

Realization of Kimono Fashion by Fusing Digital Art and Digital Textile Printing

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Abstract. We have been working to create new art fashion by fusing digital art and digital textile printing. As a new attempt of this activity, we produced a Kimono, a traditional Japanese garment, using the same method. The challenge was creating a Kimono with an extended hem, called "Ohikizuri," used for weddings and other ceremonial occasions. The Kimono was designed using the "Sound of Ikebana," the digital art created by Naoko Tosa, one of the authors. In the production process, we learned and obtained much knowledge and advice from the chairman of a traditional Kimono company in Kyoto. We learned the know-how of Kimono pattern making and design placement through repeated prototyping of the Kimono using paper and polyester. We were finally able to create a Kimono using silk fabric, which was shown at the runway of the New York Fashion Week in September 2023 and was highly evaluated.

Keywords: Digital Textile Printing, Digital Art, Kimono Fashion, New York Fashion Week.

1 Introduction

For a long time in the fashion world, clothes have been produced by analog methods: manual designing, textile printing on fabric, and sewing. In contrast, digital textile printing technology has recently been introduced to the fashion world [1]. Digital textile printing digitizes the textile printing process and is compatible with high-mix, low-volume production methods. Furthermore, since it is compatible with the art world based on one-of-a-kind items, the combination of art and digital textile printing can realize art fashion, in which one-of-a-kind art is developed into fashion. This will open new possibilities for fashion, and art, which used to be something to be appreciated, will become worn as fashion.

We started the challenge of creating art fashion within our laboratory environment. The fashion samples we have developed were shown to the public through exhibitions and accompanying fashion shows, demonstrating the new possibilities of fashion [2].

The next step is to produce Kimonos through a fusion of art and digital textile printing. Kimono is a traditional Japanese fashion; almost everything from designing to sewing has been done by hand. This is the reason why Kimono is recognized as highly artistic. Therefore, it is a great challenge to incorporate digital art into the Kimono

production process by using digital textile printing technology to print designs on fabric. The research themes targeted in this paper is the following.

- (1) To see if digital textile printing technology can be applied to producing Kimono, a traditional Japanese fashion item.
- (2) To see if digital art-based design suits Kimono design.

2 Digital art "Sound of Ikebana"

One of the authors, Naoko Tosa, found that by giving sound vibrations to fluids such as color paints and shooting the phenomenon with a high-speed camera, the jumping-up fluid makes beautiful forms. Using this environment, Tosa confirmed that various fluid shapes can be generated by changing the shape of the sound, the frequency of the sound, the type of fluid, and the viscosity of the fluid [3]. Tosa further edited the resulting video to match the colors of the Japanese seasons and created a digital artwork called "Sound of Ikebana" [4]. Figure 1 shows a scene from the work.



Fig. 1. A scene from "Sound of Ikebana."

The Sound of Ikebana is video art created by filming physical phenomena with a high-speed camera and is characterized by its organic and abstract shapes. Also, many overseas art professionals have pointed out that "Tosa's digital art, which expresses the beauty hidden in physical phenomena in an abstract form, contains a unique Japanese consciousness and sensibility." Therefore, the artwork is suitable for Kimono and other Japanese fashion designs.



Fig. 2. Inkjet printer for sublimation transfer (left) and thermal transfer device (right).

3 Fashion production using digital textile printing technology

An inkjet printer for sublimation transfer and a thermal transfer equipment (Fig. 2) were installed in the Tosa Laboratory, Kyoto University. In addition, sewing machines and other equipment were installed to create an environment where the entire fashion-making process, from design to sewing, is possible.

4 Kimono production using digital textile printing technology

4.1 Acquisition of basic knowledge

We decided to create a luxurious-looking Kimono called "Ohikizuri. The Ohikizuri is a style of Kimono born in the Edo period (1603-1868), characterized by a longer hem. We purchased a special Ohikizuri, a Kimono worn by a Maiko-girl in Gion. Figure 3 shows the scene when our student is wearing the "Ohikizuri." Then, we asked Mr. Suzuki, who runs a Kimono production company in Kyoto, to share his knowledge of Kimono with us.



Fig. 3. A student wearing the Ohikizuri.

4.2 Production of prototype 1

We decided to create a prototype of the Kimono based on the knowledge provided by Mr. Suzuki. The Kimono pattern has a simple shape, a horizontal rectangle divided by rectangles (Fig. 4).

