REMINDING THE EXPERIENCE OF SITE INFORMATION THROUGH SKETCH MEDIA

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Abstract: At the early design stages in architecture, designers need to go to site frequently and record the contextual information of site with sketches. However, designers still require recalling the significant site information when they go back to their workplace. The main objective of this research is building a mediated workplace for designers, and designers can experience the adequate physics of feedback of the site environment through their sketches in the workplace. This research expects that designers can remind the important environmental factors via the bodily experiences. It not only provides the contextual experience feedbacks but also helps designers think more and work better.
Keywords: Experience, Sketch, Contextual Information, Physical Computing

1. INTRODUCTION

Contextual information, as we believe, is important for designers to understand the surrounding environment where design is situated. However, contextual information is difficult to be captured. Mostly, even designers have inspected several times or done the relevant sketches of the site. When designers are in their own workplaces, they can only try to imagine the situations blurry. The reason of not being able to picture the complete contextual information of the site is because most people seem to have the disadvantages of short term memory. On the other hand, they find it hard to memorize lots of contextual information clearly in a long period of time. Therefore, sensing the contextual information of the surrounding environment while designers are in workplace is helpful in terms of creating design ideas.

A mediated space is proposed as a workplace for a designer who can feel the environmental factors from one's sketches. To say it explicitly is that the workplace can provide a designer a simulated site with similar physical contexts and natural factors such as lighting, acoustics, wind directions and temperature. Therefore, designers not necessarily have to go to the site and capture the ambient information as if they can sense the real contextual information in the surrounding. This kind of mediated space is helpful for designers at the early design stages. It not only provides the contextual experience feedbacks but also helps designers make better design decisions.

2. BACKGROUND

In this research, we take three components to be the basis; they are including sketch media, site description classifications and experiencing physical feedback. And designers can experience the contextual information through an interface in workplace. These experiences can let designers to think more and work better.

2.1 Sketch Media

In early design phrases, designers present their thinking through by visual representations such as diagrams, drawing and sketches.

Diagrams are often used as primary representations for thinking, problem solving and communication in the design domains. Diagrams are particularly important for people who use them for making physical forms, mechanical and civil engineering, graphic design and architectural and physical planning[1].

Drawing, is another description of sketches, is regarded not only as a vehicle for communicating with others but also as a tool for designers to see and understand the forms and the design problems they work with[2, 3]. Nevertheless, sketches are essential media that are mostly seen and used by designers during the design process.

In terms of architectural point of view, sketches are not just the drawing of lines and arrows for abstract concepts of the physical elements but rather regarded as symbolic representations of forces and flows. On the other hand, these sketches of lines and arrows convey crucial spatial characteristics such as magnitudes and directions[1]. For examples, the forces of sun and wind and flow of people and materials are always seen in architectural sketches.

Designers present their ideas and thoughts by sketches. However, in the architectural site designs, the sketches only present the visual way but experience nothing except vision. If there is a media that not only provide visual way but also provide the real environmental feedback, it is better than only visual way. Therefore, we propose these kinds of sketch media, and this media can let designers sketch and feel the contextual information of the site.

2.2 Site Description

According to literature of the building construction illustrated[4], there are the defined site descriptions, for example, soils, plant, trees, solar radiation, wind, sound, views, slope and etc. These factors are very important for people in house; it is because that they can influence the

physics environment of house. However, these kinds of the site descriptions are wide and detailed. In this research, we focus on the ventilation and temperature, and the solar radiation and wind have the direct relationship about them: (1) Solar energy can heat the interior space of a house; (2) Wind induced ventilation of interior spaces.

2.3 Experiencing Physical Feedbacks

Technologies are always expected to be more advanced as time goes by, designers and engineers have to show much more endeavors on developing more and more designing complex and dynamic interactions converging hardware and software, spaces and services — products such as mobile digital communication devices, or systems of connected interactions[5]. The emergence of convergence provides an opportunity for users to experience force feedbacks, tangible interface and etc. These experiences of interactions give users different opinions and thoughts. "Experience", in our research, is close to what Houde and Hill called "look and feel" of a product or system that is the concrete sensory experience of using an artifact[6]. Therefore, we define our experiences by what a user looks at, feels and hears.

