therefore sizing and fit do matter and can be limiting to some in terms of expression. Also since it is limited to personal space, public spaces cannot be considered a part of personal style. Wearing a vibrant blue ballgown to the office may seem to have a dramatic effect on the surrounding area causing people to stare. However, this is more psychological and people cannot literally extend their personal style off of their body and onto their surroundings. If we could however extend the current limitations of personal style, it would be crucial to maintain the key attributes of personal style as mentioned in 1.4.

1.5.1 Contribution

In this thesis, we present the exploration of expanding personal style from the user's body and personal space to public space, while maintaining the key attributes of personal style mentioned in 1.4. As a method to this exploration we have designed Ambiance accessories. Ambiance accessories are wearable devices which trigger projected visual effects in the theme of the accessory onto public surfaces around the user. Through two implementations of the accessories with Ambiance Found. and Ambiance Walkway., this study proved it is possible to extend personal style to public spaces while maintaining three key attributes of personal style: That it is (1) A visual experience, (2) A part of self consciousness, and (3) A variable which may influence mood.

Chapter 2

Related Works

2.1. Influencing Public Spaces

To use public space as an extension of personal style, we must first look into effective methods of changing public space visually. By changing an environments visuals to match the visuals of ones personal style, it is possible to make the space around them an extension of their personal style. This idea of using space as a part of personal expression is not a new concept. However, in the early days quickly changing the visuals of a public place was a difficult task, and therefore restricted to only people with great influence. By looking at both early examples and latest efforts using new technology, we can better design a public space that responds visually to personal style.

2.1.1 Medieval Banners

In history, the ability to fill a public space with the visuals of ones style has been an expression of power and influence. During the Middle Ages in Europe, significant families had their soldiers carry flags and banners adorned with their crest and color. When an army of hundreds of men marched into a field the field would be filled with the symbolism and color of the family, an extremely powerful or frightening sight depending on the viewer. A visual extension of the familys power, people who saw the flags and banners immediately knew the status, association, or religion of the flag bearer. Colors were also very significant. Gold symbolized generosity while silver or white represented peace or sincerity [8]. Green symbolized hope and blue was associated with truth and loyalty [8]. Red was very popular too as it represented military strength [8].

When a significant family rode in with their army, they were able to fill their surrounding as seen in Figure 2.1 in their color. With that they projected various meanings often associated with that color on a large scale. This is a simple but valuable example of using physical objects like banners and flags to extend personal style to public space. On issue with using physical objects however is



(Source: Game of Thrones [9])

Figure 2.1 Flags and Banners used in the Middle Ages in Europe

that it requires man power. In this case many soldiers were needed to carry and move the flags and banners. Therefore this extension of personal style was limited to people who have influence and can mobilize many people to help extend their personal style. Another issue was that since physical objects take time to craft, family colors and crests were not changed often. Therefore, individuals could not express their personal style as we have defined it, which could change on a day to day basis. Some of these issues are being solved today as we move from physical objects to digital ones. As we see in the following example, large scale digital signs and projections are becoming extremely popular for their ability to rapidly change the feeling of a place. Individuals can change mundane places can be turned into visually stimulating places without the need for their own army of men.

2.1.2 X Games

Interactive projection mapping is a recently popular way of quickly changing the visuals of the space. One example project which uses this technology is the X Games installation done by the Melbourne based art and design firm ENESS [10]. A company known for transforming normal surfaces into extraordinary works of art, they utilized their own three-dimensional mapping software to project colorful animations and the X Games Logo onto the snow ramps as seen in Figure 2.2. The X games Logo was interactive, responding as snowboarders approached and took off from the ramp. Most interestingly the animations changed as more snowboarders came down the ramp, making it a dynamically changing pattern that depended on human interaction.



(Source: ENESS Website [10])

Figure 2.2 X Games by ENESS

Visually this work is powerful because it transforms an ordinary white surface into a world of color and energy. It showcases the prowess of high powered projections. It has the ability to continue dramatically transforming a real space once it has been set up; something very difficult to do with physical objects. Another benefit of projections is that it can be used easily for special experiences without permanent effects. The combination of the digital projections and physical snow ramps gives a virtual reality feeling enjoyable to all without any equipment. That said, this work does have its limitations in terms of interactivity. While the system recognizes snowboarders in general as they come down the ramp, it cannot differentiate between them. For the purpose of this implementation it may not be necessary, but if interactive projections could reflect characteristics of the individual we speculate it could help make the snowboarders feel more connected to the visuals they see. The move towards a more personalized interaction with digital visuals in a space is being explored as we see in the following example.

2.1.3 The Changing Room - Displays of Emotion

The Changing Room - Displays of emotion is an installation performance created for the Queensland University of Technology. As a part of the TRANSMIT Residency and presented by Are Electronica and QUT , creator Lauren McCarthy's installation deals with themes of surveillance architectures, social technologies, and smart homes [11]. It provides an innovated approach creating spaces that respond directly to the feelings desired by its inhabitants. Users are first asked Do you want to feel? on a large monitor and invited to browse and select one

emotion out of the hundreds available. When a user selects an emotion, the room utilizes various text, visual, and sound stimuli trying to make everyone in the space feel that emotion as intensely as possible as seen in Figure 2.3.



(Source: Creative Applications Network Article [11])

Figure 2.3 The Changing Room - Displays of Emotion by Lauren McCarthy

There are six networked zones on two floors and a central software built in Unity. It monitors inputs from various cameras, microphones and sensors. In one zone users body positions are analyzed and users are guided through a series of positions and contortions which are designed to evoke the selected emotion. Another zone picks up ambient sounds and voices which are analyzed to give instructions to the users like share your feelings or calm down depending on the selected emotion. What makes this system so novel is that it uses several different methods like subtle changes in the environment's color and direct suggestions through text to change the emotion of its users. It also gives people the unique experience of having their environment cooperate with them to put them and others nearby in a designed space that reflects their feelings. Unless a famous figure we seldom have the chance to visually see and feel the effects our presence on large public spaces or on other people. The Changing Room gives people that ability and brings new value in terms of people interacting on a more personal level with public spaces. Unfortunately, there are no records of studies conducted with this installation about how the users felt about their experience. This installation would benefit greatly by a series of qualitative research studies focusing on the user. Also one issue is that the emotion that a user may choose and the one they actually feel may be different. Due to curiosity some users may select an emotion for the sake of seeing it. One idea could be implementing a different way

of emotion selection which is more concealed.

2.2. Personal Style Leaves the Body

Designers and engineers alike are now attempting to create innovative works that expand the boundaries of personal style. They look towards technology to create new experiences previously impossible with regular fashion. Although limited in terms of the experience variation, we looked towards such works to bring the fashion design off of the body and into users surrounding area.

2.2.1 Light Perfume

One example of an innovative project which extends personal style, is a collaborative research project between the Graduate School of Media Design at Keio University, Keio-NUS CUTE center, Interactive Digital Media Institute, and the National University of Singapore. Light Perfume is a wearable system that helps users and their communication partner to mirror their nonverbal communication cues together using blinking speed, light colors, and subtle perfume emission from a wearable arm accessory during a face-to-face conversation [12]. In a paper published by Yongsoon Choi, Rahul Parsani, Xavier Roman, Anshul Vikram Pandey and Adrian David Cheok, they explore the effect of lights and fragrance as a way of expression when talking to another person.



(Source: Light Perfume [12])

Figure 2.4 Light Perfume by Yongsoon Choi, Rahul Parsani, Xavier Roman, Anshul Vikram Pandey and Adrian David Cheok

Although it is a communication device, it is also an innovative way of extending personal style because it uses perfume. Perfume scents carry different interpretations and feelings and therefore people use perfume as a part of their personal style. One thing that makes perfume unique is that it has the ability to leave the body of the wearer and linger in space. Extending personal style through perfume emission is an interesting approach. However one problem with this approach is that it does not fulfill a key attribute of personal style, that it is a visual experience. The perfume is the only part of the personal style which leaves the body and yet it is invisible. Although scents can be stimulating, it is hard to associate a scent with the person who produced it. We learn from this example that while exploring ways to bring personal style off of the physical body and into space, it is important to keep the connection between the extension and the person.

2.2.2 The Butterfly Dress

The Butterfly Dress is a beautiful piece created by engineers at Intel Labs Europe and designers Ezra Cetin and Tuba Cetin of the fashion design brand Ezra+Tuba [13]. The dress is made from luxury jacquard interwoven with metallic Lurex fibers and is adorned with forty butterflies that flutter and fly around the user when provoked. The dress is powered by the Intel Edison compute model, essentially a tiny computer that can be programmed to perform defined tasks which include wireless capabilities. The system works by using a proximity sensor which allows for the detection of an approaching person. The effect is a beautiful visual experience of the user filling their surrounding space with a flurry of blue butterflies that match the dress. This work is a great example of extending the space of personal style. For a second the design of the butterfly dress expands to a larger area around the user. By wearing this dress the user has the ability to change their surroundings for themselves and others around them. It is truly a beautiful mix of technology and design. It does have one issue which is that it is not easy for the user to wear and use themselves. The dress and system requires set up and is designed to be a spectacle. The butterflies are mechanically set up so that they can only fly off the dress once as seen in Figure 2.5, before they must be reattached manually.



(Source: Intel Website [13])

Figure 2.5 The Butterfly Dress by Intel and Ezra+Tuba

2.2.3 Step in the City

STEP in the City is a previous research project conducted in association with researcher Ayana Kobayashi. A collaborative project between The Graduate School of Media Design at Keio University and Fujitsu, the goal of this project started out as using Fujitsu's Interactive Shoes Hub sensor in a fashionable application [14]. We decided to focus on young millennial women as the target and discovered through preliminary research that many of them associated wearing high heels with wanting to feel special like a heroine of a musical or play. We first defined a heroine feeling as the satisfaction felt by women when they can improve their physical appearance based on their beauty standards, feel they are getting closer to their ideal self, and fulfill the desire to be approved by others. Then to bring this feeling to the user we designed magical high heel shoes which would transform the city around the user with visual effects and sounds based on their movement. To create the experience we embedded Fujitsu's Smart Shoes sensor within sparkly high heels and set up a miniature city made of mirror boxes as seen in 2.6. Taking inspiration from how a heroine in a play would spin around whimsically and fill the world around them with sparkles and effects, we asked the user to spin to activate the miniature city. Once they did, music would play and lights designed to match the design of the shoe would illuminate inside of the mirror boxes and reveal flowers and jewels inside.

Every time the user took a step there were also sparkle sound effects and twin-



(Source: Step in the City by Ayana Kobayashi [14])

Figure 2.6 Step in the City at KMD Forum 2018

pling of the LED lights to create the magic. The system was based mainly on the Interactive Shoes Hub sensor embedded in the high heels which sent information on rotation and acceleration. According to that information, Arduinos attached to the led lights and music would play out pre-programmed sequences creating an interactive experience. There were two high heel prototypes, one gold and one silver and each one had their programmed themes. Two users could also wear the shoes together and trigger a special effect only triggered by spinning at the same time. The implementation of STEP in the City at the KMD Forum 2017 was overall successful and many users responded positively to the experience, despite some difficulty with wearing the heels. STEP in the City served as a predecessor to the current ambiance project and we were able to learn much from the experience and feedback. For one it brought up the possibility of extending personal style to users surroundings. The usability issues that came with users not being able to wear heels easily aided in the decision to move to more universal accessories with ambiance. We also received feedback from users that they wished the spacial effects of the shoe were not confined to inside the mirror box. To address that issue we decided to use portable projectors and a rigging set up with ambiance so that the system could be installed more easily and provide a larger range of effects. Lastly since the two high heel prototypes for STEP in the City had similar designs, it was difficult to see clearly the change in the users surroundings when they wore the different shoes. With this in mind, we decide to make three very

distinct themes and styles of accessory for ambiance.