We asked Mr. Suzuki to unravel the Ohikizuri shown in Fig. 3 into multiple parts and then produced a Katagami (paper pattern) for each section. The first step was to use the paper pattern to prototype the Kimono. Figure 5 shows the design placed on the paper pattern and printed using a printer. The resulting prototype 1 is shown in Fig. 6. Mr. Suzuki checked the finished prototype and confirmed that each part of the

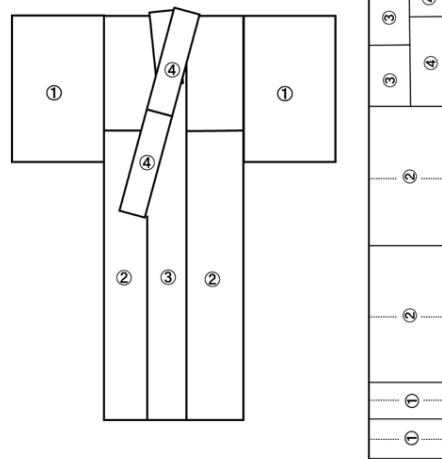


Fig. 4. Correspondence between Kimono and paper pattern.

Kimono was made correctly and assembled correctly to form the Kimono.



Fig. 5. Cutting out the necessary parts.



Fig. 6. Finished Kimono prototype 1.

4.3 Creation of prototype 2 and 3

Based on the knowledge obtained from Mr. Suzuki, the Sound of Ikebana design was rearranged. In addition, the material was changed from paper to polyester. The production of the Kimono using polyester was done entirely in-house. The resulting prototype 2 is shown in Fig. 7.

Prototype 1, made of paper, was challenging to wear and see. However, prototype 2, made of polyester, was easy to wear. Therefore, it became possible for us to study in detail the appearance of the Kimono as a three-dimensional object when worn by a person, as well as the design arrangement, such as the appearance of the Kimono when the person walks or performs other actions.



Fig. 7. The resulting prototype 2.

For prototype 2, we placed designs cut from different parts of the Sound of Ikebana to suit each part of the Kimono. However, we recognized that the different designs used in each part of the Kimono were causing the Kimono to lose a sense of unity from an overall perspective.

Therefore, we decided to place designs from the exact moment of the Sound of Ikebana. The resulting Prototype 3 is shown in Fig. 8.

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4.4 Final Kimono production

We decided to produce the final Kimono fashion based on prototype 3. For the final Kimono production, we decided to ask a specialized company to produce it, considering our plan to use it for fashion shows.

The Kimono fabric was purchased from Itoko, a company in Kyoto specializing in silk fabrics for Kimono. The printing of the design on the fabric was subcontracted to a digital textile printing company with equipment capable of printing on silk. The printed fabric is shown in Fig. 9.



Fig. 8. The resulting prototype 3.



Fig. 9. Silk fabric on which the design was printed.

The printed fabric was then sewn at Mr. Suzuki's company. Figure 10 shows the finished Kimono worn by a Japanese dancer in our project.



Fig. 10. A Japanese dancer wearing a Kimono.

4.5 Fashion show

The developed Kimono fashion was shown on the runway of the New York Fashion Week in the fall of 2023 and was featured in prominent fashion magazines such as Vogue (Fig. 11).

5 Conclusion

We have been researching the creation of art fashion, which combines digital textile printing technology and digital art to develop art into fashion. In this paper, we have extended this activity and challenged to create a traditional Japanese Kimono by combining digital textile printing technology and digital art.



Fig. 11 The Kimono featured by the Vogue
(<https://www.vogue.it/moda/branded/global-fashion-collective-edizione-estate-2024>)

For the digital textile dyeing technology, an environment enabling in-house fashion production in the laboratory was established based on joint research with Seiko Epson. As for digital art, we used the "Sound of Ikebana," which features abstract and organic shapes based on a technique created by Naoko Tosa, one of the authors of this project, of using a high-speed camera to photograph liquids scattered by sound vibrations.

Starting with no knowledge of Kimonos, there was some uncertainty about how far the combination of digital textile printing and digital art would go in traditional Kimono making. However, with the help of many companies and people who have been involved in Kimono making in Kyoto for many years, including Seiko Epson, with whom we have been conducting joint research, Mr. Suzuki and his company, and Itoko, a company specializing in silk fabric, we were able to create a prototype using called "Ohikizuri," which is considered difficult to make even among Kimono. We were able to open new possibilities in the world of traditional Kimono.

The finished Kimono was shown on the runway at New York Fashion Week in September 2023, one of the four primary fashion weeks in the world. Therefore, we can conclude that the two research themes presented in the Introduction were successfully met.

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