Creating a New Technological Tool to Design a Unique Façade—Using “Processing” Coding Software to Recreate a Façade in Shanghai Zhonghua Road

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ABSTRACT: The aim of architectural technology is the exploration of new methods to figure out the next generation of buildings and future building performance requirements. Designers merely realized to use BIM for completing new architectural design, rather than think about using the current architectural technology to create a new prototype tool. On this basis, tools and architectural technology can lead the designers and architects achieve the design content which they expect faster relevantly. It also means that by using developing of science technology, in the meanwhile, architecture needs to tightly follow the development of technology, which combines together for further development. Therefore, this paper mainly illustrates the methodology of using “Processing”, which is a part of fashion method in architectural area, as a technological tool to achieve the design purpose based on an ongoing screen reconstruction project in Zhonghua Street, Shanghai.

KEYWORD: Processing; Programming; Façade;

1 INSTRUCTIONS

1.1 “Processing” Introduction

“Processing” is a flexible software sketchbook and a language for understanding how to code within the context of the visual arts. “Processing” is a proactive computer language. It is a programming language under the electronic art and introduces the conception of electronic art to programmer. It utilizes a simple method to link the design elements and visual movement which build a bridge to connect the programming and visual art (Casey Reas & Ben Fry, 2007). Using “Processing” to present design is beyond the static images and texts. The dynamic interactive mode can be subtle representation for architects. Meanwhile, “Processing” as a coding software has already spread in architecture area to achieve designer’s concepts accurately.
1.2 Site Introduction

The reconstruction site is located at the intersection of Zhonghua Road and East Fuxing Road. It covers about 7,500 square kilometers. Residential area plays a significant role on this site. Old building structures maintain well. The layout of the architectural complex on Zhonghua Road is very distinctive since it had the Lilong patterns of architectural forms before the liberation, however, after the liberation, Shanghai has become one of the largest modern cities in the world, which is filled with skyscrapers, high density of people, cars and the global top companies. Behind the booming development, this city easily hides the fact that several historical problems which have been left now still lingering on (Wenbing Fan, 2004). This site is a typical example.

Many native ‘Shanghainese’ refer to the area that their site is located in as slum. Even some people call here ‘scar’ because of the quarter disorders and chaotic building environment. The site looks like fragments, leaving so much scar on the skin. Meanwhile, the scar means that it does not delay running faultlessly, but it looks a little defectively. Therefore, how to use the latest technological tool to build the screen and use functions to make the area livelier and more vivid is the key point to this reconstruction project.

2 GETTING STARTED

2.1 The Initial Idea

Almost everyone who lives in Shanghai struggles for a better position, more money, and higher social status even under the huge pressure of living cost. The cheap rent in such nice location is the most significant aspect that attracts entrepreneurs who come to Shanghai for a living. Although the reality does not give them chances to live a better condition. Soaring housing prices have become an eternal pain. People living here are obliged to suffer from this situation. However, architects could control the cost in this complicated condition and change this area to a brand new site. Using fragments of the quarter disorder could make the original order has been broken and become pieces of fragments, hurting the people’s lives - to heal this place. City Village, would be a Chinese characteristics, needs to be disappeared in a wave of reform. Despite the fact that it was not harmony in this society, this place where record a lot of people struggling for life needs to be commemorated. Therefore, to save this kind of fragment and to rearrange these orders, is the best way to provide a chance memory people’s old lives. Meanwhile, a memory wall which kept here can play a major role in a public city.

Therefore, I use the fragments as my concept, taking the elements from this scar area. And arrange them to the right places. Meanwhile, all new buildings contain the style of the fragments. In addition, adding the basic functions, returning some public space for native citizens is my designing aim.

2.2 Creating the Tool

The tool of architectural technology is isolated if without any design project combining. From this intention, I would like to combine the tool into this project. In addition, there are numerous extra elements broke the unprecedented presence of Lilong structure. When these superfluous elements cannot be treated as harmonious existing. In this situation, the idea was that rearranged fragments coming up. I had picked four typical extra elements which appeared very often in my site (Figure 1). Using these four elements and rearranging them to create a new façade, which is suitable for the project. Additionally, the façade is not only an exterior cover. It can reflect the functions behind the facade and follow the needs of functions.
Due to hundreds of small fragments were spliced together for one façade. It would cost a lot of time and make many mistakes if only using people’s thinking and calculating. On this basis, there were also several requirements limiting the façade. First, these fragments should keep the disorder for finishing the initial idea. It would not influence the result of the original situation of site. Second is that the four different elements should be filled with a given area without changing size of each elements. Finally, it was better that provided additional cases for choosing which one is most suitable for the façade (Figure 2).

Considering the above requirements, I use the “Processing” to create this unique façade. Due to “Processing” contained the functions of visual design, meanwhile, the façade needed to be thought of randomness and fewer mistakes by human error. It is rational for using “Processing” to make this tool to establish. Since simulating the separate orders of the patterns, picked the one which is appropriate to the results site analysis (Figure 3).
3 BASIC LOGIC ANALYSIS

Almost every complete program needs a legible code and a clear logic. Likewise, the program of façade also requires this kind of support. Here describes the logic:
- Define a specific space and give this space definition values.
- Add limitations, for instance: the size of rectangles and blank space. It means that these definitions, limitations and values can be utilized for the following parts.
- Set the color of background, the speed and order of the rectangles coming out.
- Illustrates that if the rectangles having already been paved with background, all rectangles would be deleted and do the next loop.

Languages show that the sizes and colors of rectangles. Meanwhile, it also provides the locations of rectangles which can be set in random positions (Kyosuke Nakanishi, 2013).

This case shows an example about how to analysis program design. Meanwhile, the logic can support the elementary program knowledge. And the order illustrated that how to complete the tool.

4 PROGRAMMING DESCRIPTION

Following the elementary logic of the case, this program begins from this basis.
- Defining the maximal units in a grid.
- Define sizes of rectangles and give the value of the rectangles. In this part, set up the white background, and the speed of each pattern coming out.
- Regulate the order of each patterns coming out happens. When patterns are paved with background, it will clear all patterns and appear the new white background.
- Languages reflected the value of x has already been to the end, it will change to the next row and start from zero point.
- Program is moving to how to put accurate patterns on the designated location.
- Calculate what pattern needed at the next grid space.
- Locate the place of these rectangles and replace rectangles by four elements which are similar size of rectangles.
- Save pictures when finish one loop, and choose the best one for façade that needed for this design. (Figure 4).
5 DIFFICULTY AND CONSTRAINTS IN IMPLEMENTATION

As the picture makes it quite clear that the location of patterns are coming out randomly. Therefore, it will take time to choose one that is suitable façade. And testing the patterns, people can find that the weight and length are proportional because of filling with all background without extra sides. Meanwhile, there is no extra space of white. It has already been filled with specific patterns. If architects need some specific space in this façade, some rectangles have to be deleted or change codes of elements which make blank space a little bigger.
6 CONCLUSION

This example shows how architectural technology helps architects to achieve ideal model fast and accurately. This paper shows that creating a tool which can be given access to our inspiration using the architectural technology. After searching the changing processed at the site from 1948 to now, it is from neat and uniform before removing to disorder owing to illegal housing forced by functions needed after that. Therefore, extracting the common elements and take the advantage of “Processing”, doing a unique façade has become a new fashion of the renovation of the old structure. Meanwhile, this tool can be used in some comparable projects.

7 REFERENCES