2.3. Accessories as Triggers

In deciding which fashion item to use in our study, accessories proved to be the best option to use as a trigger for extending personal style to public space. One reason is that accessories are more universal in sizing when compared to clothing items like we learned in 2.2.3. Also unlike clothing, they do not require people to go into a private space to change allowing for quick changes of personal style. The most significant benefit of accessories we found was their power to trigger dramatic personal style changes despite their easy usability. The fact that they do not need to be washed makes it easier to store technology inside.

2.3.1 16 Ways That Accessories Can Update Boring Outfits

In this Glamour article, author Nikki Ogunnaike shows that accessories can define a personal style. This article shows that by changing the accessories paired with the same black dress, the personal style changes dramatically.



(Source: 16 Ways That Accessories Can Update Boring Outfits [15])

Figure 2.7 Accessories for a Date



(Source: 16 Ways That Accessories Can Update Boring Outfits [15])

Figure 2.8 Accessories for the Weekend

The same black dress can be used for work, the weekend, or for a date depending on the accessories paired with it as seen in Figure 2.7 and Figure 2.8 [15]. Personal style is enjoyed by many because of its ability to transform the person into many different versions of themselves as explained in 1.2. Therefore we speculate that accessories which have that power would be the most effective fashion item to use as a trigger to extend personal style into public space.

2.3.2 CSR and Cellini Bluetooth Pendant

In 2014 England based chip maker CSR released a new line of Bluetooth jewelry in attempt to bring visually beautiful IOT accessories into the mass market. CSR conducted their own study and found that 72 percent of their study group believed that wearable technology devices must look good and that 67 percent admitted that it is important that the wearables with their own personal style [16]. To answer this demand for beautiful connected wearable devices, they designed a pendant necklace in collaboration with boutique jeweler Cellini. This sleek pendant necklace seen in Figure 2.9 is Bluetooth enabled and equipped with CSR's Bluetooth Smart chip, the CSR1012. The special chip is designed for wearable devices and it can connect the pendant to Smartphones by using only a small

amount of power from a lithium battery.



(Source: CSR Bluetooth Smart jewelry brings wearables to a fashionable place at CES 2014 [16])

Figure 2.9 CSR Cellini Bluetooth Necklace

The current prototype seen in Figure 2.9 was designed to send notification alerts to the user from their iPhone but Paul Williamson the director of low-power wireless at CSR explains that he wants this prototype to be a base to inspire developers to add in their own functions. One feature they were considering is adding scent capsules to allow users to release a spray of their favorite perfumes at different times throughout the day. This pendant necklace by CSR is an excellent example of designing a fashion item which can act a trigger for many experiences. The design is small and comfortable to wear for the user. People can wear the pendant as they would any other necklace and yet they can interact with many more things just by wearing it. Currently, the device itself may not have many functions but the fact that it is Bluetooth enabled makes it able to connect to other devices in the user's surrounding to perform more complex functions. It gives new value to the necklace without having to change user behavior, which can be cumbersome. This product shows the possibility of utilizing low frequency Bluetooth enabled chips that run on batteries as triggers, a simple lightweight option to making IOT accessories. Although this product has much potential, one issue is that it only receives input from the outside and not vice versa. By utilizing the Bluetooth output, more functions and interactions can be added for example sending out directions to change the visuals of a public space based on personal style.

Chapter 3

Ambiance Concept

3.1. Concept Design

Ambiance imagines a world where a persons surroundings change in subtle ways based on their personal style. People who want to feel flowery can wear floral accessories into the city and experience vacant spaces around them fill with floral patterns and soft lighting. In the same way people use bags and shoes to accessorize, users can use public surfaces within the city as spacial accessories. People can now experience and enjoy personal style in a new way. With Ambiance, the city actively responds to the peoples styles with dynamic visual changes that affect everyone. People are able to make spaces theirs while simultaneously enjoying spaces created by others. Personal style is expanded from the users body to include their surroundings, all while maintaining the key attributes of personal style mentioned in 1.4. Personal style now has the added value of being a trigger to various experiences within the city.

3.2. Target Audience

The target audience for Ambiance is young women and men in their late teens to early thirties who have an active lifestyle. They have several different obligations such as school, work, social events, and or hobbies that require them to dress in several different ways. They enjoy having a diverse lifestyle and like to express their personal style while also dressing the part to match the TPO (time, place, occasion). Deciding what coordinate to wear is a fun challenge for them naturally, they feel satisfied when they feel that they look great. For the target audience the city is a place where they frequently walk through and a place to express their personal style as well as a place to check out other people s styles. They often find style inspiration just by people watching and enjoy trying different looks in addition to the personal style they have already developed. Being open minded and fun-loving the target audience likes to check out to new interesting spots in

the city like cafes or pop up events. Visual stimuli is something they value in their everyday lives.

3.3. Preliminary Research on Personal Style

As the first step in our study, we investigated what exactly people enjoyed about personal style. Preliminary research was conducted through conversations with participants, with varying levels of interest in personal style. In an open discussion about personal style we decided to map out the the common interactions people had with fashion items in general. They were; browsing for items, trying on items (in store), buying items, trying on items (at home), and wearing the items out. Breaking down each interaction revealed that people have enjoyable moments within each interaction that lead to their overall interest in personal style. When browsing items, there is the excitement of making a great find. Then when trying on items within the store, there is the fun of seeing different versions of oneself and imagining the experiences that each item may bring. When purchasing fashion items, there is the feeling of obtaining a key to a future experience. Trying on fashion items at home just before wearing them out, puts people in a specific mindset fit for the occasion. We discovered through our preliminary research that every each stage of interaction with the fashion item is driven by the joy of imaging one's future self and the various experience they will encounter [17]. The ability of personal style to generate imagination and bring people pleasure is what makes it so valuable. This part of the study provided us the idea that expanding personal style to public spaces, could broaden the imagination of a person deciding what to wear that day.

3.4. Vision Story Design

From the information gathered from 3.3 we created an appropriate target persona and a vision story of the Ambiance experience.

3.4.1 Target Persona

The target persona created for Ambiance was Chloe, a 21 year old university student studying art in a metropolitan city. She has a bright personality and balances her busy schedule of university courses, part time work, and yoga classes while still leaving some time to go to music events with her friends. When it comes to fashion she is a chameleon and likes to try different styles, always getting inspiration from social media and her friends at university. As an art student she believes that her personal style is another way of expression and enjoys both shopping and creating coordinates for different occasions. Even with her busy lifestyle she tries to always look her best because it motivates her.

3.4.2 Vision Story

One Friday, Chloe from 3.4.1 has a fully scheduled day. After a particularly stressful morning of university courses, Chloe wears her Ambiance flower hair accessory to put her hair in a ponytail for yoga. She arrives at yoga tired, but hopeful that she can feel relaxed at the end of the lesson. At first she has a hard time getting her mind off of her schoolwork during the lesson but a few minutes in she notices her Ambiance hair accessory is creating subtle flower motifs that float around yoga studio blooming slowly in a natural breathing pattern. The flowers are so beautiful and their soft movements help her to calm her breathing and focus on the lesson. In the afternoon, Chloe returns to her apartment and dresses up for a rock concert with her friends. She selects an all black coordinate and accessorizes with her ambience studded bracelet to look fierce. As Chloe and her friends walk into the concert downtown together wearing the Ambiance bracelets, suddenly fire effects and flashing red lights show up around them making them feel energized and excited for an explosive night out. The next morning, Chloe wakes up at 5:00pm exhausted from last night's festivities. Although she feels like staying in and relaxing she also wants to get in shape for summer so she pulls herself together and decides to go for a run to refresh herself. She wears her neon pink Ambiance sweatband and begins her run in the city. Running on a lazy Saturday afternoon is difficult for her but Chloe starts to notice neon lights speeding past her on the wall and sidewalk making her feel like she is running through a science

fiction game. The speeding lights make Chloe feel fast and encourage her to keep running. Magical accessories entertain Chloe by triggering spaces around her to become extensions of her personal style, reflecting the theme of her accessory. In this story, the spaces she creates through her Ambiance accessories give her pleasant surprises that make her feel more relaxed, or excited, or motivated.

3.4.3 Experience Design

The Ambiance experience was designed to have users bring their personal style to public spaces through their accessories like in the vision story in 3.4.2. The experience begins with the user choosing an Ambiance accessory. We started with this step because the act of choosing fashion items before wearing them provokes imagination, a part of what makes personal style enjoyable. Like in the vision story, the visual design of the accessories correlate thematically to the experience the user will have. They do not however correlate directly in designs or colors. This was to remove predictability which hinders the magic of Ambiance accessories which bring pleasant surprises in the vision story. When the user puts on their accessory, they are asked to walk around to simulate wearing it out to town. As they walk around, visual effects in the theme of their accessory appear projected on various surfaces within their proximity. The space around the user is momentarily transformed for everyone one to see. Initially, we had considered using virtual reality to have the visuals only visible to the user. However, one of the highlights of the Ambiance experience is that it gives people the rare opportunity to affect others with their personal style. With the Ambiance experience, users can easily experience transforming a space with extensions of their personal style.

Chapter 4

Proof of Concept

4.1. Ambiance Found

The initial prototype Ambiance. Found was designed to have users experience the ability to extend their personal style to their surroundings by wearing accessories. We designed an experience where users wear an Ambiance accessory and walk around to find visuals appearing around them in the theme of that accessory. The goal of this prototype was to (1) see if users notice the visuals they triggered, (2) to see if users could connect the theme of visuals they saw to their Ambiance accessory and (3) most importantly learn about how they felt about the Ambiance experience. It was also a way to test various types of visuals and see the surface the visuals were most noticeable on. We also wanted to observe how users interacted with the prototype to get ideas about the timing of when the visuals should appear and how far from the user they should appear.

4.1.1 Ambiance Accessories

Three Ambiance accessories were created, each with a different theme. We then created four visual effects in the theme of each accessory, which would show up around the user. Understanding that there are numerous style themes available to people when creating their own personal style, we decided to focus on three criteria when coming up with themes. One of those criteria was to have a theme often associated with a strong mood or feeling. Another criteria was the themes were visually distinct, so the three themes would be easy to differentiate since several people would be demoing the Ambiance experience at once. Lastly, because the Ambiance experience is all about giving people a novel amusing experience, the themes had to be bold and not mundane. After some deliberation, we designed the following three themes Flutter , Explosive , and Speed which all fit the necessary criteria.

Flutter

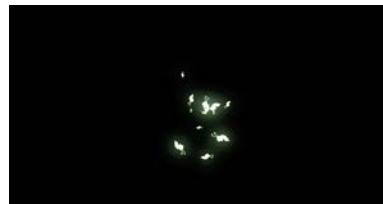
Flutter was inspired by the calm yet magical feelings created by nature, and the primary color palette consisted of greens and yellows taken from forest photographs. Green was chosen for its calming effect based on color theory [18]. With this theme, the aim was to have the user feel like a magical princess taking a walk through a beautifully lit magical forest that reacted gently to her presence. To fit this theme, we decided to create a flower crown Ambiance accessory seen in Figure 4.1. For this theme it was important to express fleeting moments and ephemeral beauty like that of a butterfly or firefly. Therefore the visuals of the Flutter theme mainly featured green firefly lights in several floating motions.