People can sense the physical feedbacks as soon as they are in the space. What are these physical feedbacks? They are defined as sunshade, sound insulation and guarding sun from architectural physics in the surrounding environment where people are in. These are inevitable matters for householders.

There are several research projects that use physical computing to work on dynamic interactions between human and media[7-10]. The reason of using it is to observe and investigate the responses from human. In order to present the realistic contextual information for designers while they design, we use physical computing in the designer's workplace for providing adequate responses from the requests.

3. EXPLORATION OF RELATIONSHIPS

Designers often represent ideas by sketches. These sketches can be used as the approaches for the problems as well as the focuses of the design stages. Designers also tend to use uncomplicated and explanatory sketches to represent concepts completely. For them, sketches are regarded as guidance for exploring new designs and problems. And that is why sketches are always important for designers in design process. However, they can only try to comprehend the concepts of architectural space but can not experience the physical feedbacks within the space. Is it possible to experience the physical feedbacks from the sketches? What are the relationships and co-responses between sketches and physical feedbacks? How to deal with the surrounding matters as well as design good physical feedbacks with only first hand sketches?

The goal of this research is to explore a possibility of experiencing the contextual information of the environment by sketches and examine the physical feedbacks on site. If the contextual information of the environment is changed according to the correspondence of modifying sketches of the spatial arrangement, designers can see the change of physics of feedback and experience the real space while design.

A physical computing workplace is proposed with three factors. They are (1) Sketch Media (2) Site Description Classifications and (3) Experiencing Physical Feedbacks. By adopting human-computer interface (HCI) that designers can experience the physical feedbacks of the site (Figure 1).

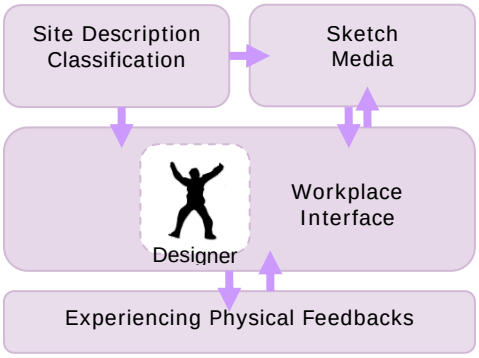

Figure 1: The Framework of Mediated Space.

4. APPROACHES

In order to achieve our goal, we observe and analyze the design sketches. According to the literature of the diagramming information[11], we can recognize the sketches and these sketches can be computed. We refine the sketches with several principles.

When designers proceed this exercise in a workplace, they can choose to touch the objects with a pen. There are six objects such as the site description modeling objects. Designers can use these objects according to their sketches with preference. These site sketch objects can be computed, and it presents the environmental appropriate feedback in the surrounding.

We define contextual environment as the contextual awareness of the designers' sketches. While general context is derived from the environment at large, contextual environment is derived from an awareness of designers' sketches, for instance, direction of light and flows of wind in sketches, etc.

The primary usage of sketch is to present designers' creative thinking, and any sketch can be as arbitrary as the designer desires. However, this research focuses on the architectural site sketches which are comprised of specific components. In order to compute sketches of a architectural site, we defined the components according to the analysis of "Site Analysis Diagramming Information for Architectural Design"[11] and "Building Construction Illustrated"[4] as the climatic factors:

A. Sun

The sun is the source of:

1. solar radiation(heat gain)

Natural light

B. Wind
The prevalence, direction, and velocity of wind affect:
1. air infiltration into a building(potential heat loss)
2. the ventilation of interior spaces and outdoor courts
The lateral load on a structure