(Flower Headband)

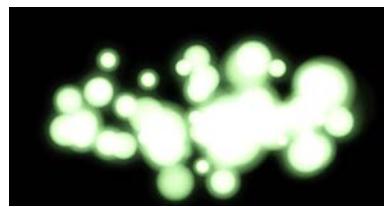
Figure 4.1 Flutter Ambiance Accessory

The following four visual effects were created:



(Created with Adobe After Effects)

Figure 4.2 Flutter Visual Effect 1: A cluster of green butterflies appearing from the center



(Created with Adobe After Effects)

Figure 4.3 Flutter Visual Effect 2: Green fairy lights swarming



(Created with Adobe After Effects)

Figure 4.4 Flutter Visual Effect 3: A trail of green fairy lights moving from right to left



(Created with Adobe After Effects)

Figure 4.5 Flutter Visual Effect 4: A ring of green fairy lights with a cluster of green butterflies inside

Explosive

Explosive was inspired by the feeling of destruction and chaos, and its primary color palette consisted of black and red, colors associated with darkness and alarm [18]. The aim of this theme was to have the user feel powerful like a fierce rebel setting their surroundings ablaze. To match this theme, we decided to make a studded wrist cuff Ambiance accessory as seen in Figure 4.6. The emphasis for this theme was on destruction so fire which is known to burn everything in its path was chosen to express that power. The Explosive theme visuals featured fire igniting in several patterns and one imitating the ground shattering.



(Spiked Wrist Band)

Figure 4.6 Explosive Ambiance Accessory

In After Effects, a Video Copilot plugin called Saber [19] was used to create the fire effect. The following four visual effects were created:



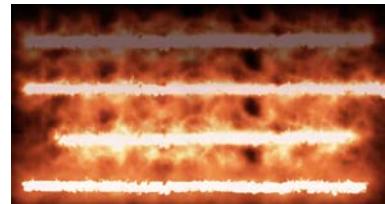
(Created with Adobe After Effects)

Figure 4.7 Explosive Visual Effect 1: Concrete breaking apart



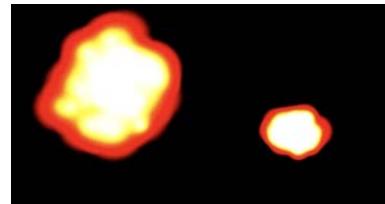
(Created with Adobe After Effects)

Figure 4.8 Explosive Visual Effect 2: A ring of fire burning



(Created with Adobe After Effects)

Figure 4.9 Explosive Visual Effect 3: Horizontal bars of fire appearing and disappearing



(Created with Adobe After Effects)

Figure 4.10 Explosive Visual Effect 4: Fire exploding in bursts

Speed

The theme Speed was inspired by energy and acceleration, and its primary color palette was made with glowing purples and blue taken from neon lights. With this theme, the goal was to have the user feel energized like a science fiction character speeding through a futuristic city. We thought that this theme would be especially fitting for users who want to feel motivated during a run in the city. Therefore we made an athletic sweatband Ambiance accessory as seen in Figure 4.11 so that the user could wear it while running. Taking inspiration from science fiction films such as Tron as a way of expressing acceleration, we decided to use fast moving geometric neon lines for the visuals.



(Sports Wrist Band)

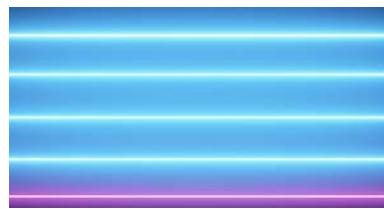
Figure 4.11 Speed Ambiance Accessory

In After Effects, a Video Copilot plugin called Saber [19] was used to create the neon effect. The following four visual effects were created:



(Created with Adobe After Effects)

Figure 4.12 Speed Visual Effect 1: A pink neon triangle being drawn



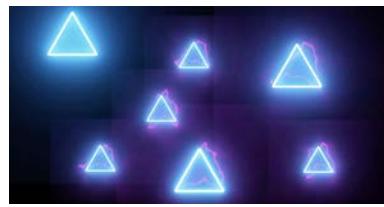
(Created with Adobe After Effects)

Figure 4.13 Speed Visual Effect 2: Horizontal lines of racing blue and pink neon lights



(Created with Adobe After Effects)

Figure 4.14 Speed Visual Effect 3: Purple neon lines flying from left to right



(Created with Adobe After Effects)

Figure 4.15 Speed Visual Effect 4: Blue neon triangles flying up vertically

Technical Specifications of Ambiance Accessories

The three Ambiance accessories differed in visual design, yet their main goal was to trigger subtle theme visuals in the user's surrounding area. Ambiance accessory prototypes were created by attaching beacons to store bought accessories to make them interactive. Mamorio beacons are low Bluetooth emitting devices used primarily for keeping track of valuable items such as wallets. By checking their location on the Mamorio app with a smart phone, users can track their lost items. The original Mamorio is 35.5mm x 19.00mm x 3.4 mm and only weighs 3 grams. The size and weight of this beacon made it a great option. It was small and light enough to be embedded directly into the Ambiance accessories without compromising comfort. Initially the plan was to put one Mamorio device on each accessory but after noticing that Mamorio's Bluetooth power was actually weak to support a longer battery life, we decided to combine three Mamorios onto each accessory. This helped the Ambiance accessories' Bluetooth signals to be stronger and more recognizable.



(35.5mm x 19.00mm x 3.4mm))

Figure 4.16 Size of the Original Mamorio

4.1.2 System Specifications

Ambiance Found's experience was created by a system of 9 beacons, 4 raspberry pis, and 4 projectors communicating with each other. The beacons attached to an Ambiance accessory emitted low Bluetooth signals. Once they got close to a raspberry pi, the raspberry pi picked up and recognized the Mamorio ID's (which were previously registered) as either Flutter, Explosive, or Speed. Then according

to the theme, the raspberry pi played the correct pre-installed video file. The video file would contain a visual effect and it was projected onto the floor or wall through a mounted projector. This system shown in 4.17 allowed for users to walk around with a certain Ambiance accessory and fill their surroundings with various visual effects in that theme.

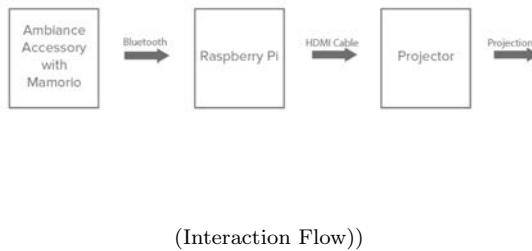


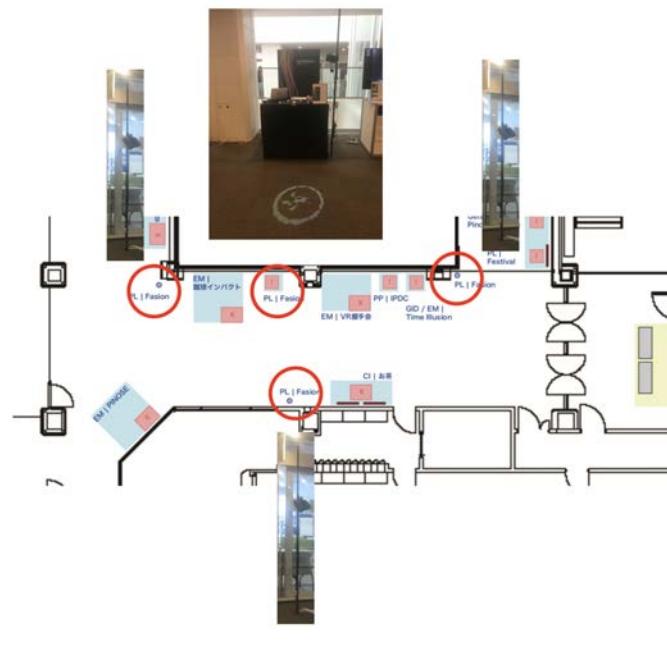
Figure 4.17 Ambiance Found System

4.1.3 Experiment Design

Ambiance Found was implemented at KMD Forum 2018, a public event at held at the Graduate School of Media Design at Keio University. The event took place in the Kyoseikan building at Hiyoshi Campus from November 2nd to the 3rd. The event showcased various research projects from the university and we were able to demo Ambiance at a booth seen in Figure 4.19. We had one high powered Qumi projector mounted at the booth along with three other lower powered projectors mounted on poles nearby the booth as seen in Figure 4.18.

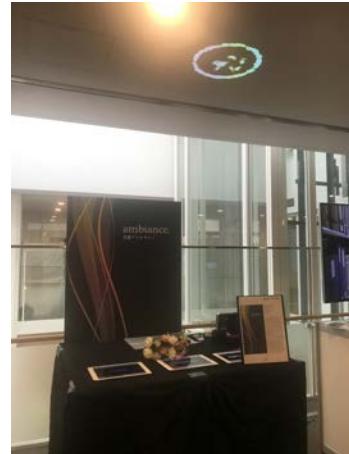
There were many people at the event and through the implementation of Ambiance Found we were able to confirm that it was able to meet the prototype goals. To restate them, they were (1) see if users notice the visuals they triggered, (2) to see if users could connect the theme of visuals they saw to their Ambiance accessory and (3) most importantly learn about how they felt about the Ambiance experience.

At the booth, we first asked users to watch three slide show videos that were mood boards for each of the themes as seen in 4.20.



(Map)

Figure 4.18 Ambiance Found Implementation at KMD FORUM 2018



(Booth Setup)

Figure 4.19 Ambiance Booth at KMD FORUM 2018



(Speed, Flutter, Explosive)

Figure 4.20 Slide show Mood Boards Displayed on IPads

Then the user was asked to choose a theme they wanted to try, and we brought them the corresponding Ambiance accessory. Unfortunately we realized that we could not store the accessories at the booth because there was no way to turn off their Bluetooth signals causing visuals to appear before the experience started. Once the visitor put on their Ambiance accessory we asked them to walk around the area seen in Figure 4.18 while they visited other booths and return to the booth in five minutes. As the user walked around with the Ambiance accessory on, the visuals in the theme of the accessory appeared around them. Some were on the ceiling and others on the floor. One of the goals of the user test was to test if people could see the visuals. Therefore, users were not told what visuals they would be seeing prior to the experience. After their five minutes had ended we had them fill out a survey on what they saw and their experience. Only then did we explain to them the goal of our study and discuss with their opinions about Ambiance.

4.1.4 Evaluation Method

In our research we chose to take a qualitative research method to evaluate the implementation of Ambiance Found at the 2018 KMD Forum. Qualitative research is an approach that allows for the examination of peoples experiences in detail, with why questions and how questions that describe processes or behavior. We believed this method would be most effective for the topic of our study

because as noted in Qualitative Research Methods, qualitative research is useful for exploring new topics [20]. Ambiance is exploring new experiences in personal style expression and in-depth information would be valuable in exploring this new area. We also took note of qualitative researchs ability to understand emotions from the perspective of study participants themselves and uncover the meaning to their experience [20]. Researching the topic of extending personal style is a very personal topic that would benefit greatly from learning about how users felt about their experience.

Visibility Evaluation

To evaluate if (1) users noticed the visuals they triggered and or (2) were able to connect the theme of the visuals they saw to their Ambiance accessory, we used a one page survey that took about five minutes. The first couple of questions were about the users demographic and their interest in fashion or accessories. We then asked users Did you notice any visual changes to your surroundings during the demo? to see if they were able to notice the visuals that they triggered. We also asked Why did you choose this accessory? What feelings do you associate with this accessory? to learn about what sort of thoughts they had about the Ambiance accessory that they chose. Then we needed to see if they were able to connect the theme of the visuals that they saw to the feeling they had associated with the accessory initially. We asked users a follow up question of Did the effects that you created with your accessory give you the feeling you described (as you wrote in above in question 5)?.

Ambiance Experience Evaluation

We approached the evaluation of how users felt about the Ambiance experience in two ways. One approach was through closely observing the users movements focusing especially on their movement when they saw visuals appearing around them. Were the users moving closer to the visuals? Were they walking through them? Did any of the users try to avoid walking into the visuals? Those the things we aimed to pick up on. The second approach was through prompt questions within the survey such as How do you think this system could be improved? which lead to further detailed discussions. We also asked What places in the city

would you want to have this experience? as a prompt to discussing implementation ideas of where we could have people try Ambiance for an improved experience.

4.1.5 Results

From the Ambiance Found implementation at the 2018 KMD Forum, we conducted 23 users tests and had each user fill out a survey and discuss with us valuable feedback. 10 of the users were male and 13 were female and their ages ranged from 20 years old to 40 years old, with varying amounts of interest in fashion and accessories.

Visibility

From the survey we learned that 20 out of 23 users saw changes to their environment while 3 out of 23 did not answer. This showed that users were able to visibly see the visuals that were projected. We must note however that the lower powered projectors were not bright enough for the lighting conditions at the 2018 KMD FORUM and their visuals were difficult to see. Most likely the visuals produced by the Qumi projector were the one most visible to the users. In addition, since there were many Bluetooth signals in the area, there was some lag in time it took visuals to appear and the visuals were not always accurate to the theme of the accessory.

Even with some issues however, we were able to gather what thoughts users had initially associated with their chosen Ambiance accessory. One 23 year old female student wrote that she wanted to feel a dreamy princess feeling when she put on the Flutter accessory. Another 24 year old female student wrote that her choice matched my outfit feeling . Others like a 25 year old male student wrote that he wanted a relaxed feeling , hoping the accessory would bring a direct effect to his emotion. For the Speed Ambiance accessory, one 22 year old female student wrote, A futuristic feeling . Another 17 year old female student noted that she expected a fun feeling that pops . This reconfirmed our idea that just by looking at the design of an accessory people expect certain feelings and experiences that would be brought by wearing that accessory. Even, before wearing the accessory the Ambiance accessories triggered the users imagination. One 24 year old female

student also shared that she wanted to stand out, and it looked fun. We see that she had also attached a wishful experience to her accessory.

We also gathered if the users were able to experience these initial feeling they had imagined wearing the accessory. 10 out of 23 said yes, 4 out of 23 said sort of, and 9 out of 23 said no or did not answer. This result suggests that about half of the users were able to connect the theme of the visuals they saw with the feeling they had imagined just by looking at the accessorys design. The themed designs of the visuals were to a degree on par with the design of the accessory. That being said, about half of the people found it difficult to make that connection which calls for improvement.

Body Movement

In terms of body movement, there were several interesting tendencies that appeared in the users actions. One common action was that users were holding the Flutter headband with their hands while observing the visuals that it triggered as seen in Figure 4.21 and 4.22. When asked about why they were doing so, a male student responded by saying that it was a sort of natural reaction and that it could have been because he connected the two together. On the other hand, some people were moving around the visuals waving their Ambiance accessory as seen in Figure 4.23. According to a male student, he had expected the visuals to move with the motion of the accessory once triggered and shared that he felt disconnected because of the lack of movement.

Another apparent tendency was that several users wanted to put the visuals directly on their body. As seen in Figure 4.24 they stood right in front of the projector so that looked like the visuals were a moving part of their clothings design. When asked about what made them want to do this, one male researcher explained that It would be really cool if my accessory can change my clothes, and Then I dont have to buy so many designs of clothes. This was interesting feedback because it hinted that another way to increase connectivity would be placing the projected visual directly on the user.

Another observation we made in terms of body movement was that people seemed to be confused without being directed where to walk during the demo. They wandered around but appeared uncomfortable not having any direction of



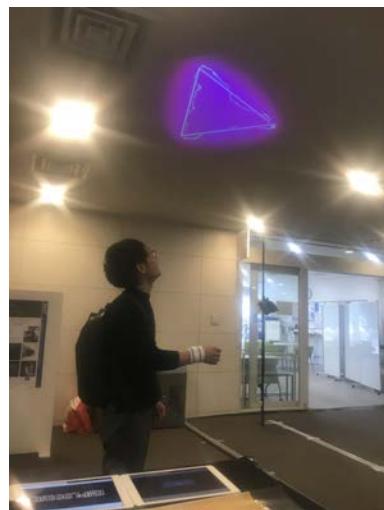
(Male Student X)

Figure 4.21 User holding Ambiance accessory with hand



(Male Student Y)

Figure 4.22 User holding Ambiance accessory with hand



(Male Student Z)

Figure 4.23 User waving Ambiance accessory



(Male Researcher X)

Figure 4.24 User with visuals on his shirt

where they should be walking for the five minute Ambiance experience. This helped us to realize that for the next implementation the demo will be better if there are clear directions for the user in terms of where they should walk. Lastly one thing that stood out was that when a user was demoing Ambiance, other people around them came to look at them and the visuals they were producing as seen in both Figure 4.21 and 4.25. This suggests that the other people were able to connect the visuals to the user with the accessory. It also suggests that extending personal style to public spaces could be a social experience not possible with regular accessories.



(Male Student X with a visitor)

Figure 4.25 Users Ambiance experience attracting attention

Ambiance Experience

Overall many people seemed to enjoy wearing the Ambiance accessories and saw the visuals appearing as an extension of their personal style. For several users the demo experience prompted them to share with us where they would like to have Ambiance implemented and why. A female researcher shared with us that she would like to have Ambiance at her home or on the way to work to change up her mood. She explained that she would like to see it in places that she would

pass through regularly like a doorway or hallway. According to her Ambiance accessories would help her to easily change the space around her and therefore her feeling. For example if she was feeling tired, she could put on an Ambiance accessory to feel energized. She noted that she liked how she would not have to set up the space manually and that all she would have to do is change her accessory.

Another male student told us that he personally would want use Ambiance in Shibuya with his friends. He explained to us that he actually is interested in fashion and likes to wear different styles out to the city. He explained that if he and his friends could change the visuals of Shibuya, they would really enjoy the experience. He explained that Ambiance implemented in a city would expand the area of his personal expression and create for him a new way of enjoying fashion.

Overall the responses from the users about implementation fell into three categories. One popular category was large public spaces like parks, city squares, or in the subway. Another was in indoor establishments often used for leisure like movie theaters, music halls, and restaurants. The most common reason users suggested such places was because they felt that the experience made them feel special and out of ordinary so they felt it would be appropriate for special occasions. Lastly, some users also wanted to see Ambiance implemented in what they considered boring places. One user explained that he would want to see Ambiance in the countryside as a way to liven up ghost towns. From these results we were able to see that Ambiance could be implemented in different places for various purposes. At the same time, there was one common thing with all of the implementation ideas which was that it would bring a special experience.

Generally, Ambiance Found was beneficial step in exploring the notion of expanding personal style to public spaces. It helped us to see what people thought of the idea and gave us insight into the various system complications that come with creating the Ambiance experience.

4.2. Ambiance Walkway

The Ambiance. Walkway was the second prototype experience designed and implemented to demonstrate the Ambiance experience. While Ambiance Found was a great way of initially exploring the topic of extending personal style to public

spaces, we discovered that many improvements could be made to the system. This prototype was created to resolve some of the issues found through the implementation of Ambiance Found. The goal for this prototype was to get a more precise look into how the Ambiance experience effected the users feelings. From the earlier Ambiance Found prototype implementation we also learned it would be more effective if the users were directed where to walk. To create a more realistic experience of Ambiance being implemented in a public place, we designed a space for users to walk through. Essentially Ambiance Walkway was a similar experience to Ambiance Found for the sake of having user experience the Ambiance experience. The difference was mostly in the design of the Ambiance accessory system and the overall Experiment design.

4.2.1 Ambiance Accessories

One of the issues with the experiment design of Ambiance Found was that users had difficulty expressing in words what experience they thought their chosen accessory would bring. Without a clear definition of the desired experience it was difficult to say if it was achieved. To solve this issue we updated each Ambiance accessory to promote a certain emotion in the user. For Ambiance Walkway, we narrowed the choices down to two different accessories, Flutter and Speed.

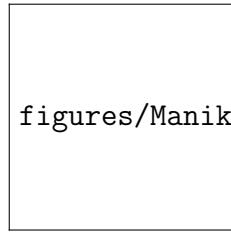
Speed

The goal of the Speed theme was already designed to motivate users so we did not change the visual effects. However to clarify what we defined as motivated, we utilized the Self Assessment Manikin introduced in 4.2.4.

We defined a motivated user as highly aroused, with positive valence, and dominant as seen in Figure 4.26.

Flutter

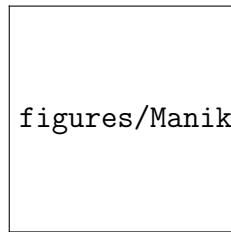
For the Flutter theme, we changed the visual effects to better suit the themes goal of putting users in a relaxed state. An issue with the visual effect used for Flutter in Ambiance Found. was that the movements were too fast. We first defined the relaxed state according to the Self Assessment Manikin as not aroused, with



(High Arousal, Positive Valence, and Dominant)

Figure 4.26 Goal Mood for Speed expressed on a Self Assessment Manikin

positive valence, and neutral dominance as seen in Figure 4.27. Then we created four new visual effects to promote this feeling as seen in Figure 4.28, 4.29, 4.30, and 4.31.



(No Arousal, Positive Valence, and Neutral Dominance)

Figure 4.27 Goal Mood for Flutter expressed on a Self Assessment Manikin

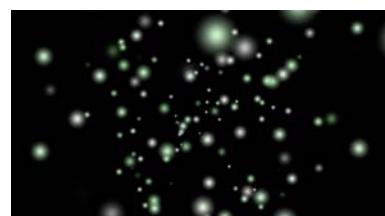
4.2.2 System Specifications

Ambiance Walkways experience was created by a system of 1 smart phone, 3 raspberry pis, and 3 projectors. One major change from the earlier prototype Ambiance Found. was that we did not use Mamorio beacons onto the accessories. Although we initially believed that the Mamorio beacons would be a good way to trigger the visuals, we learned that their Bluetooth signals were not strong enough to compete with other Bluetooth signals in the air. When testing the system we discovered that even a vending machine nearby was sending fast Bluetooth signals making it difficult for the Mamorio to be discovered. To overcome this problem, we decided to use an Apple iPhone 7S as a beacon since it could send stronger



(Made in After Effects)

Figure 4.28 New Flutter Visual Effect 1: Calmly Rustling Leaves



(Made in After Effects)

Figure 4.29 New Flutter Visual Effect 2: Floating Green Fireflies



(Made in After Effects)

Figure 4.30 New Flutter Visual Effect 3: Butterfly Flying Up



(Made in After Effects)

Figure 4.31 New Flutter Visual Effect 4: Breathing Pattern

Bluetooth signals. The most important thing was that users could experience extending their personal style to public spaces through the use of Ambiance accessories. Therefore, we faked the effect of having the accessories triggering themed visuals by having an observer walk next to the user holding a smart phone that acted as a beacon. We installed an application called BLE Scanner and used a feature called the iBeacon Broadcast as seen in Figure 4.32. On this app we created the two different Bluetooth beacons, one for Flutter and one for Speed seen in Figure 4.33. With this app we could also turn off the Bluetooth signals, so that the visuals would not appear before the experience as they did in the previous prototype.