Designers use the site, greenbelt, road, and ventilation components as the site description classifications to plan the basic site layout; and designers use lines and arrows to present the ambient of site, it includes wind direction and directional light. Contextual information is required to be captured as seamlessly as possible through interaction between users and surrounding environments[12, 13]. Therefore, the contextual information in this research is to sense what the content of sketches by designers, and the mediated space presents the different physics of feedback depend on the different sketch factors. Computer-enabled artifacts can gather information about the surrounding and the activities of users[14, 15]. From researches mentioned above, location sensors are necessity for identifying the implicit contextual information in surrounding environment. Also, we use sensors to capture the contextual information of the sketches. According to this contextual information, our media can let designers experience the ambient feeling in surrounding, and these experiences let designers can experience the real sense when people are on the site, and it can urge designers do the better.
Current design media provides less relevant information that designers encounter on the site, and the stimulation has to be interrupted and re-continued the design when they are at the office[16]. Some crucial features of the site may be forgotten due to the disadvantages of long time memory lost that most people are suffering. However, with the assistance of physical feedbacks, designers can easily remind the experience they have on the site. Two major physical feedbacks are used as following. (1) Light experiences (2) Wind experiences.
When designers are on site, they can easily grasp the experiences of physical contexts and natural factors. These experiences are significant in the early design stage of site planning as they help designers make better design decisions that maximize the satisfaction of the criteria. However, most designers can only remember partially these experiences through sketches or their discrete memory of the site. In order to enhance designers' creativity and capability of problem-solving, we propose to construct a mediated workplace which simulates the physical context of the site with similar natural factors of the site. In this workplace, designers can experience the contextual information through simple sketches given from the designers.

5. A SCENARIO EXAMPLE

Cheng is a designer. He has an idea about some architectural spaces and he goes to the site and collects the site information through sketch. And then, he goes back to his workplace and review the sketch. When he put his sketch on the desk, the workplace simulates the experience of site environment from his sketch. Therefore, it reminds Cheng of the experiences on site environment through the simulations.

Figure 2: Designer sketches on site.

Figure 3: Go back to designer's workplace.

6. IMPLEMENTATION AND TECHNOLOGY

Designers need to take the environmental factors into first consideration while they design. People can easily feel light and air flow when they are in a space. And that is why we take these factors into our implementation and research.
Our system is comprised of the following key components (Figure 4 shows the framework):
1. Ambient sketch interface is used for sensing the designers' sketch activities and displaying the sketch information.
2. Context-based server is to analyze the sketches and provide adequate feedback to the designers.
3. When the sketches have been analyzed and the physical feedbacks system would urge awareness of the surrounding environment to the designers.

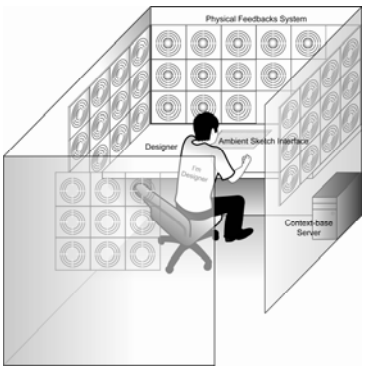

Figure 4: This is the system framework. The appropriate feedbacks include lighting, wind and heat from physical devices.

We implement the interactive sketch device in personal computer with digital hard-writing board. In order to create this mediated workplace with relevant physical feedbacks, we set light and air flow reflective devices around the workplace. These reflect devices connect to context server through AD/DA converter such as IO-9624, and the context server would deal with the reflection. We program this system in Visual C++ in order to analyze the sketches. The context-based server is implemented in Visual Basic and we use AD/DA converter to control the environment devices to represent the feedbacks.

Light and wind come everywhere around people and those physical feedbacks generated by the devices provide different feelings of ambient environment where the de-signer is in. In order to maximize the credibility of contextual information of the sketches, we take two kinds of physical devices into one component (Figure 7 shows the framework of component) which in relation to the designers in the workplace. The components are around the environment of workplace. Designers can experience the relevant contextual information from their own sketches.

Figure 5: This device is in order to feel the experience of wind.

Figure 6: This device is in order to feel the experience of light.

Figure 7: The component is composed of two devices (they include Figure 5 and Figure 6).

7. CONCLUSION

Designers are good at transforming abstract ideas into fantastic spaces through sketches. Our media can not only review the sketches but also provide the physical experience within the workplace that helps designers become more innovative. With this experience, designers can enhance potential of ideas. Our media can immediately gather the contextual information from designers' sketches and then reflect onto the adequate physics of feedback of the surrounding environment for them.

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