(BLE Scanner iPhone Application)

Figure 4.32 iBeacon Broadcast



(BLE Scanner iPhone Application)

Figure 4.33 Beacons List

4.2.3 Experiment Design

Ambiance Walkway was implemented for two days on the 3rd floor hallway of the Kyoseikan building in Hiyoshi from November 15th to 16th 2018 as seen in Figure 4.34. We chose this location because there were many people there that fit our target audience demographic. We also believed that the hallway was ideal because it would provide a long straight space for the users to walk through without direction. In addition many of the users we found were familiar the hallway. They could notice changes brought to their usual environment with the implementation of Ambiance Walkway. Since Ambiance is an experience to be enjoyed in a public space, it was also fitting that there were many people passing by.

The experiment was conducted one to one between one observer and one user. First we brought the user into a meeting room and asked them to sit down to record their current mood using the Self Assessment Manikin, which is explained in 4.2.4. We also asked them to write down their name, age, and occupation for our record. Then we began with an interview followed by a demo of the Ambiance Walkway and a closing interview. The whole experiment took about 20 minutes per user.



(Set Up in Kyoseikan Hallway)

Figure 4.34 Ambiance Walkway Implemented

4.2.4 Evaluation Method

Two methods were used to evaluate Ambiance Walkway. One method was a casual but in depth interview with the user. The aim was to first capture the persona of the user in terms of their relationship to personal style. For the opening interview we asked the user questions about their interest in personal style. We asked questions like, How do you define your personal style? and What do you enjoy about personal style?. We also asked questions about their thoughts on matching the TPO. Questions such as Do you try to match the TPO?, How do you feel when your personal style does not match the TPO?, and Does whether or not your personal style is matching the TPO ever effect your performance? were also asked. We also asked them if they ever used personal style to intentionally alter their feelings. These questions were all asked before the demo and they were to look into each individual users self consciousness about personal style. For the demo of the Ambiance Walkway., users were asked to put on an Ambiance accessory after their initial interview. Then they were lead through a hallway walking with the observer. As they walked to the back of the hallway and back, visuals in the theme of their accessory appeared on the floor close to their feet. To imitate a natural situation in a public setting, the observer kept a light conversation going with the user while walking through the hallway.

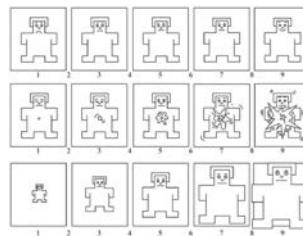
After the demo, users were brought back into the meeting room and first asked to record their current mood after the experience using the Self Assessment Manikin. For the closing interview users were asked how felt about the

experience including specifics about what changes they saw in their surroundings. From their answers we also directed the conversation to how they felt about the Ambiance experience in terms of self consciousness. In the end, we told users about the larger Ambiance concept asked if they would be interested in such a experience, and if so how they would use it.

The Self Assessment Manikin recordings taken before the experience and after were compared to see if there was any change in the users mood. The reason we took this approach is because recognizing and recording feelings of human emotion has always been a difficult challenge. There are words like happy and sad to describe generalized feelings but they are often subjective and one person's happy may look completely different from another. Because of its subjective nature, often times it is better for feelings to be recorded by the users themselves. In this study, we used the Self Assessment Manikin to see users moods from their point of view.

Self Assessment Manikin

Published in 1994, the Self Assessment Manikin (SAM) is a picture based non verbal way of assessing an users affective reaction to various stimuli [21]. It directly measures the pleasure, arousal, and dominance associated with the reaction and is an effective way of recording changes in human emotion as seen in Figure 4.35.



(Source: James Russells Self Assessment Manikin [21])

Figure 4.35 Self Assessment Manikin Test

Often it can be hard to put into words how one feels and by choosing from Manikins that they associate the most with helps users express their current state. A study that compared SAM to another rating method called Semantic

Differential scale. They found correlations across the two rating methods were high both for reports of experienced pleasure and felt arousal but differences obtained in the dominance dimension of the two instruments suggested that SAM may better track the personal affectedness to stimuli [21]. As a method of observing Ambiances affect on users SAM was very convenient. Since emotion is a tricky subject which can have many different variables affecting it, for the sake of this study the emotional affects of Ambiance on users moods was conducted as an early exploration.

4.2.5 Results

From the Ambiance Walkway. implementation and experiments we were able to obtain in depth results. For the sake of organization, they have been divided into case studies for each user referred to as subject.

4.2.6 Test Subject A

Test Subject A Flutter Experience 26 year old male student.

Personal Style Background

Test Subject A was a 26 year old male graduate student. He was wearing a dark colored top and bottom with no visible accessories besides his glasses. When asked about his interest in fashion and accessories, he told us that he does not really have an interest. That said, he did share with us that he tries to make his personal style not uncool even if it rather plain. In regards to if he dresses to fit the TPO he stated that he did not really care unless there was a dress code. He did share with us that he feels uncomfortable when he finds himself in a place where personal style does not match the TPO. On the other hand he explained that if his personal style matched the TPO he felt more put together and that would make him more confident. One interesting thing he shared with us was that he actually started basing his personal style off of advice from a manga book called Fukuwokirunara Konnafuuni by Yae Shimano. From this manga he said he was able to improve his personal style and feel more comfortable.



(Test Subject A Recording their Mood)

Figure 4.36 Test Subject A

Behavior During Experience

Initially, when he was handed the flower crown for the flutter experience, his eyes widened and he laughed softly. He held the flower crown with both hands and spun it around a few times in his hands while he asked How should I put this on?. He seemed amused but slightly nervous about wearing the accessory. As he walked through the Ambiance Walkway, he was walking at a slightly faster than usual pace and mostly focused his attention on the conversation with the observer we provided. When the visual effects showed up around him he looked down and slowed his pace slightly but did not stop. Three times during the middle of the walk he readjusted the flower crown. When there were other people walking past he did not make eye contact with them and seemed slightly embarrassed when his presence caused Flutter Visual Effect 1 seen in 4.28 to come out. During the experience, a friend of his walked by him and complimented his flower crown to which they both shared a laugh. Overall the conversation with the observer was casual although he seemed slightly nervous about the experience. The nervousness however did not seem uncomfortable or distressed as he was smiling often and laughing occasionally.



(Walking through Ambiance Walkway)

Figure 4.37 Test Subject A

Thoughts on the Experience

When asked about his experience, he said he was initially surprised and was a little worried about what others might think of his appearance. In regards to the visual effects, he explained that he was able to notice some changes to his surrounding area when he walked by. That being said, he did also say he was focused on speaking with the observer walking with him. He was also worried about other people's opinions about his appearance and the effects he was creating, so he could not focus on the visual effects very well. When asked about where he thought he would prefer the visual effects to show he explained that perhaps having it on the wall might be better since it is at eye level. He explained that when walking with other people while talking, he rarely has a chance to look down on the floor. In terms of implementation ideas, he stated that he would want to experience extending personal style as a group for example with a group of his friends. He explained that that way he could feel more comfortable and would be open to such experience even in public spaces.



(Self Assessment Manikins Recorded by Test Subject A)

Figure 4.38 +1 Valence, -2 Arousal, +2 Dominance

Changes in Mood

4.2.7 Test Subject B

Test Subject B Flutter Experience 22 year old male student.

Personal Style Background

Test Subject B was a 22 year old male graduate student. He was wearing a casual top and neutral grey bottoms with no visible accessories. When asked about his interest in fashion and accessories, he told us that he has a little interest. He shared with us that he enjoys buying clothing as a way of enjoying personal style. He explained that he always tries to make his personal style fit the TPO. When his personal style did not match the TPO he stated he would feel like he messed up. Therefore he explained that if he was able to make his personal style match the TPO he would be relieved and glad. When it came to where he got his inspiration for his personal style he explained that he does not really get inspiration from media.

Behavior During Experience

Initially, when he was handed the flower crown for the Flutter experience, he smiled and put it on his head immediately. He looked around his a couple of times after he put it on but did not show too much change in his behavior.

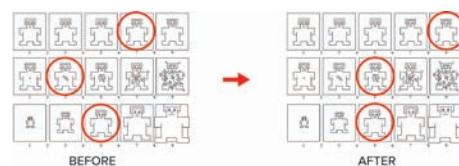
As he walked through the Ambiance Walkway, he walked at a normal pace and waved his hands at his sides. When the visual effects showed up around him he glanced at them and kept walking. He did not touch the Ambiance accessory once during the whole experience. When there were other people walking past he did not show any visible changes to his walk. Overall he did not show any signs

of discomfort during the conversation with the observer while walking through the Ambiance Walkway experience. One thing that did stand out was that he spoke very politely and slightly reserved, although that could have been how he generally speaks.

Thoughts on the Experience

When asked about his experience, he said he was calm but shared that he felt worried about getting attention from others. Yet overall he said it was an interesting experience. He explained that for the visual effects his accessory was causing it was difficult to see them. Although he had seen the visuals appearing he said that since they did not move with him, he missed seeing some of them. Although the one he could see he understood was related to the accessory he was wearing due to its visual design, the connection was not concrete. Even noting the problems with the prototype, when considering the larger Ambiance experience he stated he would want to use it. Particularly he explained that he would enjoy such an experience of extending this personal style to public spaces as a personally entertaining experience. He explained he would want to use it at night when he walk walking home, so he could be entertained.

Changes in Mood



(Self Assessment Manikins Recorded by Test Subject B)

Figure 4.39 +1 Valence, -1 Arousal, No Movement in Dominance

4.2.8 Test Subject C

Test Subject C Flutter Experience 23 year old male student.

Personal Style Background

Test Subject C was a 23 year old male graduate student. He was wearing a casual white top light grey bottoms with black glasses and a silver ring. When asked about his interest in fashion and accessories, he told us that he has interest. He explained to us that he likes fashion and accessories because it can tell you about people. When it came to his personal style he explained that he like semi-casual clothing. As he explained it he said he likes to dress in a way where he could go to a restaurant at any time. He when it comes to TPO he generally does not go to places where his personal style wouldnt fit the TPO. When he found himself in situations where he had to be at such a place he would just accept the fact that he was not matching the TPO. On the other hand, if he was matching the TPO very well he said that he would feel energized. One interesting things he shared was that he only wears perfume when he goes to hang out with girls. He explained that he got into this habit from a past relationship and that he does this because he wants the other person to think well of him. Also he shared with us that he feels better personally in expensive clothing.



(Subject C Being Interviewd)

Figure 4.40 Subject C

Behavior During Experience

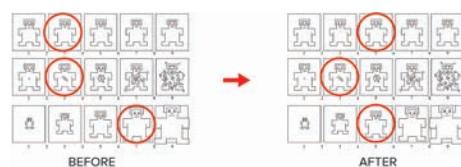
Initially, when he was handed the flower crown for the Flutter experience, he laughed and put it on his head while fidgeting slightly. As soon as he put it on he

shared with us that when he goes to Disneyland he always puts head accessories on so liven up the mood for others even though wearing the accessory does not necessarily do anything to change his mood. As he walked through the Ambiance Walkway, he did seem unimpressed. His attention seemed to be mostly on the projectors which were visible and not the visual effects which appeared around him. He seemed to enjoy wearing the accessory because he was smiling, but seemed unaffected by the visuals overall. His walking pace stayed the same throughout the experience and he did not seem to be affected by the presence of others around him. When the experience was over he did seem like he was expecting more.

Thoughts on Experience

When asked about his experience, he explained that although it was a good attempt he felt disconnected with the visuals that showed up around him. He was able to see all of the visuals but he explained that because the color and shape of the visual effects were not of the accessory he could not make the connection immediately. In addition he suggested perhaps hiding the projectors better to make the experience better. Overall he stated that the idea of extending personal style to public spaces was something he would want to try. That being said he said that the visuals should be more impressive and that it would be better if it was an experience he could do by himself and not with a observer.

Changes in Mood



(Self Assessment Manikins Recorded by Test Subject C)

Figure 4.41 -1 Valence, No Movement in Arousal, +1 Dominance

4.2.9 Test Subject D

Test Subject D Flutter Experience 29 year old male student.

Personal Style Background

Test Subject D was a 29 year old male graduate student. He was wearing a casual blue cotton jacket and khaki pants with brown boots. He was not wearing any visible accessories. When asked about his interest in fashion and accessories, he told us that he has some interest. He explained to us that he likes fashion and accessories as a way to have fun at school. When it came to his personal style he explained that he liked commonly popular style and that he was influence easily by others styles. When it came to TPO he felt he wanted to fit in so that he can be comfortable. He explained that because he is Japanese he feels uncomfortable when he is not matching others around him. In a situation where his personal style did not fit the TPO he stated he was afraid of not being taken seriously. However, when he was able to match the TPO he was able to feel confident, calm, and not embarrassed. One interesting he shared with us was the fact that he likes to change up his personal style with his shirts. He explained that he wore T-shirts when he wanted to feel relaxed and collared shirts when he want to feel serious.

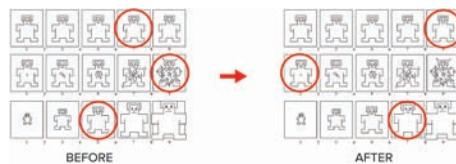
Behavior During Experience

Initially, when he was handed the flower crown for the flutter experience, he immediately put it on his head without and hesitation. He seemed very comfortable wearing the accessory and did not fidget with it at all. Overall he seems pleasantly relaxed, visible form his calm facial expression. As he walked through the Ambiance Walkway, he seemed very relaxed and walked slowly. Also, he gave us a big smile when he saw the visuals appear around him. He paused at the visuals and held his Ambiance accessory to look down briefly. He seemed surprised by the visuals but in a positive way as he was laughing and smiling throughout the whole experience. Although he was focusing on having a conversation with the observer while walking, he did take some time to glance around him as we walked. He did not mind when there were other people around him and waved to one passerby.

Thoughts on Experience

When asked about his experience, he explained that it was a fun experience for him. He explained that he liked not knowing exactly what the visuals would be like from just wearing the accessory. In terms of embarrassment, he said he did not feel embarrassed because the visual effects were not too big and overall very subtle. He also shared with us that he would enjoy having something like Ambiance where he could change his personal style in a more comprehensive way. For example he explained he would want to have his surroundings change to fit his mood so that he could feel more relaxed or energetic. The possibility of using Ambiance for personal entertainment was something that he said he was most interested in.

Changes in Mood



(Self Assessment Manikins Recorded by Test Subject D)

Figure 4.42 +1 Valence, -4 Arousal, +1 Dominance

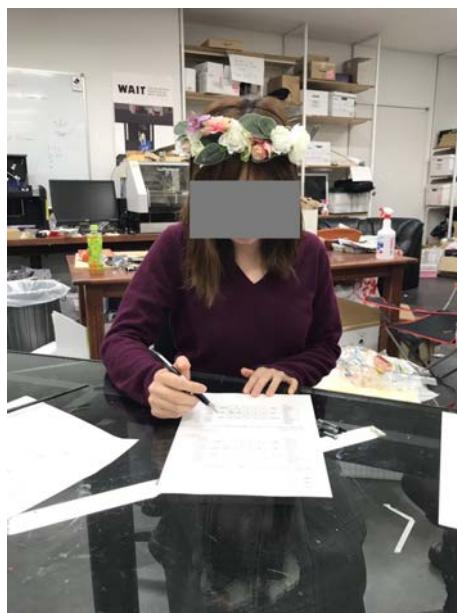
4.2.10 Test Subject E

Test Subject E Speed Experience 24 year old female student.

Personal Style Background

Test Subject E was a 24 year old female graduate student. She was wearing a purple knit top and a long grey skirt. She was not wearing any visible accessories. When asked about her interest in fashion and accessories, she told us that she was very interested. She explained that she especially liked changing up her personal style according to the season, for example wearing cashmere in the winter. When

it came to her personal style she told us that it is generally the same, that she had a specific style she liked. Having a decided personal style she said made it easier for her to choose clothing. When it came to TPO she felt it was important especially important for her to match when meeting new people. Being in the appropriate style to match the TPO she said made her feel comfortable. Therefore she would spend time thinking about her schedule thoroughly when decided what to wear. She also explained that when she was in the unfortunate situation of not matching the TPO she would even sometimes buy clothing outside on the spot to change to match the TPO. In addition she shared that wearing clothes she had just bought or that she really liked helped her feel determined and special in her everyday life. She gave us an example of when she decided to buy earrings to match a group of her friends who would always wear them. She shared that she felt more confident and outgoing when she was able to join them by wearing earrings too.



(Test Subject E Recording her Mood)

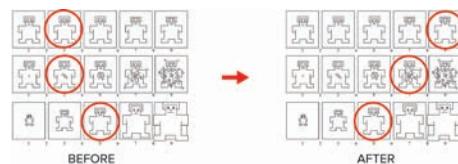
Figure 4.43 Test Subject E

Behavior During Experience

Initially, when she was handed the flower crown for the flutter experience, she put it on said So cute!, and asked us if she could put it on. When she put the accessory on her head she smiled and looked at us to check if she had put it on correctly. She seemed happy putting on the accessory and excited about the experience she was anticipating from her constant smile. As she walked through the Ambiance Walkway, she seemed to be having fun from her light footsteps. When she saw the visuals appear around her she exclaimed Wow and brought her hand to her Ambiance accessory. Although she noticed the visuals and responded verbally she did not slow down her walking pace. Throughout the experience she seemed focused on the experience and did not interact with any passing people. She did look around slightly perhaps to find more visuals after she saw one and was expecting more to appear. Overall she was smiling and laughing quite often and seemed to be enjoying the new experience.

Thoughts on Experience

When asked about his experience, she explained that the experience made her excited and that it was really enjoyable. She explained that she especially liked how easily she could make a place fun just by wearing an accessory. Especially she liked looking at the moving visuals especially the ones that looked to her like sparkles. When asked about the connection between her accessories and the visuals she noted that she felt they were connected through a soft magical feeling. When asked about where she would want to have the Ambiance experience implemented she commented that she would love to see it at parties or at occasions where she would dress up. One place she suggested also was a mall like Ginza Six where there are many people so that the effects of everyone would mix together to create a beautiful visual. Lastly, she also suggested trying to make the visuals directly the design of the accessory to increase the feeling that the user is making the visuals appear.



(Self Assessment Manikins Recorded by Test Subject E)

Figure 4.44 +3 Valence, +2 Arousal, No Changes in Dominance

Changes in Mood

4.2.11 Test Subject F

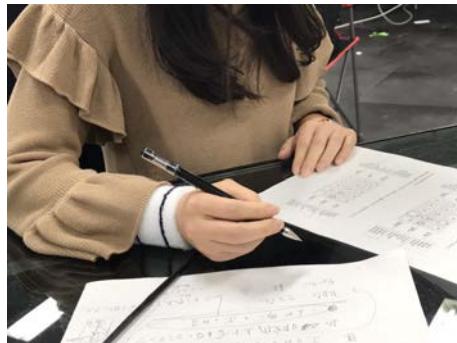
Test Subject F Speed Experience 24 year old female student.

Personal Style Background

Test Subject F was a 24 year old female graduate student. She was wearing a beige knit top and a long black pants. She was not wearing any visible accessories. When asked about her interest in fashion and accessories, she told us that she was very interested. She explained that actually she wanted to enjoy it more by wearing more accessories and expressing her self more. However, she said that because she worried about what others would think, she could not fully enjoy personal style to the point that she wanted. She noted that sometimes she wished she had a stylist. When it came to her personal style she told us that she had specific personal styles for different occasions. When it came to TPO she explained that if she was not matching the TPO it would continue to bother her. One thing that she said made her feel better was when someone commented positively about her personal style. Then she said she would feel okay about not matching the TPO. In addition she shared that wearing certain personal styles especially for business occasions helped her to feel confident and she explained it as gaining an aura of power. One other interesting thing she shared was that she liked to wear different pearls every season and that it was very important to her to wear the seasonal pearl. For example she stated that it would bother her very much to wear a pearl that was not right for winter.

Behavior During Experience

Initially, when she was handed the wristband Ambiance accessory for the Speed experience, she put it on quickly after asking us Can I put it on my right hand?. She readjusted the wristband slightly but seemed relaxed and comfortable wearing it. Once she put it on, she rested her hand onto the table and calmly waited for the next direction. As she walked through the Ambiance Walkway, she seemed to be enjoying the experience conversing casually with the observer and walking at a normal pace. When the visuals appeared around her she looked at them briefly but did not have any apparent reaction. Most of the time she was making eye contact with the observer or looking forward so she did not look down to see what the visuals were. She also did not seem affected by other people around her and never interacted with other passing people. Overall she seemed to be having a pleasant relaxed experience.



(Test Subject F Recording her Mood)

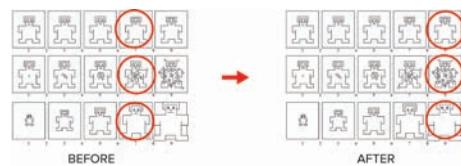
Figure 4.45 Test Subject F

Thoughts on Experience

When asked about her experience, she explained that the experience was overall pleasant. She did however note that she was only able to notice one of the three visuals as she was focused on walking. Also another issue she felt was that for the visual she saw the color was not the same as her accessory making it difficult to connect the two. However, because both the visual and accessory had lines, she

could sort of make a connection. Upon better explaining the Ambiance experience to her, she noted that she would definitely want to use it. She explained that she would have so much fun using it with her friends while walking through the city and making their surroundings colorful. Also she suggested putting it places like gyms or fitting rooms so that the visuals would encourage the user.

Changes in Mood



(Self Assessment Manikins Recorded by Test Subject F)

Figure 4.46 +1 Valence, +1 Arousal, +1 Dominance

4.2.12 Test Subject G

Test Subject G Speed Experience 28 year old female student.

Personal Style Background

Test Subject G was a 28 year old female graduate student. She was wearing a dark grey knit top and a long grey skirt. She was not wearing any visible accessories. When asked about her interest in fashion and accessories, she told us that she was interested. According to she enjoyed window shopping and buying different clothes to create her personal style. She explained that she had several different personal styles for different occasions like weddings or for business. As for TPO she tried to match to the best of her abilities but if she found herself in a situation where she did not match the TPO she would not care and just accept it. However, when her personal style matched the TPO she said she felt good about herself and made her perform better. She noted that her body movement would become more sharp. Another interesting she noted was that she often used clothing to change not only her feeling but the feeling of this around her. She gave an example of

wearing casual jeans to a workshop she had set up to make the participants feel comfortable and relaxed. Also she also mentioned that she used personal style to change or refresh her own feelings. For example she explained that when she felt stressed and tired, she would take sometime to refresh her look and dress more feminine to lift her mood. She commented that she really enjoyed wearing different personal styles to different occasions or to change how she was feeling.

Behavior During Experience

Initially, when she was handed the wristband Ambiance accessory for the Speed experience, she put it on without hesitation. She readjusted the wristband slightly stretching it a couple of times. Once she put it on, she appeared relaxed and kept smiling.

As she walked through the Ambiance Walkway, she seemed seemed to be relaxed and walked a little slowly while conversing with the observer. When the visuals appeared around her she slowed down her walking pace slightly and looked down. However, she did not comment on the visuals and only glanced at them and continued. She also did not look around at people around her and mostly kept her attention on the observer. Throughout the experience she smiled many times and seemed to be comfortable.

Thoughts on Experience

When asked about his experience, she explained that she enjoyed the experience. She did however note that she was only able to notice one of the three visuals because they appeared too fast and were not bright enough. The only one she was able to see as noted by her was the Speed Visual Effect 3 seen in Figure 4.14. The bold lines in that video seemed to make the visual easy to see even though the projector was not bright enough. When asked if she felt a connection between the design of the accessory and the visual effects, she commented that personally she thought maybe since they both had lines they were both minimalist. However, it was not clear to her what the theme was. Also she explained that perhaps she missed two of the visuals because of the timing that they had appeared, which was when she was already very close to the area.



(Walking Through Ambiance Walkway)

Figure 4.47 Test Subject G

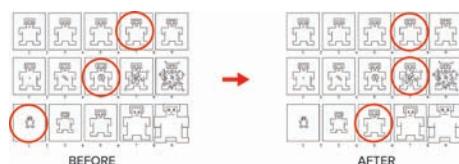
Overall she liked the subtle nature of the visuals but she explained she wished she could have noticed more. One suggestion she had was to improve the timing and add some movement to the visuals so that they would follow the user. Regarding the Ambiance experience in general she commented that she would be very interested in using it for fun occasions like hanging out with her girl friends. She noted that personally she would want to use it both for social events with many people and by herself as a pick me up. For the latter she gave the example of being able to produce visuals when walking home alone at night to cheer up her mood.



(Test Subject G Being Interviewed)

Figure 4.48 Test Subject G

Changes in Mood



(Self Assessment Manikins Recorded by Test Subject G)

Figure 4.49 +1 Valence, +1 Arousal, +2 Dominance

4.2.13 Test Subject H

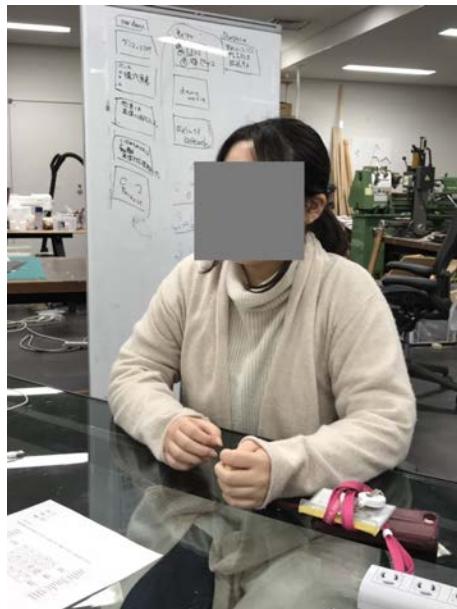
Test Subject H Speed Experience 24 year old female graduate student.

Personal Style Background

Test Subject H was a 24 year old female graduate student. She was wearing a light beige knit top and long black pants. She was not wearing any visible accessories. When asked about her interest in fashion and accessories, she told us that she was interested. According to her, she enjoyed making her personal style after looking on Instagram for ideas. She described most of her personal styles as soft and that she liked hand made items. One interesting thing she noted was that she actually had a single brand that she used to buy most of her clothing from. However recently she explained she would buy items from more mainstream stores for convenience. In regards to TPO she noted that she did care and that she tried to show different versions of her self at different places. For school she liked to wear frilly clothes that she liked personally but felt she had to dress more modestly and plainly for business meetings. She also noted that when she was unable to match the TPO she would just accept it and try to not let it bother her. On the other hand when she matched the TPO she felt relieved. She shared with us that wearing clothes she liked actually helped her in the past. One example she gave us was when she competed in a Hackathon while wearing her favorite clothing. She is not sure how much of it was due to her clothing but she remembers feeling motivated and that may have lead to her teams win. So overall she enjoys personal style in her life and always enjoys looking for new fashion items to incorporate into her style.

Behavior During Experience

Initially, when she was handed the wristband Ambiance accessory for the Speed experience, she slowly put on the wristband while smiling. She pulled at the wrist band once stretching it slightly. Overall she was calm and seemed comfortable wearing the wristband without any issues. As she walked through the Ambiance Walkway, she seemed to be comfortable and walked at a normal pace. When the visuals appeared around her she did not slow down nor did she glance



(Test Subject H Being Interviewed)

Figure 4.50 Test Subject H

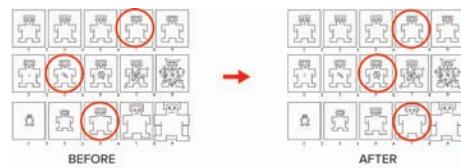
down to check them. She seemed to be most focused on conversing with the observer and therefore kept her head up most of the time, not looking at the floor in front of her. She did not seem bothered by other people around her either as she did not interact with passing people. Throughout the experience she also never touched her wristband. In terms of an emotional response, she smiled many times and showed signs of having a calm pleasing experience.

Thoughts on Experience

When asked about her experience, she explained that since she had just had a tiring class, the experience woke her up and made her feel better overall. She explained that she felt active wearing the sports style wristband and that it was fun to walk with it on with the anticipation of what might happen. For the visuals, she was only able to notice one out the three. She was able to see Speed Video Effect 3 seen in 4.14 because it was a clear shape and the timing was good for her to notice. When it came to the visuals connecting to her accessory she noted

that she wished the visuals were larger and filled the space more so that it was immersive. When it came to implementation locations for the Ambiance system she explained that she would enjoy it most seeing small visuals in public spaces. According to her such an experience would make her feel like she is the only one seeing a magical effect and improve her mood especially after a long tiring day.

Changes in Mood



(Self Assessment Manikins Recorded by Test Subject HH)

Figure 4.51 +1 Valence, +1 Arousal, +1 Dominance

4.2.14 Test Subject I

Test Subject I Speed Experience 28 year old female graduate student.

Personal Style Background

Test Subject I was a 28 year old female graduate student. She was wearing a black long sleeve top and light color jeans. She was also wearing a rose gold watch on her left wrist. When asked about her interest in fashion and accessories, she told us that she was very interested. She explained to us that she loved wearing rings and earrings, especially rose gold ones. In addition she expressed that she wished to wear more accessories like she would in her home country but felt she had to tone it down while in Japan. When choosing accessories she also shared with us that she prefers ones that last long and are versatile when it comes to matching it with her clothing. When it came to TPO she explained that she tried to match her accessory to the feeling each time place or occasion called for. For example she noted that she liked wearing bright colored jewelry to the beach to feel fun.

Caring about her image she explained was the biggest reason she matched her personal styles to match the TPO. When she was able to fit the TPO, she said she felt more care free and able to enjoy the occasion more. In addition to clothing and accessories she also shared with us that she used makeup as an important part of her personal style. She noted that when she felt tired or down she would put on makeup to feel pretty and confident and to lift her overall mood.



(Test Subject I Being Interviewed)

Figure 4.52 Test Subject I

Behavior During Experience

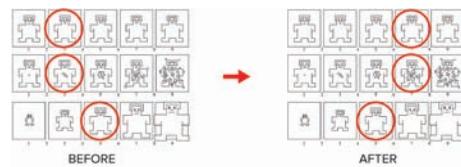
Initially, when she was handed the wristband Ambiance accessory for the Speed experience, she calmly put it on and looked up for the next direction. She did rotate her wrist slightly to see the back of the wristband but did not seem bothered by the wristband.

As she walked through the Ambiance Walkway, she was very cheerful smiling and laughing while conversing with the observer. When the visuals appeared around her eyes lit up slightly and smiled at the observer, although she did not slow down her walking pace. Overall she walked with a light step and was not bothered by other passing people. Never did she fidget with the wristband and overall seemed relaxed.

Thoughts on Experience

When asked about his experience, she explained that she was happy to be able to see two of the three effects. She said she liked seeing the the moving colors and triangle because it was out of the ordinary. In terms of the connectivity between the visuals and the design of the accessory she noted that in her mind she thought they were all sports based because they had many lines. She did however note the perhaps matching the colors would have made the association more clear. Another interesting suggestion she proposed was to have the visual effects projected directly onto the user for a more dramatic effect. In terms of implementation she explained that she would love to see it in a gym or a tourist spot to activate the place and make it more fun.

Changes in Mood



(Self Assessment Manikins Recorded by Test Subject I)

Figure 4.53 +2 Valence, -2 Arousal, No Movemement in Dominance

4.2.15 Test Subject J

Test Subject J Speed Experience 24 year old male graduate student.

Personal Style Background

Test Subject J was a 24 year old male graduate student. He was wearing a dark grey sweater and dark brown pants. He was not wearing any visible accessories. When asked about his interest in fashion and accessories, he said he was not very interested. He explained that he usually choose his personal style by convenience, depending on how his clothing is organized. Whatever clothing was close to the

opening of his drawer was usually the one he would wear, unless he had a special occasion. In terms of TPO he explained to us that he cares and always to imagine what sort of activity he will be doing. Comfort was something he explained that was very important to him when it came to personal style. Especially when going to places where he would be active he explained he would think about the functionality of his personal style first. When asked how he would feel if he were in a situation where he was not matching the TPO he explained that he would want to go home. On the other hand if he was able to match the TPO well he explained he would be able to enjoy the occasion more because he would not be distracted by his clothing. One interesting thing he shared with us was that he would make small changes to his personal style based on his body condition and weather. For example when he woke up with messy hair he would wear a more refined style to counter balance that and when it rained he would not wear his glasses because it would be difficult for him to see.

Behavior During Experience

Initially, when he was handed the wristband Ambiance accessory for the Speed experience, he put it on very quickly. When he did he laughed slightly nervously and awaited for further instruction. He seemed calm but seemed slightly uncomfortable.

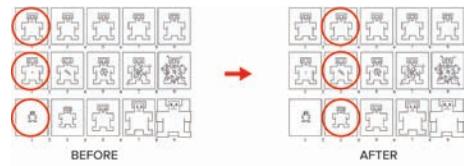
As he walked through the Ambiance Walkway, he remained casual conversing with the observer but walked rather quickly. When the visuals appeared around him he only glanced down quickly and spent most of the time facing up to talk with the observer. Perhaps because he was focused mostly on the conversation he did not seem to be worried or aware of others around him. Towards the end of the walk he seemed more comfortable and the nervousness seemed to have faded.

Thoughts on Experience

When asked about his experience, he explained that because he was so focused on having a conversation, it was slightly difficult to pick up on all of the visual effects. He explained that personally he may have preferred having the visuals appear near eye level so that he could see it more. In regards to the connectivity between the accessory and the visual effect designs he also suggested that the colors should

be the same so that they are more connected. For the scale of the visual effects, he noted that the smaller scale might be nice because it was subtle and he could enjoy it personally without bothering others. In terms of implementation he also noted that it may be hard to notice the effects in a busy place and perhaps a place where people stand around in might be more effective in terms of getting it noticed by the user.

Changes in Mood



(Self Assessment Manikins Recorded by Test Subject J)

Figure 4.54 -1 Valence, -1 Arousal, -1 Dominance

4.3. Results Summary

The results of the implementation showed that personal style was expanded from the users body to include their surroundings, while maintaining the three key attributes of personal style defined in 1.4. From the users feedback we saw that Ambiance was a visual experience. Many users were able to enjoy the visual theme of the accessories when it appeared around them in a public space. It was apparent from the smiles and laughter from many users that it was a positive experience. Secondly, users felt self consciousness about the visuals that appeared around them. We could see this from the fact that many users were worried about others seeing the visuals they produced during the experience. This suggests that they felt it was a extension of their personal style. Lastly, there was some movement in the users mood after their experience, although the variable which caused it was not conclusive. This is seen in the changes recorded in the Self Assessment Manikins taken before and after the test. The results however are too inconsistent and require further investigation.

Chapter 5

Discussion

5.1. Embarrassment Issue

One thing that we analyzed from the results was that many users were self conscious when extending their personal style to public spaces. This is not surprising because personal style is already connected deeply with self perception. By putting personal style into public space, users may feel even more vulnerable. Many users had trouble focusing on enjoying the visual effects and instead were embarrassed or thinking about their image the whole time. This could be because the accessory extended their personal style which extended areas they could be potentially judged on by others. If we improve the connectivity between the accessory and the visual effects, it will be more obvious who is making the changes to the public space. With that we speculate there may be more self consciousness.

5.1.1 Mood Issue

Despite its challenges, this study revealed that the extension of personal style may be worth researching further because many users seemed to enjoy the experience. From the results we are able to record many moments where the user was smiling or laughing and although there is a need for further tests, there seemed to be some emotional effect on the users. In every one of the test subject there was a change in the Self Assessment Manikin recorded before and after the Ambiance experience. Since there were many other variables included like the physical activity of walking etc. it is hard to pinpoint that Ambiance was causing the change. Also there seemed to be no correlation between the goal of the Ambiance accessories and the move in emotion. That being said, the fact that there was some change calls for a more controlled study in the future.

5.2. Limitations

Due to the limited time and resources of this study there were several problems which made testing and implementation difficult. One of the most significant issues was that the projectors used were not bright enough. We discovered that this was especially a problem in public places because many places are well lit and require very bright projectors to display the visual effects. From the results it was clear that many users were not able to see all the visual effects since they were too subtle.

5.3. Connectivity Issue

Regarding the designs of the visual effects, we discovered that connecting the accessory to the visual effects by theme was not enough. Users could not make the connection very well and many suggested that the two should be tied together either by color or design. The connection between the visual effects and the design of the accessory needed to be more obvious especially since users will see it in a busy public space. Adding movement to make the visual effects so that they move with the user may also help make the user feel more connected and make Ambiance more interactive as suggested in the results. The study overall brought to light important things to consider in the extending of personal style to public spaces.

5.3.1 Scale Issue

In extending personal style to public places, it became apparent the scale of the extended visual effects is very important. From the results we see that some users expected larger changes to their surroundings and were not satisfied with small visual effects. In the results some users with private self consciousness suggested that they want to experience Ambiance on a large scale for example in the city. Such users want a dramatic extension of their personal style, so that they can be immersed in the preferred mood expressed through their personal style.

On the other hand, some users shared that they would want to enjoy Ambiance alone as a mood refresher. Such results suggested that users with high public self

consciousness may have worries about extending their personal style. This study made clear that even within the same target audience demographic, opinions on how they want to extend their personal style were divided based on the users level of public and private self consciousness.

5.4. Future Works

5.4.1 Immediate Improvements

The immediate next steps for this research begins with the improvement of the Ambiance system. Specifically the connectivity issue between the Ambiance accessorys design and the visual effects need to be addressed. Altering the visual effects to match the color and design of the accessory directly would be a first step. Further tests would also be needed to perhaps try several visual effects for one accessory and see which ones people associate most with the accessory. Another immediate improvement we could make to the system is using brighter projectors to make the visual effects more visible even in brightly lit rooms. This will help us to implement Ambiance into more places. It will also be important once the system is improved to try it in a public setting as well. In terms of testing size, future tests would benefit from having a larger number of user tests. Also because it became clear from the results that different levels of private and public self consciousness could effect how they react to the experience, it could be beneficial to divide users based on the users levels.

5.4.2 Future Developments

Looking at the future development of Ambiance, there are several things to consider. One of the issues of implementing Ambiance in public places would be deciding who will financially back the implementation and upkeep of the system. Although further consultation is needed with finance experts, one idea is to market the Ambiance system to brands as a way of marketing their brand image. Brands could make a contract to use the various Ambiance systems in the city so that their products come with specially designed experiences. Not only will the experience be fun for the user because of its novelty, but it will also be a way to

advertise the brand to others nearby. In the same way that social influencers are now introducing different brand products to their viewer base, regular people can advertise a brands products in an interactive way. Another idea would be to partner with multi-use buildings and large city spaces like in Shibuya. Ambiance will benefit from being placed in a place where there are many people because then there will be a mixing of the various extended personal styles changing the visuals of the city space. Further research is needed to design how multiple extensions of personal style will interact with each other. While it will be very exciting to have Ambiance implemented in various locations within the city, security is also something that must be considered. Because most of the visual effects will be digital there is a chance they could be used for malicious purposes. Although this is out of the scope of this study, in future studies it will be crucial to get insight from specialists on this issue to make Ambiance a safe experience.

Chapter 6

Conclusion

This study shows through the design of Ambiance, that it is possible to extend personal style from the body to public spaces. Furthermore, the findings suggest that the extended experience still maintains the three key attributes of personal style. Firstly, the extended personal style is still visually enjoyable. Secondly, there is still public self consciousness about the extended personal style. And thirdly, experiencing the extended personal style still has some emotional effect. The individual design iterations of Ambiance also brought to light interesting notions that from the extension of personal style. One notion is that in a public place, people can be distracted and not notice changes to their environment unless it is obvious. Another interesting notion is that people are sometimes so self conscious about how they are being viewed that sometimes that is the main priority in a public setting. Also through this study it became clear that although the target audience demographic may be similar, individual personalities and their levels of private and public self consciousness may determine to what extent they would want to extend their personal style. The feedback received from the user tests of Ambiance has also brought implementation ideas. Many users suggested after trying the system that they would want to experience it in large public spaces. While others shared that they would like to experience it by themselves to improve their mood. This showed that the extension of personal style could vary in experience and still bring users enjoyment. Overall this study provided early stage prototypes and feedback in the relatively new exploration of extending personal style for enjoyment.

References

- [1] Tea Romih. Humans are visual creatures. <https://www.seyens.com/humans-are-visual-creatures/>. (Accessed on 01/12/2019).
- [2] Thomas Cash. The psychology of physical appearance: Aesthetics, attributes, and images., 01 1990.
- [3] Allan Fenigstein, Michael F. Scheier, and Arnold H. Buss. Public and private self-consciousness, 08 1975. doi:10.1037/h0076760.
- [4] Franklin G. Miller, Leslie L. Davis, and Kathleen L. Rowold. Public self-consciousness, social anxiety, and attitudes toward the use of clothing, 1982. URL: <https://onlinelibrary.wiley.com/doi/abs/10.1177/1077727X8201000407>, arXiv:<https://onlinelibrary.wiley.com/doi/pdf/10.1177/1077727X8201000407>, doi:10.1177/1077727X8201000407.
- [5] B R Schlenker and M F Weigold. Interpersonal processes involving impression regulation and management, 1992. URL: <https://doi.org/10.1146/annurev.ps.43.020192.001025>, arXiv:<https://doi.org/10.1146/annurev.ps.43.020192.001025>, doi:10.1146/annurev.ps.43.020192.001025.
- [6] Yoon-Hee Kwon. The influence of the perception of mood and self-consciousness on the selection of clothing, 1991. URL: <https://doi.org/10.1177/0887302X9100900406>, arXiv:<https://doi.org/10.1177/0887302X9100900406>, doi:10.1177/0887302X9100900406.
- [7] Ted Polhemus. The customized body, 1996.
- [8] Gettysburg Flag Works Inc. Medieval flags. <https://www.gettysburgflag.com/medieval-flags>. (Accessed on 01/12/2019).
- [9] Game of thrones: "the queen's justice" recap - core77. <https://www.core77.com/posts/68079/Game-of-Thrones-The-Queens-Justice-Recap>. (Accessed on 01/12/2019).

- [10] X games — eness. <http://www.eness.com/i.php?r=Project&p=30&c=>. (Accessed on 01/12/2019).
- [11] Filip Visnjic. The changing room displays of emotion by @laurmccarthy. <https://www.creativeapplications.net/unity-3d/the-changing-room-displays-of-emotion-by-lauren-mccarthy/>. (Accessed on 01/12/2019).
- [12] Yongsoon Choi, Rahul Parsani, Xavier Roman, Anshul Vikram Pandey, and Adrian David Cheok. Light perfume: Designing a wearable lighting and olfactory accessory for empathic interactions, 2012.
- [13] Deb Miller Landau. Fashion metamorphosis: Meet the butterfly dress - iq by intel. <https://iq.intel.com/fashion-metamorphosis-meet-the-butterfly-dress/>. (Accessed on 01/12/2019).
- [14] Ayana Kobayashi. Step in the city : design of high heel shoes that produce a heroine feeling experience, 2017. URL: http://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=K040001001-00002017-0601.
- [15] Nikki Ogunnaike. 16 ways that accessories can update boring outfits - glamour. <https://www.glamour.com/gallery/16-ways-accessories-can-update-boring-outfits>. (Accessed on 01/12/2019).
- [16] Chris Burns. Csr bluetooth smart jewelry brings wearables to a fashionable place at ces 2014 - slashgear. <https://www.slashgear.com/csr-bluetooth-smart-jewelry-brings-wearables-to-a-fashionable-place-at-ces-2014-06311477/>, January 2014. (Accessed on 01/12/2019).
- [17] Kit Yarrow. Clothing shopping mistakes: Why buy clothes you never wear? — money. <http://time.com/money/4499539/why-we-buy-clothes-we-never-wear/>, September 2016. (Accessed on 01/12/2019).
- [18] Leatrice Eiseman. Color - messages meanings: A pantone color resource. <https://www.amazon.com/Color-Messages-Meanings-PANTONE-Resource/dp/0971401063>, November 2006.

- [19] Video copilot — after effects tutorials, plug-ins and stock footage for post production professionals. <https://www.videocopilot.net/blog/2016/03/new-plug-in-saber-now-available-100-free/>. (Accessed on 01/12/2019).
- [20] Hutter Inge Hennink, Monique and Bailey Ajay. Qualitative research methods. <https://uk.sagepub.com/en-gb/asi/qualitative-research-methods/book229185>, 2011.
- [21] Margaret M. Bradley and Peter J. Lang. Measuring emotion: The self-assessment manikin and the semantic differential, 1994. URL: <http://www.sciencedirect.com/science/article/pii/0005791694900639>, doi: [https://doi.org/10.1016/0005-7916\(94\)90063-9](https://doi.org/10.1016/0005-7916(94)90063-9).